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Do fibromyalgia patients benefit from cognitive restructuring and acceptance? An experimental study

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ABSTRACT

Background and objectives: The aim of this study was to clarify mechanisms of psychological fibromyalgia treatment by experimentally examining the effectiveness of its core elements. We assessed the effects of cognitive restructuring and acceptance on experimentally-induced heat and cold pain tolerance and pain intensity in fibromyalgia patients.
Methods: Cold and heat pain were induced in a sample of 60 fibromyalgia patients using a thermode. We conducted ANCOVAs to examine group differences in posttest scores, co-varying for pretest scores. The between-groups factor was the type of instruction provided (acceptance, cognitive restructuring, and a control condition). In addition, we controlled for pain sensitivity, age, and depression.
Results: We found that acceptance and cognitive restructuring were superior to the control condition in increasing heat pain tolerance, but did not differ from one another. With respect to cold pain tolerance, cognitive restructuring was associated with increases in cold pain tolerance compared to the control condition, while acceptance did not differ either from the control condition or from cognitive restructuring.
Limitations: Further experimental research on chronic pain treatment mechanisms is needed, particularly research on individually tailoring treatment strategies according to patients characteristics. Conclusion: Results show that both, cognitive restructuring and acceptance instructions, enhance pain tolerance in fibromyalgia patients.

1. Introduction

Fibromyalgia is a chronic pain syndrome characterized by widespread pain (Wolfe et al., 1990). Psychological treatment of fibromyalgia is challenging, and its efficacy is unclear, as indicated by the fact that two recent reviews on treatment for fibromyalgia came to contradictory conclusions (Bernardy, Füber, Köllner, & Häuser, 2010; Glombiewski, Sawyer et al., 2010). Glombiewski and colleagues concluded that psychological interventions may lead to small changes in fibromyalgia pain, depression, catastophizing, and sleep. Bernardy and colleagues, however, concluded that cognitive behavioral treatment (CBT) did not influence fibromyalgia pain. This is rather surprising since CBT is known to be effective at lowering pain intensity for other pain syndromes (Glombiewski, Hartwich-Tersek, & Rief, 2010; Hoffman, Papas, Chatkoff, & Kerns, 2007). Clearly, more studies are needed to clarify the efficacy of psychological treatments for fibromyalgia.

When treatment studies and reviews, do not provide a clear conclusion, it is necessary to take a step back and examine the unanswered questions using experimental designs to trace results to underlying constructs or unique strategies. Therefore, we designed an experimental study to further examine the influence of CBT interventions on pain in fibromyalgia patients.

Fibromyalgia patients report differences in pain intensity, lower pain threshold, lower pain tolerance, and augmented pain processing relative to healthy controls (Cook et al., 2004; Gibson, Littlejohn, Gorman, Helme, & Granges, 1994; Gracely, Petzke, Wolf, & Clauw, 2002; Hurtig, Raak, Kendall, Gerdle, & Wahren, 2001; Wolfe, Ross, Anderson, & Russell, 1995). Patients with fibromyalgia have also been shown to have lower pain tolerance and greater vigilance to pain compared to other chronic pain patients (Crombez, Eccleston, Van den Broeck, Goubert, & Van Houdenhove, 2004; McDermid, Rollman, & McCain, 1996). In addition, fibromyalgia patients differ from healthy participants with respect to pain sensitivity for thermal and pressure pain paradigms (Petzke, Clauw,

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Ambrose, Khine, & Gracely, 2003). High experimental pain sensitivity is also a risk factor for poor treatment response (Edwards, Doleys, Lowery, & Fillingim, 2003; Granot, Zimmer, Friedman, Lowenstein, & Yarnitsky, 2004). Accordingly, we expected thermal stimuli to be similar to these patients' usual pain sensations and therefore to result in high external validity.

Cognitive restructuring is a core component of CBT for chronic pain (Keefe, 1996; Morley, Eccleston, & Williams, 1999). Even outside of fibromyalgia research, surprisingly little is known about the relative efficacy of cognitive restructuring, acceptance, and control conditions for pain tolerance and pain intensity (Kohl, Rief, & Glombiewski, 2012). Only one experimental study has investigated this topic, and this study included only healthy volunteers (Kohl, Rief, & Glombiewski, 2013). This study found that an acceptance strategy was more effective at increasing pain tolerance than cognitive restructuring, while no group differences were found in effects on pain intensity.

Acceptance is also an effective psychological intervention for chronic pain patients (Pull, 2009; Wetherell et al., 2011). In line with the underlying theory of Acceptance and Commitment Therapy (ACT) (Hayes, Strohsal, & Wilson, 1999), results from experimental studies on acceptance have demonstrated that acceptance strategies increase pain tolerance more than other strategies such as distraction or suppression (Branstetter-Rost, Cushing, & Douleh, 2009; Jackson et al., 2012). With respect to reducing pain intensity, studies have indicated that acceptance is inferior to other pain regulation strategies such as distraction (Branstetter-Rost et al., 2009; Gutiérrez, Luciano, Rodríguez, & Fink, 2004; Páez-Blarrina, Luciano, Gutiérrez-Martínez, Valdivia, Ortega, et al., 2008).

However, low external validity due to inclusion of only healthy participants is a major shortcoming of this body of research. To our knowledge, this is the first study to compare the effects of a cognitive restructuring strategy, an acceptance strategy, and a control condition on pain intensity and pain tolerance among fibromyalgia patients (Kohl et al., 2012). Furthermore, we were interested in testing whether pain sensitivity affects response to instructions.

2. Methods

2.1. Participants

Participants were fibromyalgia patients (ICD 10: M79.7) recruited through announcements in regional newspapers, in pain doctors' offices, and pain clinics, on official notice boards, and in pharmacies. We relied on the self-report, that a health professional diagnosed fibromyalgia. Fibromyalgia self-help groups were also contacted and provided with information about the study. Patients received 25 Euros for participation. Exclusion criteria were Raynaud's disease, high blood pressure, neuropathy, coronary diseases, diabetes, drug intake, and insufficient knowledge of German language.

An a priori power analysis was performed with G*Power 3.1.3. The power analysis indicated that given an effect-size of $f = 0.32$, three groups and two degrees of freedom, and four covariates, a sample of 98 participants was expected to be suitable for detecting main and interaction effects with a power of 0.8 and an alpha criterion of 0.05. Due to the reason that we did not want to calculate interaction effects, we assumed a sample of 62 to be sufficient.

Sixty-two patients participated in the study. Only two of the participants were male (3%) and were therefore excluded from analyses because a statistical control for gender would not have been possible. Furthermore, prevalence of fibromyalgia is almost seven times higher in women than in men (Wolfe, Ross, Anderson, Russell, & Hebert, 1995), and in two prior studies 86% and 100% of fibromyalgia patients were women, respectively (White, Speechley, Harth, & Ostbye, 1999); (Lindell, Bergman, Petersson, Jacobsson, & Herrström, 2000). Participants were randomly assigned to one of the three conditions: acceptance, cognitive restructuring, or the control condition.

Participants' ages ranged from 24 to 65 years ($M = 51.4$, $SD = 9.4$).

The study was approved by the Ethics Committee of the Department of Psychology, Philipps-University of Marburg (2011-18K). Participants were aware of the procedure and had the opportunity to withdraw from the study at any time.

2.2. Study design

A mixed between-within design with three factors (acceptance, cognitive restructuring, and control) was used. The between-group factor was *instruction condition* (acceptance, cognitive restructuring, and control), and the within-group factor was *pretest* vs. *posttest*.

2.3. Procedure

2.3.1. Self-report measures

All participants completed two questionnaires assessing habitual coping strategies corresponding to the two different instruction conditions in order to control for possible group differences. Questionnaires were completed at home prior to the experimental session. Habitual *cognitive restructuring* of pain-related thoughts was assessed by the Coping Strategies and Pain-Related Distress Questionnaire (FESV; Cronbach's $\alpha = 0.77$, test-retest reliability = 0.79) (Geissner, 2001). A typical item for cognitive restructuring is, “When I am in pain, I say to myself that because of pain, I learn to appreciate painless conditions.” Habitual *acceptance of pain* was measured using the German version of the Chronic Pain Acceptance Questionnaire (CPAQ-D; Cronbach's $\alpha = 0.87$) (McCracken, Vowles, & Eccleston, 2004; Nilges, Köster, & Schmidt, 2007). A typical item is, “Although things have changed, I am living a normal life despite my chronic pain.”

In addition, participants completed the Beck Depression Inventory (BDI; Cronbach's $\alpha = 0.91$) (Hautzinger; Kühner, Bürger, Keller, & Hautzinger, 2007) and the Pain Sensitivity Questionnaire (PSQ; Cronbach's $\alpha = 0.92$, test-retest reliability = 0.83) (Ruscheweyh, Marziniak, Stumpenhorst, Reinholz, & Knecht, 2009). Participants are asked to rate how painful certain conditions are on an eleven-point Likert scale. A typical item is, “Imagine you burn your tongue on a very hot drink.” Pain sensitivity is an important variable in experimental pain studies, because high pain sensitivity may influence poor responding to instructions (Edwards, Doleys, et al., 2003; Edwards, Fillingim, & Ness, 2003; Granot et al., 2004).

2.3.2. Pretest

Two different female experimenters conducted the experimental sessions. Participants signed an informed consent form, were given the opportunity to ask questions, and were informed about the procedure and the application of the thermode. Before the pretest, participants had the opportunity to familiarize themselves with the procedure and to practice stopping the pain stimulus.

2.3.2.1. Stimulus material and outcome measures. Thermal stimuli between 1 °C and 49 °C were used to induce pain. Stimuli were delivered to the dominant forearm via a 3 × 3 cm peltier-based thermode (TSA II: Thermal Sensory Analyzer, Medoc Ltd, Israel). The thermal stimulus started at 32 °C and rose or decline with a