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Low mindfulness predicts pain catastrophizing in a fear-avoidance model of chronic pain

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ABSTRACT

The relationship between persistent pain and self-directed, non-reactive awareness of present-moment experience (i.e., mindfulness) was explored in one of the dominant psychological theories of chronic pain – the *fear-avoidance model* [53]. A heterogeneous sample of 104 chronic pain outpatients at a multidisciplinary pain clinic in Australia completed psychometrically sound self-report measures of major variables in this model: Pain intensity, negative affect, pain catastrophizing, pain-related fear, pain hypervigilance, and functional disability. Two measures of mindfulness were also used, the Mindful Attention Awareness Scale [4] and the Five-Factor Mindfulness Questionnaire [1]. Results showed that mindfulness significantly negatively predicts each of these variables, accounting for 17–41% of their variance. Hierarchical multiple regression analysis showed that mindfulness uniquely predicts pain catastrophizing when other variables are controlled, and moderates the relationship between pain intensity and pain catastrophizing. This is the first clear evidence substantiating the strong link between mindfulness and pain catastrophizing, and suggests mindfulness might be added to the fear-avoidance model. Implications for the clinical use of mindfulness in screening and intervention are discussed.

1. Introduction

Psychological models of chronic pain, such as the well-supported fear-avoidance model, show that the way people interpret and respond to their pain sensations is a strong determinant of their future pain experience [20,53]. Cognitions shape not only psychological outcomes such as emotional functioning, but the nervous system activity underlying pain perception [39,51]. It is therefore unsurprising that maladaptive pain cognitions, such as pain catastrophizing, are associated with emotional and behavioural responses (e.g., fear and avoidance) that predict depression, functional disability and future pain [26].

Catastrophizing is a central variable in the fear-avoidance (FA) model (see Fig. 1), not only because it is understood as the cognitive route through which fear of pain develops [52], but because this negative evaluation of pain accounts for 7–31% of the variance in pain severity [44]. This suggests that addressing the cognitive distortions that occur through pain catastrophizing may be beneficial in interrupting the fear-avoidance cycle. Cognitive-behavioural therapy (CBT) for chronic pain has emerged as one approach to challenging these unhelpful cognitions [56]. Another promising approach is the use of so-called 'third wave' psychological models. These are distinct from 'second wave' cognitive behavioural approaches in that they address metacognitive variables such as *mindfulness*, and focus on acceptance of inner experiences, such as thoughts, rather than changing them.

Mindfulness has been defined as "awareness that emerges by way of paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment" [23]. Importantly, mindful awareness is flexible, self-regulated and does not involve conceptual processing [3,55]. Therefore, it is theoretically at odds with the type of attention involved in catastrophizing, which involves interpretation, conceptual processing, judgement and is most often automatically invoked rather than intentional [43].

Mindfulness-based interventions have already been found to produce reductions in pain and emotional distress in uncontrolled studies [21], and recent research suggests mindfulness meditation is effective in enhancing coping ability, emotional functioning and quality of life in heterogeneous chronic pain populations [16,47], and for patients with fibromyalgia [18], chronic headache [34], and chronic low back pain [33]. One recent study of 105 heterogeneous chronic pain patients found mindfulness significantly predicted lower depression, anxiety, and physical and psychosocial disability, even when other variables were controlled [29].

The present study aimed to build on this emerging research to explore the role of mindfulness in the FA-model of chronic pain. It was predicted that mindfulness would negatively correlate with

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Fig. 1. The fear-avoidance model of chronic pain. Adapted from "Fear avoidance and its consequences in musculoskeletal pain: A state of the art", by J.W. Vlaeyen and S.J. Linton, 2000, Pain, 85, p. 329. Used with permission from IASP.

each of the variables in the fear-avoidance cycle and most strongly with pain catastrophizing. One variable from each link in the FA-cycle was measured – pain intensity, catastrophizing, fear of pain, pain hypervigilance, and functional disability. Since high mindfulness should theoretically counteract the tendency to catastrophize, it was also expected that the relationship between pain intensity and catastrophizing would depend to some extent on one's level of mindfulness. Therefore it was predicted that once other variables were controlled, mindfulness would account for further variance in catastrophizing and would moderate the relationship between pain intensity and pain catastrophizing.

2. Methods

2.1. Participants and procedure

This was a cross-sectional study conducted at the Sir Charles Gairdner Hospital Department of Pain Management, a multidisciplinary chronic pain clinic in Perth, Western Australia. The study was approved by the Human Research Ethics Committees of the hospital and Curtin University of Technology. Participants were chronic pain outpatients recruited while they waited for appointments to see a pain specialist. After reading an information sheet and agreeing to take part anonymously participants completed a battery of self-report measures described below. Where a large number of missing values existed or participants chose to withdraw from the study before finishing the measures, these responses were deemed invalid. A total of 22 invalid and 104 valid responses were collected.

The majority of participants were women (68.3%) and ages ranged from 26 to 94 (M = 54.5, SD = 16.1). The only exclusion criterion was age, with children 17 years or younger not being accepted for ethical reasons. The only inclusion criterion was the presence of chronic pain. This was defined as pain that continues beyond the usual course of healing, taken to mean continuous or intermittent pain for at least three months [32], a time frame also adopted in Elliot and colleagues' [13] epidemiological study of chronic pain. All participants met this criterion, with the duration of pain ranging from 3 to 648 months. The median duration of pain was 89.5 months (M = 125.7, SD = 121.2).

The main site of participants' pain was recorded using the IASP's Axis 1 (regions) coding scheme for chronic pain diagnoses [32]. This was slightly adapted to include *upper back* as a region and to combine *pelvis* and *genitals* into one region. These regions and the frequency of pain in these sites within the sample are shown in Table 1. These sites were grouped into two categories of pain: musculoskeletal and non-musculoskeletal. Musculoskeletal pain predominated in this sample, with the lower back being the most common site of chronic pain.

2.2. Materials

Aside from preliminary questions assessing age, gender, duration and site of pain, all of the measures used were previously validated self-report instruments. One variable was measured for each step of the fear-avoidance cycle shown in Fig. 1, while mindfulness was measured with two instruments. The Five-Factor Mindfulness Questionnaire (FFMQ) was used wherever possible in analysis because it allows for examination of the various facets of mindfulness, which is useful in determining the relative importance of each in the fear-avoidance model. However, since the FFMQ does not yield a total mindfulness score, the Mindful Atten-

Table 1
Pain type and location of main site of pain in chronic pain patients (N = 104).

	Frequency	Percent
Pain type		
Musculoskeletal	83	79.8
Non-musculoskeletal	21	20.2
Total	104	100.0
Pain location		
1. Head/face	10	9.6
2. Neck	16	15.4
3. Shoulder/arm	2	1.9
4. Chest	1	1.0
5. Upper back	6	5.8
6. Abdomen	5	4.8
7. Lower back	50	48.1
8. Leg	9	8.7
9. Pelvis/genitals	1	1.0
10. Equal multiple sites	4	3.8
Total	104	100.0

Note. Musculoskeletal pain was comprised of pain locations 2, 3, 5, 7, and 8; non-musculoskeletal pain was comprised of pain locations 1, 4, 6, 9, and 10.