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Diagnostic uncertainty and recall bias in chronic low back pain

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ABSTRACT

Patients' beliefs about the origin of their pain and their cognitive processing of pain-related information have both been shown to be associated with poorer prognosis in low back pain (LBP), but the relationship between specific beliefs and specific cognitive processes is not known. The aim of this study was to examine the relationship between diagnostic uncertainty and recall bias in 2 groups of chronic LBP patients, those who were certain about their diagnosis and those who believed that their pain was due to an undiagnosed problem. Patients (N = 68) endorsed and subsequently recalled pain, illness, depression, and neutral stimuli. They also provided measures of pain, diagnostic status, mood, and disability. Both groups exhibited a recall bias for pain stimuli, but only the group with diagnostic uncertainty also displayed a recall bias for illness-related stimuli. This bias remained after controlling for depression and disability. Sensitivity analyses using grouping by diagnosis/explanation received supported these findings. Higher levels of depression and disability were found in the group with diagnostic uncertainty, but levels of pain intensity did not differ between the groups. Although the methodology does not provide information on causality, the results provide evidence for a relationship between diagnostic uncertainty and recall bias for negative health-related stimuli in chronic LBP patients.

1. Introduction

The identification of subgroups of individuals with low back pain (LBP) has been outlined as a priority, to modify interventions to match patients' obstacles to recovery [5]. Patients' beliefs and expectations about their pain have been shown to predict prognosis [13,15,17]. Among these beliefs, catastrophic thinking appears to be particularly important [24]. A related emerging area of research focuses on perceived diagnostic uncertainty, and the impact that such uncertainty could have on subsequent beliefs, behaviors, and outcomes. Precise causes and diagnostic labels can be found only in about 5% to 10% of patients with LBP [16]. In the absence of a clear diagnosis, practitioners are expected to provide explanations [17]. There is evidence from qualitative studies that the absence of a clear diagnosis and explanation are associated with negative social, cognitive, and emotional functioning [25,29]. Patients who are uncertain about their condition continue searching for a diagnosis [29]; this may place an extra burden on health services and prevent patients from directing their attention to other aspects of life.

Better understanding of the mechanisms underlying the relationship between beliefs and outcomes is needed. One method to study this is through quasi-experiments observing cognitive processes, such as attention and recall for specific types of stimuli. This method has the advantage of being relatively free of self-awareness and demand characteristics. There is evidence that patients with pain selectively recall pain and illness-related information in preference to other types of stimuli when compared with control groups [20]. In addition, despite early mixed evidence [20], recent meta-analyses [4,28] suggest that patients with pain also selectively attend to pain words. These biases reflect underlying pain and illness schemas and are associated with disability [12,20] and higher health care costs [21]. Although interrelated, pain schemas contain immediate properties and features of pain, whereas illness schemas incorporate the consequences of illness relevant to patients' self-image, and have been hypothesized as evidence for poor coping [20]. To date, there has been no direct comparison between recall bias in persons with LBP who perceived their condition to be unexplained and undiagnosed, and those who perceived their condition to have an acceptable diagnostic label. Previous research has demonstrated that recall bias toward

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illness-related stimuli is also associated with high rates of depression [22]. Because of the proposition that uncertainty leads not only to preoccupation with illness but also to increases in depression, we included a set of stimuli related to depression.

The current study aimed to compare recall of specific stimuli sets in 2 groups of patients with LBP: those who perceive themselves to have a clear and acceptable diagnosis, and those who believe that their pain is caused by an undiagnosed problem. We hypothesized that both groups would replicate previous findings for a bias toward pain stimuli, but that only the group of patients high in uncertainty would selectively recall words related to illness, reflecting these patients' preoccupation with the meaning and consequences of their pain.

2. Methods

2.1. Study design

The research design was a 2 (between-group, levels of certainty about diagnosis) × 4 (within-group, word type) mixed factorial design. In the primary analysis, the 2 groups were a priori categorized on the basis of participants' self-report answers to the following question: "I think there is something else happening with my back which the doctors have not found out about yet (yes/no)." In a secondary sensitivity analysis, groups were categorized on the basis of participants' self-report answers to the following questions: "I have been given a clear label/diagnosis for my back pain (yes/no)" or "I have been given a clear explanation about why I have back pain (yes/no)." The 4 levels of the within-group factor were word category (ie, pain, illness, depression, and neutral).

The primary outcome measure was the number of words recalled for each word category by each participant. In addition, we measured the number of words endorsed as self-descriptors for each word category and the mean reaction time (measured in milliseconds) for each word category. Additional measures were pain intensity, disability, depression, and anxiety self-report scores.

Sample size calculation using G*Power [8] ($\alpha = 0.05$, $\beta = 0.80$) was set to achieve a medium effect size and resulted in a minimum sample size of 62. The sample size in the present study was in excess of this value and therefore satisfied this criterion. Our assumption of a medium effect size was based on other studies of recall bias in pain populations [20]. These were not identical to our study in design, but, in the absence of studies of cognitive bias that compared groups for diagnostic certainty, this appeared to be the most informed assumption.

2.2. Study participants

A total of 80 participants with mechanical chronic low back pain (CLBP) were recruited from the pain management services in 2 UK urban hospitals. Inclusion criteria were that participants be between the ages of 18 and 65 years, would speak fluent English, and would have musculoskeletal CLBP with pain duration of at least 3 months. Participants with back pain due to ankylosing spondylitis, osteoporosis, cancer, and inflammatory conditions such as rheumatoid arthritis were excluded. These inclusion criteria were checked for each patient by that patient's clinician before being invited to participate in the study. However, it was not possible to keep a record of how many patients were approached and how many refused to take part in the study; therefore response rates could not be calculated. The study received ethical approval from aNational Health Service (NHS) ethics committee and the university research ethics committee.

2.3. Materials and procedure

Participants were first given a screening questionnaire that included demographic questions along with questions about their pain, other conditions, and diagnosis. The testing began with a computer-based task. The task was created and delivered using the DMDX software program [10], and it included 32 words (all adjectives) as follows: 8 depression related (describe salient aspects of depression, eg, feeling guilty, withdrawn, unlovable); 8 illness related (describe the consequences of illness, eg, suffering, disabled, dependent), 8 pain related (describe immediate properties of pain, eg, pounding, sore, pricking); and 8 neutral (eg, nosey, Q3 obnoxious, crude). The complete word stimuli are reported elsewhere [33] and are available from the authors. Depression and neutral adjectives were taken from previous research [11,22,23] in which adjectives had been matched for social desirability, word frequency, and length. Illness and pain adjectives were taken from previous recall bias studies in chronic pain patients [22,23].

The words were presented in white letters (font type, Times New Roman; font size, 36-point) against a black background on a laptop computer (12.1 inches; 1280 × 800-pixel resolution) positioned approximately 50 cm in front of seated participants. Right and left shift keys were labeled with "yes" and "no," respectively. The task was preceded by written instructions on the screen, which participants were asked to read, and then these were rephrased by the investigator to ensure that the instructions were clear and understood:

> *You will be presented with some words that may describe you or your pain. Before each word is presented, the following question will appear on the screen: "Does the following word describe you/your pain?" Press the right SHIFT button if YES, that is if this word describes you or your pain. Press the left SHIFT button if NO, that is if the word does NOT describe you or your pain. Please respond as quickly as possible; the first response that comes to your mind is probably the most accurate. You will be presented with some practice questions first. Press SPACEBAR to start practice questions.*

Words were presented on the computer screen in random order (different for each participant), with the restriction that no 2 words from the same category were presented in succession. Preceding each "pain" word was the cue question, "Does the following word describe your pain?" Preceding all other words was the cue question, "Does the following word describe you?" The cue question facilitated encoding of the words in relation to the self. It was presented for 3 seconds, followed by a delay of 500 milliseconds, before the appearance of the target word [22]. The participants were expected to respond to the target word by answering "yes" or "no" as quickly as they could, by pressing either right or left shift key on the keyboard. As soon as a response has been made or after 3500 ms, the next cue question was presented. The 32 words were preceded by 6 practice trials at the beginning, to familiarize participants with the procedure. After the practice trials, an additional 3 adjectives were presented to control for primacy effects, as well as 3 adjectives at the end to control for recency memory effects [22].

On completion of the computer task, participants were asked to complete a filler task [22] for 2 minutes in which they were presented with 2 nearly identical images and were asked to identify differences between them. The filler task was used to avoid short-term memory effects and to prevent participants from rehearsing the information. Participants then recalled as many of the previously presented words in a surprise recall test. No time limit was imposed on the recall task. Finally, they were asked to fill in the questionnaire containing the measures listed below.

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