



RESEARCH REPORT

# Interoception, body awareness and chronic pain: Results from a case–control study



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Received 28 March 2014; revised 3 August 2014; accepted 5 August 2014

## KEYWORDS

Interoceptive aware-  
ness;  
Chronic pain;  
Body awareness;  
Self-perception;  
Mindfulness;  
Manual therapy

**Abstract** *Background:* Chronic pain remains an unresolved issue in clinical practice despite the extensive research investigating its behavioural and neural correlates. Evidence demonstrates that chronic pain results in altered representation of the body in the brain. Arguably, this impacts on the perception of the self and its associated processes; namely, interoceptive awareness and body awareness. However, there is minimal research investigating the links between interoceptive awareness, body awareness and chronic pain.

*Objectives and method:* This case–control study investigated the relationship between chronic pain and interoceptive awareness; and the links between interoceptive awareness and body awareness. A sample of 59 participants comprising of 22 patients with chronic pain and 37 individuals without a history of chronic pain were assessed using a heartbeat monitoring task (HBMT) and the Body Awareness Questionnaire (BAQ). The HBMT was used to measure interoceptive awareness; and the BAQ to measure body awareness. Data from variables regarded as potential confounders, were also collected.

*Results:* The findings did not reveal a statistical significant difference in interoceptive awareness and body awareness across the groups. Moreover, activities likely to enhance proprioception or mindfulness based practice did not influence interoceptive awareness. Notwithstanding this, a positive trend was identified between body awareness and mindfulness based activities.

*Conclusions:* Several limitations of this study suggest scope for further research investigating putative changes in interoceptive awareness in the presence of

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chronic pain and the effect of osteopathic treatment on the perception of the self. The role of mindfulness based activities in the management of chronic pain is also discussed.

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### Implications for practice

- Treatment of chronic pain remains an unresolved issue. It is important for osteopaths to have a thorough understanding of the neural processes underlying this complex phenomenon to better inform their practice.
- Chronic pain has been associated with disruption of the perception of self. Further research could investigate the putative links between interoceptive awareness and chronic pain and the effect of osteopathic treatment on the perception of self. This could better inform the use of osteopathic treatment in the management of chronic pain.
- This study also explores mindfulness-based practice in association with body awareness. Mindfulness-based practice is effective in the management of chronic pain; however, its effects onto body awareness and interoceptive awareness are largely unknown and further research could increase support for its use in clinical practice.

## Introduction

Chronic pain is a complex and at times debilitating phenomenon, the management of which represents, to this day, a challenge in clinical practice. Consequently chronic pain is the centre of burgeoning research which aims at a better understanding of this phenomenon in order to achieve successful management according to the individual's context.<sup>1,2</sup> Recent advances in neuroscience have enabled a clearer understanding of the behavioural and neural correlates of pain and how these can affect the individual. Pain is a sensory, cognitive and emotional experience.<sup>3</sup> This experience results from the complex integration and modulation of nociceptive and non-nociceptive stimuli within a network of spinal pathways and central nervous system (CNS) structures.<sup>4–7</sup> This network, known as the 'pain matrix', includes, mainly, the somatosensory cortices (S1, S2), the

insular cortex, the anterior cingulate cortex and the thalamus.<sup>1,8–10</sup> However other cortical and subcortical regions such as the hippocampus, amygdala, basal ganglia and the cerebellum are typically implicated, depending upon the individual's set of circumstances.<sup>11</sup> This suggests that the pain experience may differ in each individual according to their own processing of pain.<sup>1,8,10</sup>

Research demonstrates that structural and functional changes are found in this neural network in association with chronic pain, i.e. pain persisting beyond the time of tissue healing. Although causality cannot be clearly established, the array of chemical, functional and structural neural changes contributes to changes in the individual's behaviour, emotions and perception of the self.<sup>12,13</sup> The perception of the self is regarded as a superset of self-consciousness that includes the elements of body schema, body image and body ownership and body awareness; the latter is considered as the conscious awareness of all internal and external stimuli. Recently, there has been an increasing interest in the understanding of the neural network underlying the perception of the self within the context of psychopathologies and disorders of body awareness, including those experienced by chronic pain sufferers.<sup>14,15</sup> Evidence demonstrates that the representation of the body in the brain is associated with the result of the integration of multisensory stimuli across several CNS structures.<sup>16–19</sup> In particular, a growing body of evidence highlights the role of the insular cortex, site of integration of interoceptive stimuli, in the perception of the self.<sup>20–22</sup>

Interoception has been defined as the "*sense of the physiological condition of the body*", i.e. the perception of all internal bodily cues.<sup>20</sup> Interoceptive awareness has been investigated in relation to psychopathologies such as anxiety and depression, on the assumption that different attention to oneself would contribute to different perception of external stimuli and therefore different behavioural responses to such stimuli.<sup>23–26</sup> For example Dunn and colleagues<sup>23</sup> found that interoceptive accuracy is positively linked with anxiety and that instead symptoms of depression weaken this link. Similarly Pollatos and colleagues<sup>24</sup> found that in healthy individuals

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