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Attentional Biases Toward Sensory Pain Words in Acute and Chronic Pain Patients

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Abstract: Attentional biases towards pain-related words of chronic and acute low back pain (LBP) patients were compared with healthy pain-free controls. Specifically, the aims were to determine: 1) whether chronic LBP patients demonstrate attentional biases compared to pain-free controls; 2) whether observed biases are also present in those with acute LBP; and 3) whether observed biases are associated with pain-related fear among the pain groups. Four groups were recruited: 1) acute LBP patients; 2) chronic LBP patients from physiotherapy practices; 3) chronic LBP patients from a tertiary referral pain-management center; and 4) healthy pain-free controls. Participants were assessed on the dot-probe computer task for attentional bias to pain-related words. All 3 pain groups demonstrated biases compared to controls on sensory but not on affective, disability, or threat words. Among the pain groups, those with low and moderate levels of fear of (re)injury demonstrated biases towards sensory pain words that were absent in those with high levels of fear, which is counterintuitive to what the fear of (re)injury model suggests. These results suggest that the experience of pain, rather than duration, is the primary indicator of the presence of pain-related biases.

***Perspective:** Attentional biases are present in chronic and acute pain. Biases towards sensory-pain stimuli were demonstrated regardless of pain duration; however, they were present in those with low and moderate levels of fear of (re)injury only and not those high in fear. These findings are not consistent with the fear of (re)injury model.*

***Key words:** Attentional biases, acute pain, chronic pain, fear of (re)injury, dot-probe.*

The existence and nature of attentional biases in chronic pain has received interest due to the potentially causal role of hypervigilance in the development of chronicity. The fear of (re)injury model proposes that pain-fearful individuals become involved in a vicious cycle of avoidance and disability that culminates in and maintains chronic pain. According to Vlaeyen and Linton,[37] this cycle develops when pain-fearful individuals interpret pain as threatening, become hypervigilant to painful sensations, and avoid activity as a result of the fear.[9,36] This ultimately contributes to ongoing pain-related disability and perpetuates the cycle of pain.

Attentional bias is defined as the consistent disruption or facilitation of the response of an individual to a defined group of stimuli.[27] There is robust evidence for attentional biases across various anxiety disorders.[4] However, findings for attentional biases in pain patients are mixed.[3,27] Pincus and Morley[27] concluded that there was evidence of a small effect size for attentional biases towards sensory-related but not affective pain words, based on their review of the literature involving predominantly research using the modified Stroop task.[27] When mood disturbance co-exists with pain, however, biases towards affective pain words have been demonstrated.[27] More recent research using the dot-probe paradigm (thought to be a less ambiguous measure of attentional bias) has also been mixed. Three studies have failed to find an effect.[1,3,29] These studies are marred by small sample sizes (combined n = 107) (eg, Asmundson and Hadjivropoulos[1]). Only 2 studies have found attentional

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biases to sensory words using the dot-probe task.[10,33] Both used large samples sizes (combined n = 268), and both found biases towards sensory but not other categories of pain words. However, neither compared the biases of pain patients to a control group. Therefore, where biases have been found in heterogeneous groups of chronic pain patients, it has been for sensory pain words. Comparison between those studies identifying differences and those who have failed to do so are made difficult by the use of different words, and parameters of the task. Hence, there is a pressing need for more large-scale research, using the precise paradigms tested in the literature. Further, theories suggest that the biases should be associated with the degree to which participants fear (re)injury. However, the little empirical attention within pain samples that this has received[1] and the findings in healthy samples are mixed.[15]

The present study aimed to address these gaps in knowledge. That is, firstly we aimed to identify whether a representative sample of both private and tertiary chronic LBP patients demonstrate attentional biases compared to healthy, pain-free controls, using the same paradigm that has successfully shown the presence of biases towards sensory pain words in previous studies.[10,33] Secondly, this study aimed to determine whether biases observed in chronic LBP are also present in those experiencing an acute injury. The final aim was to determine whether attentional biases varied as a function of level of fear of (re)injury in the pain samples. The following hypotheses were made:

1. The 3 groups of pain patients would demonstrate attentional biases towards sensory pain-related words, but not other categories of pain-related stimuli, compared with the healthy control group.
2. Within the pain groups, those with high levels of fear of (re)injury would demonstrate biases towards sensory pain words not observed in those with moderate levels of fear, whereas those with low levels of fear of (re)injury would demonstrate a bias away from sensory pain words.

Methods

Participants

The participants in this study were recruited between May 2005 and December 2007, and comprised 4 groups: 1) 51 acute LBP patients; 2) 50 chronic LBP patients from physiotherapy practices; 3) 57 chronic pain patients from a tertiary referral pain clinic; 4) and 50 healthy pain-free controls. All participants were aged between 18 and 75 years and the mean age of the entire sample was 43.6 years (SD = 14.5). Fifty-six percent of the sample were male and 62% were married or living in a de facto relationship. Thirty-one percent of the sample had less than 10 years of education while 43% had completed a university degree. Fifty-five percent were working full-time, with a further 17% in part-time employment. Forty-one percent of the pain sample had used alcohol for pain relief while 49% were using analgesics at the time of assessment and 73% had used analgesics in the past 3 months.

Participants in the pain-free control group were matched against the acute pain group for age (±3 years), sex and education. Participants in the control group were aged between 18 and 73 years (mean = 40.52 years, SD = 14.8), and 64% of the sample were male. Sixty-six percent of the control sample was married or living in a de facto relationship, 28% had never married, and 6% had been divorced. Thirty-four percent had less than 10 years education, whereas 18% had completed a trade certificate and 48% had completed a university degree. Seventy-four percent of the control sample was working full-time and 16% were employed part-time. The remainder of the sample comprised participants who were retired, students, or involved in home duties.

For the participants in the acute LBP group, patients were to be experiencing a single acute episode of LBP of less than 3 month's duration. Sixty-five percent of the sample had experienced pain for less than 2 weeks, and only 10% had experienced pain between 2 and 3 months. Hence, this group was recruited very early following their injury. Participants in the chronic groups had to have experienced constant pain for more than 3 month's duration. Participants were excluded if they suffered comorbid medical illness, psychosis, or if their level of English language was insufficient to complete the assessment. The chronic patients were recruited from 2 different sources. One group of chronic LBP patients (chronic physiotherapy group) were recruited from 24 private physiotherapy clinics throughout the Sydney metropolitan area, from which the acute LBP pain patients were also recruited. The physiotherapy clinics were located in 5 regions of Sydney and were selected from the 2005 Sydney telephone directory. Forty-five clinics agreed in principal to participate; however, only 24 recruited participants for the study. Hence, the method of recruitment was controlled for the acute pain and chronic physiotherapy pain groups. In the chronic physiotherapy group, nearly a quarter of the sample (23%) had experienced pain for between 3 and 6 months, with another 23% having pain for 6 to 12 months. The remainder (41%) had experienced pain in excess of a year. Another set of participants formed the tertiary referral chronic pain group (chronic tertiary group) and were recruited from a tertiary pain management center in Sydney. Consecutive patients were recruited prior to taking part in the pain management program and from new referrals to the center. Patients were invited to participate at the commencement of the 3-week program for chronic pain management or when they attended their assessment appointment. Most of the published studies in the attentional bias literature have recruited patients from similar clinics and hence these patients had a range of pain sites, whereas the chronic physiotherapy group was solely LBP patients. The vast majority of patients from the chronic tertiary group had experienced pain for in excess of 1 year (81%). The pain-free control group was recruited from the community and via advertisements placed around the campus of The University of Sydney. Participants