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Observational study

The relationship between chronic musculoskeletal pain, anxiety and mindfulness: Adjustments to the Fear-Avoidance Model of Chronic Pain

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HIGHLIGHTS

- Ruminative anxiety may be a psychological vulnerability for chronic pain.
- Comorbid ruminative anxiety and chronic pain predicted lower mindfulness.
- Mindfulness predicted 8.5–40.9% of variance in Fear-Avoidance Model elements.
- Non-reaction, non-judgment and awareness were unique predictors of chronic pain.
- Mindfulness may treat physical, cognitive and behavioral aspects of chronic pain.

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ABSTRACT

Background and purpose: The Fear-Avoidance Model of Chronic Pain proposed by Vlaeyen and Linton states individuals enter a cycle of chronic pain due to predisposing psychological factors, such as negative affectivity, negative appraisal or anxiety sensitivity. They do not, however, address the closely related concept of anxious rumination. Although Vlaeyen and Linton suggest cognitive-behavioral treatment methods for chronic pain patients who exhibit pain-related fear, they do not consider mindfulness treatments. This cross-sectional study investigated the relationship between chronic musculoskeletal pain (CMP), ruminative anxiety and mindfulness to determine if (1) ruminative anxiety is a risk factor for developing chronic pain and (2) mindfulness is a potential treatment for breaking the cycle of chronic pain.

Methods: Middle-aged adults ages 35–50 years ($N = 201$) with self-reported CMP were recruited online. Participants completed standardized questionnaires assessing elements of chronic pain, anxiety, and mindfulness.

Results: Ruminative anxiety was positively correlated with pain catastrophizing, pain-related fear and avoidance, pain interference, and pain severity but negatively correlated with mindfulness. High ruminative anxiety level predicted significantly higher elements of chronic pain and significantly lower level of mindfulness. Mindfulness significantly predicted variance (R^2) in chronic pain and anxiety outcomes. Pain severity, ruminative anxiety, pain catastrophizing, pain-related fear and avoidance, and mindfulness significantly predicted 70.0% of the variance in pain interference, with pain severity, ruminative anxiety and mindfulness being unique predictors.

Conclusions: The present study provides insight into the strength and direction of the relationships between ruminative anxiety, mindfulness and chronic pain in a CMP population, demonstrating the unique associations between specific mindfulness factors and chronic pain elements.

Implications: It is possible that ruminative anxiety and mindfulness should be added into the Fear-Avoidance Model of Chronic Pain, with ruminative anxiety as a psychological vulnerability and mindfulness as an effective treatment strategy that breaks the cycle of chronic pain. This updated

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Fear-Avoidance Model should be explored further to determine the specific mechanism of mindfulness on chronic pain and anxiety and which of the five facets of mindfulness are most important to clinical improvements. This could help clinicians develop individualized mindfulness treatment plans for chronic pain patients.

1. Introduction

1.1. The Fear Avoidance Model of Chronic Pain

The Fear-Avoidance Model of Chronic Pain (Fig. 1), proposed by Vlaeyen and Linton [1] explains how fear perpetuates chronic pain states [2,3]. The model is applicable to both patients with idiopathic pain and those with specific pain conditions, such as fibromyalgia, migraines, etc. [2]. There are three major components of the model: (1) The sensation of pain elicits a perception of the experience; (2) Most people perceive pain as unpleasant but not catastrophic, allowing for continued, albeit restricted, activity until recovery; (3) People with predisposing psychological factors, however, catastrophize their pain experience, which leads to the fear of pain, avoidance of activities, functional disability, and increased future pain (chronic pain state) [1,2]. According to previous research, negative evaluation of pain accounts for 7.0–31.0% of the variance in pain severity [3]. Therefore, introducing a technique that corrects maladaptive cognitions such as pain catastrophizing and anxious rumination is likely an effective way to break the cycle of chronic pain.

1.2. Mindfulness

Mindfulness is a cognitive behavioral strategy that promotes present-moment awareness of body sensations, such as the experience of pain. In contrast to pain catastrophizing, it is intentional and non-judgmental [3]. Mindfulness meditation reduces symptoms of pain, depression, and anxiety [4–8] while increasing factors such as sleep quality, mindfulness, and psychological well-being [4,5,9]. One study explored the relationship between mindfulness and chronic pain using 104 chronic pain outpatients from a pain clinic in Australia [3]. Results demonstrated that mindfulness was significantly negatively related to pain severity, negative affect, pain catastrophizing, pain-related fear, pain hypervigilance and functional disability, accounting for 17.0–41.0% of the variance. The Schutze et al. study is one of the only studies suggesting that mindfulness reduces chronic pain by influencing the factors in the Fear-Avoidance Model of Chronic Pain [3]. Although the work of Schutze begins to explain the cognitive mechanism of the ability of mindfulness to reduce chronic pain, the role of ruminative anxiety in the chronic pain response was not considered.

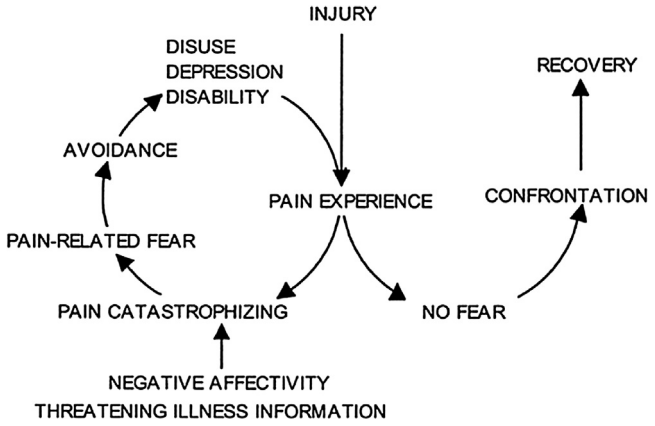

Fig. 1. The Fear-Avoidance Model of Chronic Pain. *Note:* Vlaeyen and Linton's Fear-Avoidance Model of Chronic Pain was specifically developed to describe the CMP experience [1].

1.3. Objectives

Investigation of middle-aged adults (35–50 years) with CMP using a cross-sectional design will increase knowledge about the relationship between chronic pain, anxiety and mindfulness. H1: Ruminative anxiety is positively related to some or all of the elements of the Fear-Avoidance Model of Chronic Pain (pain catastrophizing, pain-related fear, pain avoidance, functional disability and pain experience) and negatively related to mindfulness. H2a: The five facets of mindfulness significantly predict variance in the elements of the Fear-Avoidance Model of Chronic Pain. H2b: When entering the elements of the Fear-Avoidance Model in the way that they appear, mindfulness and ruminative anxiety will add a significant unique proportion to the R2. H3: The severity of pain factors and mindfulness level will differ depending on the presence of comorbid anxiety. H4: Mindfulness moderates the relationship between ruminative anxiety and pain so that in individuals with low mindfulness, the association between ruminative anxiety and components of chronic pain will be stronger than in individuals with high mindfulness.

2. Methods and materials

2.1. Participants

Participants for this study were middle-aged adults (35–50 years) with self-reported CMP. For the purposes of this study, chronic pain was operationalized as subjective symptoms continuing for the past three or more months, as defined by The American College of Rheumatology and the International Association for the Study of Pain [2,10]. Musculoskeletal pain was limited to the following five locations, in an attempt to make the sample relatively homogeneous: back, neck, hip, knee and shoulder. All data was collected between November 2016 and February 2017. Participants were recruited using online, using social media and Amazon Mechanical Turk as recruitment platforms. Individuals were included if they were between 35 and 50 years old and self-reported they had CMP in at least one of the five specified regions. If an individual had major surgery within the past three months, as defined by a medical procedure where a body cavity was invaded, a body part was removed or replaced, or there was a threat to life, they were excluded from participation because their recovery could influence reported pain levels. The IRB at American University approved this study.

Using G*power, a program developed at the University of Dusseldorf, it was determined a sample size of 199 participants would be needed to detect an effect size of 0.15, with an alpha of 0.05 and power of 0.95, in a model with 15 predictors [11]. To satisfy this criteria, it was decided 200 participants would be recruited.