Positive traits linked to less pain through lower pain catastrophizing

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ABSTRACT

The present study examined the association between positive traits, pain catastrophizing, and pain perceptions. We hypothesized that pain catastrophizing would mediate the relationship between positive traits and pain. First, participants ($n = 114$) completed the Trait Hope Scale, the Life Orientation Test-Revised, and the Pain Catastrophizing Scale. Participants then completed the experimental pain stimulus, a cold pressor task, by submerging their hand in a circulating water bath ($0\,°C$) for as long as tolerable. Immediately following the task, participants completed the Short-Form McGill Pain Questionnaire (MPQ-SF). Pearson correlation found associations between hope and pain catastrophizing ($r = -.41$, $p < .01$) and MPQ-SF scores ($r = -.20$, $p < .05$). Optimism was significantly associated with pain catastrophizing ($r = -.44$, $p < .01$) and MPQ-SF scores ($r = -.19$, $p < .05$). Bootstrapping, a non-parametric resampling procedure, tested for mediation and supported our hypothesis that pain catastrophizing mediated the relationship between positive traits and MPQ-SF pain report. To our knowledge, this investigation is the first to establish that the protective link between positive traits and experimental pain operates through lower pain catastrophizing.

1. Introduction

Pain affects more than 76 million people in the United States, or about 26% of the population. Annual estimates of healthcare costs for those suffering with chronic pain exceed $6000 per person (Centers for Disease Control & Prevention, 2006). Moreover, chronic pain is a continual burden affecting both physical and mental functioning. Negative consequences of chronic pain can include long hours of rehabilitation, loss of work and income, and hospitalization (Centers for Disease Control & Prevention, 2006).

Pain is a complex phenomenon influenced by biological, psychological, and social factors. The control gate theory of pain is a popular psychological explanation that suggests that perception and interpretation are important in understanding pain (Siegele, 1974). When individuals assess pain, their characteristic ways of thinking (i.e., cognitive sets), and their feelings are significant determinants of their subsequent pain response. For instance, anxiety can intensify the experience of pain, whereas, positive affect can attenuate pain (Siegele, 1974). The present study focused on the psychological experience of pain and addressed the influence of positive psychological traits and negative cognitive sets; specifically, how hope, optimism and pain catastrophizing affected pain outcomes.

Pain catastrophizing is an exaggerated negative response to actual or anticipated pain. It is the tendency to ruminate, magnify, or feel helplessness about pain experience (Sullivan, Bishop, & Pivik, 1995). Previous studies have found that pain catastrophizers report more pain in clinical and experimental settings (France, France, al'Absi, Ring, & McIntyre, 2002; Rhudy et al., 2009). Further, pain catastrophizers generally report significantly more pain-related thoughts, and experience more emotional distress, and greater pain intensity than non-catastrophizers (Moldovan, Onac, Vantu, Szentagotai, & Onac, 2009).

Negative personality traits, or response patterns and their association with pain have historically been the primary focus of clinical research (Pearce & Porter, 1983). Neuroticism, a negative psychological trait that can produce nervousness, moodiness, and sensitivity to negative stimuli, has been shown to influence pain report (Charles, Gatz, Kato, & Pedersen, 2008), and higher neuroticism can provoke more negative affect in emotion-inducing situations (Larsen & Ketelaar, 1989). Other recent research suggests that pain catastrophizing mediates the relationship between self-handicapping and pain. Self-handicapping is a defense mechanism whereby individuals generate hurdles prior to a performance that affects their attributions after the performance. Individuals who self-handicap tend to pain catastrophize and report higher pain (Uysal & Lu, 2010).

Within the past decade, there has been a shift from studying negative traits and emotions to also examining the important role of positive traits and emotions (Fredrickson, 2001; Lyubomirsky, King, & Diener, 2005; Seligman & Csikszentmihalyi, 2000). Emerging evidence suggests that levels of hope, a positive psycho-

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logical construct, and optimism, described as a generalized expectancy of positive outcomes are linked with lower pain reports (Berg, Snyder, & Hamilton, 2008; Geers, Wellman, Heifer, Fowler, & France, 2008; Snyder et al., 2005). In addition, positive emotions and psychological resilience are associated with less pain catastrophizing (Ong, Zautra, & Reid, 2010).

Optimism and hope are positive traits that both have links to adaptive outcomes (Scheier & Carver, 1985, 1987). Despite their similarities, the two constructs differ in important ways. Optimism is a dispositional trait conceived as an explanatory style whereby individuals focus their cognitions on distancing themselves from negative outcomes (Scheier & Carver, 1985). Conversely, hope is a construct conceived as dispositional (Snyder et al., 1991), state (Snyder et al., 1996), or goal-specific (Feldman, Rand, & Kahle-Wrobleski, 2009). Importantly, compared to optimism, hope has been shown to better describe an individual's emphasis on positive, goal-directed cognitions (Snyder, 2002).

Previous research suggests that hope and optimism are strongly associated but not identical, with correlations ranging from .51 to .55 (Magaletta & Oliver, 1999; Rand, 2009). In addition, statistical modeling has differentiated hope and optimism as distinct but related constructs. Bryant and Cvengros (2004) found that when analyzing hope and optimism, a goodness-of-fit model with separate second-order factors had greater explanatory power than a model analyzing the constructs as a single global factor. Moreover, hope and optimism had divergent patterns of association with coping and self-efficacy. They suggest that researchers interested in future physical and emotional outcomes should examine the constructs separately.

There is a need to examine the relationships among positive psychological traits, pain, and negative reactions to pain (i.e., pain catastrophizing). Therefore, in the present study, we aimed to describe the mechanism through which positive traits and pain perception are linked. We tested the hypothesis that pain catastrophizing mediates the relationship between the positive traits, hope and optimism, and pain perception.

2. Method

2.1. Participants

An initial telephone screening of 274 participants deemed 96 participants medically ineligible. As we obtained data for this study as part of larger study (Pulvers & Hood, 2010) for which smoking status was an important variable, 32 participants were ineligible due to an unstable smoking rate (any smoking rate was acceptable, so long as participants were smoking at their current rate for at least 1 year). Results from the larger study indicated that gender and smoking status were associated with pain perception (Pulvers & Hood, 2010), which is consistent with previous literature (Girdler et al., 2005; Kanarek & Carrington, 2004; Sullivan, Tripp, & Santor, 2000; Jamner, Girdler, Shapiro, & Jarvik, 1998; Riley, Robinson, Wise, Myers, & Fillingim, 1998). Therefore, we controlled for gender and smoking status in the present study. A further 32 participants were eligible but did not appear for their scheduled appointment.

Eligible participants who completed the entire study ($n = 114$, 57 males) were aged 18 – 73 years old ($M = 34$, SD = 14), and 107 completed all experimental measures. Participants predominantly identified themselves as Caucasian (65%), most had completed some college (50%), and the majority (72%) had an annual household income of less than $34,000. Smokers were approximately 50% of the sample, and smoked an average of 10 cigarettes a day. California State University San Marcos Institutional Review Board approved the protocol and all participants provided informed written consent prior to participation. Participants affiliated with the university ($n = 9$) received compensation of $10, all other participants ($n = 105$) received $25 for 1 h of their time.

2.2. Procedure

Researchers recruited participants through newspaper and Internet advertisements. Participants first completed a phone survey that assessed demographics and eligibility. Participants did not abstain from eating or drinking, and smokers could smoke ad-lib prior to the experiment. Criteria for medical exclusion included the presence of any contraindicative medical conditions self-reported by the participant (e.g., injury to non-dominant hand, circulatory problems, or a history of fainting or seizures). Participants completed a pre-experimental survey, which included the Trait Hope Scale, the Life Orientation Test-Revised and the Pain Catastrophizing Scale. Participants then completed the cold pressor task. Research assistants instructed participants to hold their non-dominant hand in the water as long as tolerable. When participants could no longer tolerate the pain, they could remove their hand from the bin of cold water. There was an uninformed maximum time limit of 5 min (Girdler et al., 2005). Directly following the cold-water task, participants completed the McGill Pain Questionnaire-Short Form. Finally, participants confirmed that they were not experiencing pain or discomfort and received a referral should they experience pain or discomfort.

2.3. Measures

2.3.1. Trait Hope Scale

The Trait Hope Scale (THS) developed by Snyder et al. (1991) is an 8-item measure (with four additional distractor items) developed to quantify dispositional hope. Two subscales, agency (e.g., I energetically pursue my goals) and pathways (e.g., there are many ways around any problem), each comprise four items measured on an 8-point Likert scale. The total THS score (range 8–64) is the sum of the four pathways and four agency items, with higher scores representing higher hope levels. The THS has good test–retest reliability over 3, 8, and 10 weeks (.85, .73, and .79, respectively), and coefficient alphas range from .73 to .86 (Curry, Snyder, Cook, Ruby, & Rehm, 1997; Snyder et al., 1991). The Cronbach's alpha in this study was .89.

2.3.2. The Life Orientation Test-Revised

The Life Orientation Test-Revised (LOT-R; Scheier, Carver, & Bridges, 1994) is a 6-item measure (with four additional filler items) developed to measure dispositional optimism. Three items are positively phrased (e.g., "I'm always optimistic about my future"), and three items are negatively phrased (e.g., "I hardly ever expect things to go my way"). Participants rated each item by indicating the extent of their agreement along a 5-point Likert scale, ranging from "strongly agree" to "strongly disagree". Previous research demonstrated test–retest reliability of .68, .60, .56, and .79, at 4, 12, 24 and 28 months, respectively (Scheier et al., 1994). The Cronbach's alpha in this study was .82.

2.3.3. The Pain Catastrophizing Scale

The Pain Catastrophizing Scale (PCS; Sullivan et al., 1995) is a 13-item measure intended to quantify catastrophizing cognitions in relation to painful experiences. The PCS has three subscales; four items assess rumination, (e.g., I cannot seem to keep it out of my mind), three items assess magnification, (e.g., I think of other painful experiences), and six items assess helplessness, (e.g., I feel I cannot go on). Participants rate the items on a five-point Likert scale with scoring ranging from zero (not at all) to four (always). The total score ranges from 0 to 52. High total scores indicate more