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Trait mindfulness and catastrophizing as mediators of the association between pain severity and pain-related impairment



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ABSTRACT

The present study examined dispositional mindfulness and pain catastrophizing as mediators of the relation between pain severity and pain-related impairment controlling for pain acceptance in a group of college students classified as either low ($N = 177$) or high ($N = 158$) in pain severity. We tested a three-path model of the following sequence: pain severity \rightarrow trait mindfulness \rightarrow pain catastrophizing \rightarrow pain-related impairment. Structural equation modeling indicated good fit of the proposed model to the data. Mediation analyses with percentile bootstrapping revealed that mindfulness mediated the relations between pain severity and (a) catastrophizing; and (b) pain-related impairment. Unexpectedly, after controlling for mindfulness and pain acceptance, catastrophizing was not significantly associated with pain-related impairment. Several explanations are provided for the null effect of pain catastrophizing on pain-related impairment. Finally, future research directions are discussed.

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1. Introduction

The deleterious effects of chronic pain on such diverse indicators of adjustment as effective goal pursuit (Karoly, Okun, Enders, & Tennen, *in press*), psychological health (e.g., depression and anxiety) (Fishbain, Cutler, Rosomoff, & Rosomoff, 1997; McWilliams, Cox, & Enns, 2003), and quality of life (Schlenk et al., 1998) have been widely documented. Further, the mechanisms by which pain may give rise to adjustment problems are gradually becoming better understood. A particularly promising avenue of investigation focuses upon individual differences in the cognitive processing of pain-related experiences (Pincus & Morley, 2001; Roelofs, Peters, Fassaert, & Vlaeyen, 2005). Specifically, mindfulness and pain catastrophizing have emerged as variables that may clarify the complex relationship between pain experience and disordered adjustment (Grossman, Tiefenthaler-Gilmer, Raysz, & Kesper, 2007; Keefe, Brown, Wallston, & Caldwell, 1989); and their role as mediators of the relation between chronic pain severity and pain-related impairment is the focus of the present investigation.

Previous research has consistently shown that people with persistent pain are likely to respond to pain reflexively and habitually (see Eccleston & Crombez, 1999; Van Damme, Legrain, Vogt, & Crombez, 2010 for a review). Hence, we propose that, relative to people reporting low chronic pain severity, people who report high

chronic pain severity are likely to be less mindful. Research likewise shows that pain possesses the capacity to disrupt conscious, reflective thinking and to facilitate maladaptive automatic reactions such as passivity and worry (Crombez, Eccleston, Van Damme, Vlaeyen, & Karoly, 2012) that can, over time, precipitate catastrophizing. Pain catastrophizing, in turn, has repeatedly been associated with various dimensions of functional disability (Arnou et al., 2011; Sullivan, Stanish, Waite, Sullivan, & Tripp, 1998).

However, as a counterpoint, it has been suggested that mindfulness, defined as the state of being present in the moment with a non-judgmental attitude of acceptance (Kabat-Zinn, 1994; Kabat-Zinn, Lipworth, & Burney, 1985), can reduce catastrophic thinking (see Kang, Gruber, & Gray, 2013 for a review). Moreover, mindfulness-based interventions have demonstrated that trait mindfulness is not a fixed characteristic, but rather can be increased with training (Carmody & Baer, 2008; Collard, Avny, & Boniwell, 2008). Thus, the impact of mindfulness on maladaptive cognitive processing merits careful empirical attention inasmuch as mindfulness may provide the regulatory leverage to mitigate pain catastrophizing and thereby short circuit pain's deleterious effects on ensuing emotional, social, vocational, and physical functioning.

In view of the above-noted relationships, we hypothesized that pain severity will be negatively related to dispositional mindfulness which, in turn, will be negatively associated with pain catastrophizing. Finally, pain catastrophizing is posited to be the most proximal determinant of pain-related impairment. These hypothesized relations are tested by means of a three-path mediation

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model (Taylor, MacKinnon, & Tein, 2008) that examines mindfulness and pain catastrophizing as mediators of the relation between pain severity and pain-related impairment.

In evaluating this three-path model, we included pain acceptance as a covariate. Acceptance gauges how much one pursues life activities while in pain and how much one is willing to experience pain without trying to control it (McCracken, Vowles, & Eccleston, 2004). This variable was selected to serve as a covariate because, like mindfulness, it is a resilience-related resource for individuals with chronic pain and may influence pain-related impairment independent of mindfulness.

2. Method

2.1. Procedure

Potential participants ($N = 3000$) were screened by administering the “Severity” subscale of the “PCP:S” to students enrolled in sections of Introduction to Psychology at a large, southwestern university in the United States. Students scoring in the upper 15% range ($n = 450$; cutoff score: above 19; $M = 20.42$, $SD = 2.28$) of pain severity were categorized as experiencing high pain severity and those who scored in the lower 15% range ($n = 450$; cutoff score: below 8; $M = 5.28$, $SD = 1.38$) of pain severity constituted the low pain severity group. Ruhlman, Karoly, and Puglise (2010) recently compared means and standard deviations of the each subscale of the PCP:S by age and gender for college student (age 17–24; $N = 2475$) and national samples. Based upon their findings, the mean pain severity of our high pain group was approximately 1.5 standard deviations above the mean of the college students ($M = 12.48$, pooled $SD = 6.18$), and the mean pain severity of our low pain group was approximately 1 standard deviation below the mean of the college sample. Following the group screening procedure, students in the low and high severity groups were asked to sign up for an online survey. We were able to recruit 158 participants from the high pain severity group (PCP:S severity sum score: $M = 20.52$, $SD = 4.40$), and 177 participants from the low pain severity group (PCP:S severity sum score: $M = 8.29$, $SD = 5.53$). The present study was approved by the Institutional Review Board, and all participants gave consent to participate.

2.2. Participants

Females comprised 59.1% of the final sample. With respect to ethnicity, 60.2% of the sample were Caucasian, 3% Black, 12.7% Hispanic, 1.5% Native American, 19.5% Asian, and 1.2% Middle Eastern with the remaining 1.8% describing themselves as “other”. The age range was from 17 to 48 years old ($M = 19.62$, $SD = 3.0$).

2.3. Measures

2.3.1. Profile of Chronic Pain:Screen (PCP:S)

The PCP:S is a brief self-report pain screen (Ruhlman, Karoly, Newton, & Aiken, 2005) consisting of 15 items assessing pain severity, emotional burden, and functional interference. Participants were asked to answer all questions based on their experience with pain over the previous 6 months. For pain severity, two items employ a rating scale ranging from 0 (no pain) to 10 (unbearable pain) and the other two items use a rating scale ranging from 0 (never) to 6 (daily). A pain severity index is created by summing the scores on the four pain items, yielding a score ranging from 0 to 32. The emotional burden subscale consists of five items that measure how often pain has led a person to feel sad or depressed, anxious, angry, isolated, or to experience reduced enjoyment in life. The emotional burden subscale uses a 6-point Likert scale

ranging from 0 (never) to 5 (extremely often). The pain interference scale consists of six items that assess how often pain interferes with activities such as hobbies, basic self-care, housework, relations with others, personal goals, etc. The rating scale ranges from 0 (never interferes) to 6 (interferes daily). In the current study, the exogenous variable, pain severity, was dichotomous and was created by coding participants as low (coded 0) or high (coded 1) in pain severity. The PCP:S emotional burden and pain interference subscales were used as indicators of the latent outcome variable: “Pain-related Impairment”. The PCP:S has been shown to have adequate reliability and validity (Ruhlman et al., 2010). Cronbach alpha coefficients for the severity, emotional burden and interference subscales in the current study were .877, .921, and .932, respectively.

2.3.2. Five Facet Mindfulness Questionnaire (FFMQ)

The 39-item Five-Facet Mindfulness Questionnaire (FFMQ) (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) is a self-report measure assessing five facets of mindfulness including: observing, describing, acting with awareness, non-judging, and non-reaction to inner experience. All items are rated on a Likert scale ranging from 1 (never or very rarely true) to 5 (very often or always true). Recently, Van Dam, Hobkirk, Danoff-Burg, and Earleywine (2012) suggested that all five facets do not directly reflect the latent variable of mindfulness (Van Dam et al., 2012). Consequently, in the current study, subscales were selected as indicators of mindfulness based upon substantive considerations. Specifically, the two major mindfulness facets, awareness and non-judging, were selected to represent trait mindfulness because awareness of the present moment with an attitude of non-judgment is considered the “core” of the mindfulness construct (Kabat-Zinn, 1994; Kabat-Zinn et al., 1985). Cronbach alpha coefficients for all five subscales ranged from .875 to .906.

2.3.3. Pain catastrophizing

The Pain Catastrophizing Scale (PCS) (Sullivan, Bishop, & Pivik, 1995) consists of 13 items rated on a 5-point Likert scale ranging from 0 (not at all) to 4 (all the time). The scale measures catastrophic thinking in response to pain. Participants respond to PCS items based upon any previous painful experiences (e.g., headaches, tooth pain, joint or muscle pain, etc.). The PCS is comprised of three reliable and valid subscales: Rumination, Magnification, and Helplessness. The total PCS score is computed by summing the three subscale scores, with a potential range varying from 0 to 52. All three pain catastrophizing scales were used as indicators of the latent outcome variable “Pain Catastrophizing”. Cronbach alphas for the total score and individual subscales of PCS in the present study were: PCS-Total 0.93; PCS-Rumination, 0.89; PCS-Magnification, 0.74; and PCS-Helplessness, 0.89.

2.3.4. Chronic Pain Acceptance Questionnaire

The Chronic Pain Acceptance Questionnaire (CPAQ; McCracken et al., 2004) is a 20-item self-report measure. The rating scale ranged from 0 (Never) to 6 (Always). In the present study, the Cronbach alpha was .78.

2.4. Data analysis

2.4.1. Mediation analysis

Structural equation modeling (SEM) via the Mplus (version 7) software (Muthen & Muthen, 2012) was used to examine the hypothesized mediating effects of dispositional mindfulness and pain catastrophizing on the relationship between pain severity and pain-related impairment. To estimate the fit of the model and to obtain estimates of the parameters for the structural paths, we used the maximum-likelihood method. For the final model, all of the structural paths are presented in Fig. 1.

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