PAIN® 154 (2013) 468–475

PAIN®

www.elsevier.com/locate/pain

The predictive value of attentional bias towards pain-related information in chronic pain patients: A diary study

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Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

ARTICLE INFO

Article history:
Received 24 June 2012
Received in revised form 14 November 2012
Accepted 12 December 2012

Keywords:
Chronic pain
Attentional bias
Avoidance
Pain severity
Disability
Distractibility

ABSTRACT

Theoretical accounts of chronic pain hypothesize that attentional bias towards pain-related information is a maintaining or exacerbating factor, fuelling further pain, disability, and distress. However, empirical research testing this idea is currently lacking. In the present study, we investigated whether attentional bias towards pain-related information predicts daily pain-related outcomes in a sample of chronic pain patients (n = 69; M_{age} = 49.64 years; 46 females). During an initial laboratory session, attentional bias to pain-related information was assessed using a modified spatial cueing task. In advance, patients completed a number of self-report measures assessing current pain intensity, current disability, and pain duration. Subsequently, daily pain outcomes (self-reported pain severity, disability, avoidance behaviour, and distractibility) were measured for 2 weeks by means of an electronic diary. Results indicated that, although an attentional bias towards pain-related information was associated with the current level of disability and pain severity, it had no additional value above control variables in predicting daily pain severity, avoidance, distractibility, and disability. Attentional bias towards pain-related information did, however, moderate the relationship between daily pain severity and both daily disability and distractibility, indicating that, particularly in those patients with a strong attentional bias, increases in pain were associated with increased disability and distractibility. The use of interventions that diminish attentional bias may therefore be helpful to reduce daily disability and the level of distraction from current tasks despite the presence of pain in chronic pain patients.

1. Introduction

The preferential and selective processing of threatening information, that is, an attentional bias, is a ubiquitous phenomenon in phobia and anxiety disorders (for a review, see [2]). Adopting theories and paradigms from the anxiety literature, researchers have investigated whether chronic pain patients also selectively attend to pain-related information. Although results are not always consistent, chronic pain patients are often found to have an attentional bias towards pain-related information in comparison with healthy volunteers [37,42,45].

An important question pertains to the precise function of an attentional bias towards pain-related information. Whereas an attentional bias towards pain-related information is argued to be initially adaptive because it allows one to escape or avoid pain, a persistent attentional bias when pain cannot be avoided or escaped from – which is mostly the case when it is chronic – may only fuel pain, disability, and distress [12,15,64]. In that respect, attentional bias has been considered as a maintaining or exacerbating factor in chronic pain [27]. Recent theoretical advances, furthermore, suggest that attentional bias may not directly amplify the experience of pain, but that (severe) pain may result in more avoidance behaviour, disability, and distractibility of ongoing behaviour in those who have an attentional bias towards pain-related information [12]. Empirical research investigating this idea is, however, lacking. Available studies (e.g., [1,14,44]) investigating the relationship between attentional bias and pain outcomes in chronic pain patients are mainly cross-sectional. It therefore remains possible that attentional bias towards pain-related information is merely an epiphenomenon of chronic pain [27]. The few studies that explored the predictive value of attentional bias towards pain-related information are restricted to predicting experimental pain sensitivity in healthy volunteers [4,5] and predicting postoperative pain in people undergoing a painful medical procedure [24,25,34]. Results are inconsistent, but suggest that a larger attentional bias towards pain-related information predicts higher pain sensitivity ([4], but

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0304-3959/$36.00
http://dx.doi.org/10.1016/j.pain.2012.12.008

see [5]) and less postoperative pain [24,34]. A more direct examination of the relationship between attentional bias and pain outcomes in chronic pain patients is warranted.

The current study aimed to further substantiate the predictive value of attentional bias towards pain-related information for pain outcomes in chronic pain patients. We focused upon 4 outcomes: pain severity, disability, avoidance behaviour, and distractibility, which were assessed daily for a period of 2 weeks. Electronic diary assessment was preceded by a laboratory session during which questionnaires were filled out and attentional bias for pain-related information was assessed by means of a modified spatial cueing paradigm in which cues signalling experimental pain stimuli were presented [55].

In particular, we examined 1) the relationships between individual differences and attentional bias towards pain-related information; 2) whether attentional bias towards pain-related information has predictive value for the levels of daily pain severity, avoidance behaviour, disability, and distractibility; and 3) whether attentional bias towards pain-related information moderates the relationship between daily reported pain severity and other pain outcomes.

2. Method

2.1. Participants

In December 2010, members of the Flemish Pain League (about 3000) were sent an invitation letter to participate in a large diary study for chronic pain patients, called the Ghent Pain and Disability I study (GPD-I study). The GPD-I study consisted of one laboratory session in which participants were interviewed, filled out additional questionnaires, and performed several experimental tasks. Subsequently, participants filled out a diary for 14 days. More information and specific details about this study can be found on http://hdl.handle.net/1854/LU-3050986. There were 518 patients who responded to the letter, of which 315 agreed to be contacted by phone. Recruitment of participants was performed in the period February–March 2011. Two hundred sixty-seven persons were actually contacted by telephone. Inclusion criteria for the GPD-I study were: 1) being aged between 18 and 65 years; 2) having sufficient knowledge of the Dutch language; and 3) suffering from pain that lasted for 6 months or more. Individuals were excluded when headache pain was the most important pain (cfr. [16]) (n = 1), when they were unable to use both index fingers (n = 1), or when their eyesight was not normal or corrected-to-normal (e.g., by glasses) (n = 2). Eighty-one patients who fulfilled the criteria agreed to participate. Because participants needed to travel to the university campus to participate in this study, transportation problems were mentioned as the most frequent reason for nonparticipation. However, later on, a further 7 patients decided not to participate because of health problems. The final sample of participants consisted of 74 individuals with chronic pain. The study design was approved by the Ethics Committee of the Faculty of Psychology and Educational Sciences of Ghent University, and written informed consent was obtained from participants. All participants received a monetary reward for their participation in the GPD-I study.

2.2. Questionnaires

State and trait anxiety were assessed by means of the Dutch version of the State-Trait Anxiety Inventory (STAI) [50,62]. This questionnaire consists of 40 items in which people are asked to report their feelings in general (e.g., I feel happy) and at present (e.g., I feel upset) using a 4-point Likert scale. Scores for the state and the trait version may vary between 20 and 80. This questionnaire showed a good reliability and validity [3,49]. In the present study, Cronbach alpha of the STAI-S (STAI state version) and STAI-T (STAI trait version) were, respectively, .91 and .93. *Disability* because of pain was assessed by means of the Dutch version of the Pain Disability Index (PDI; [38]). Participants are asked to indicate the extent of disability experienced in 7 areas of everyday life (e.g., family/home responsibilities and social activity) using a 0–10 Likert scale (0 = no disability and 10 = total disability). Scores may vary between 0 and 70. In the present study, Cronbach alpha of the PDI was .82. *Depressive mood* was measured with the depression subscale of the Hospital Anxiety and Depression Scale (HADS-D; [65]). The HADS-D is a self-report scale that screens for the presence of depression in patients with "medical conditions." It consists of 7 items to be rated on a 4-point Likert scale (e.g., I feel cheerful). Scores may vary between 0 and 21. In the present study Cronbach alpha of the HADS-D was .82. *Pain severity* was assessed by means of the pain severity subscale of the Multidimensional Pain Inventory (MPI; [21,28]). Part I of the MPI consists of 5 subscales assessing the impact of pain (i.e., pain severity, pain interference, social support, perceived life control, and affective distress). The reliability and validity of the MPI have been well established [43]. In the present study, Cronbach alpha of the MPI severity subscale was .75. *Catastrophic thinking* about pain was assessed with the Dutch version of the Pain Catastrophizing Scale (PCS), which consists of 13 items [10,51]. Participants indicate the degree to which they experienced catastrophic thoughts or feelings during pain episodes (e.g., "I become afraid that the pain will get worse") using a 5-point scale. Scores may vary between 0 and 52. The PCS showed a good reliability and validity [53]. In the present study, Cronbach alpha of the total score was .90.

2.3. Attentional bias towards pain-related information

Attentional bias towards pain-related information was assessed using a modified spatial cueing task [55,57,58,61]. For this task, participants needed to discriminate a visual target (: or¨), which was preceded by coloured cues (pink or blue square; 4.8 cm high × 6.5 cm wide) at the same (valid) or opposite (invalid) spatial location. Each trial began with a fixation cross in the middle of the screen (duration of 1000 ms). Cues were presented 9.2° from the fixation cross for a duration of 200 ms. Target onset followed immediately after cue offset. On two-thirds of the test trials, cue target location was correctly predicted by cue location (validly cued trials). On one-third of the test trials, cue location incorrectly predicted target location (invalidly cued trials). Participants were instructed to respond to the horizontal dots by pressing the "4" key with the index finger and to the vertical dots by pressing the "5" key with the ring finger of the right hand on an AZERTY computer keyboard. A trial ended when a participant responded or 2000 ms had elapsed. A 1000-ms interval was given before the next trial was presented. In order to control for responses to cues instead of targets, a number of trials were presented in which the cue was not followed by a target (catch trials). Furthermore, in order to ensure that participants maintained gaze at the middle of the screen, a number of digit trials were presented. In these trials, the fixation cross was followed by a randomly selected digit between 1 and 9 for a duration of 100 ms (digit trials). Participants were instructed to type the number on the keyboard. Cues were presented in 2 colours. One colour was related to pain by a differential classical conditioning procedure. The conditioned cue (CS+) was on one-third of the presentations, followed by a painful stimulus (unconditioned stimulus [UCS]; 500 ms after CS+ onset), that is, an electrocutaneous stimulus (ECS; bipolar; 50 Hz; 300 ms; instantaneous rise and fall time delivered by a constant current stimulator, i.e., DS5, Digitimer Ltd, Hertfordshire, UK). The other colour (CS−) was never followed by a UCS. Which colour was