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Journal of Psychosomatic Research 62 (2007) 159–165

Journal of Psychosomatic Research

Somatoform dissociation and somatosensory amplification are differentially associated with attention to the tactile modality following exposure to body-related stimuli

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Received 30 May 2006; received in revised form 17 July 2006; accepted 24 August 2006

Abstract

Objective: Body-focused attention is regarded as an important maintaining factor for somatoform illness, although there is limited empirical evidence pertaining to this hypothesis. This study was conducted to assess whether individual differences in somatoform dissociation and somatosensory amplification were associated with biased attention towards the tactile modality, particularly following exposure to threatening body-related stimuli. **Methods:** Forty-eight nonclinical participants completed the Somatoform Dissociation Questionnaire (SDQ-20; a proxy measure of somatoform symptomatology), the Somatosensory Amplification Scale (SSAS), and a modality bias task. The task consisted of a series of body-relevant or body-irrelevant (scene) picture stimuli, half of which were threatening and half were neutral, followed by target stimuli in either the visual or the tactile modality. Participants judged the location of each target stimulus, and performance data were used to calculate the degree to which participants were biased towards the tactile modality following each of the picture types. **Results:** Participants in the high SDQ-20 group (defined by median split) showed a significant increase in tactile bias when responding to targets occurring 250 ms after the presentation of threatening body-relevant stimuli only. This effect was not observed for the low SDQ-20 group. Scores on the SSAS correlated negatively with tactile bias for both threatening and neutral body-relevant stimuli at 250 ms. **Conclusions:** Individuals with a tendency to experience somatoform symptoms focus more on stimuli in the tactile modality immediately following exposure to threatening body-relevant information. In contrast, self-reported somatosensory amplification appears to be associated with attention away from the tactile modality rather than with increased tactile focus.

Keywords: Attention; Body focus; Cognitive; Modality bias; Somatoform; Somatosensory amplification

Introduction

Patients with somatoform symptoms are ubiquitous in medical settings and represent a considerable challenge to health care services [1–3]. Despite the clinical and economic implications of somatoform symptoms, the biopsychosocial mechanisms of these conditions remain poorly understood [4]. Many theories presume that an important psychological factor in symptom maintenance is selective attention to the body and to threatening somatic sensations (e.g., Refs. [4–6]). Such theories typically assume that individuals with somatoform symptoms spend disproportionate amounts of time focusing on their body and scanning for evidence of disease. This is thought to contribute to problem maintenance by augmenting the detection and perceived salience of physical symptoms, and by fuelling the misinterpretation of these symptoms as threatening signs of illness. The resulting increase in physiological arousal leads to further physical symptoms,

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doi:10.1016/j.jpsychores.2006.08.008

and a vicious cycle is established. Barsky et al. [7,8] developed the term "somatosensory amplification" to refer to this process of focusing on and misinterpreting somatic sensations and developed the Somatosensory Amplification Scale (SSAS) to measure individual differences in this cognitive–perceptual style.

Several studies with nonclinical groups have shown that focusing attention on the body increases physical symptom reports (e.g., Refs. [9,10]). Conversely, distraction has been shown to ameliorate the perceived intensity and unpleasantness of painful sensations [11]. Individual differences in self-focus are also associated with elevated somatic symptom reports [9,12]. While these findings may be regarded as consistent with the idea that body-focused attention is an important feature of somatoform illness, direct empirical evidence in support of this view remains limited. Houtveen et al. [13] found that undergraduates with a tendency to develop somatoform complaints were more likely than controls to report somatic symptoms following mental stress and CO_2-enriched air breathing, despite comparable autonomic and respiratory responses in the two groups. This finding was interpreted as evidence for an exaggerated perception of normal physiological processes in the experimental group, reflecting increased symptom-focused attention. Similarly, Haenen et al. [14] found that hypochondriacal patients showed a disproportionate increase in physical symptoms when instructed to focus on the body compared to controls.

Using an emotional Stroop task, Lim and Kim [15] found that patients with somatoform disorders exhibited longer color-naming latencies for physical threat words compared to other word types, suggesting that the former drew more attentional resources from the primary task; the difference between somatoform and psychiatric control patients was not significant, however. Owens et al. [16] also found Stroop interference for illness words in a nonclinical group reporting high levels of health anxiety, compared to less health-anxious controls. As the stimuli used in the emotional Stroop task are words, however, this paradigm only provides an indirect test of whether somatoform symptoms are associated with excessive attention to bodily sensations.

Other studies indicate that SSAS scores are elevated in patients with hypochondriasis and other somatoform disorders [7,8,17]. Not all studies have found this relationship, however, and significant correlations between the SSAS and questionnaire measures of somatization [18,19] have also proved difficult to replicate [20]. In addition, some studies have shown that high scorers on the SSAS are no more able to detect physiological sensations than low scorers [21,22], raising doubts about the SSAS as an index of body-focused attention and hypervigilance to bodily sensations. Moreover, one nonclinical study found that high SSAS scorers were actually less able to detect bodily sensations (heartbeats) than low scorers, suggesting a decreased somatosensory sensitivity in this group [23]. In contrast, Scholz et al. [24] found that patients with somatoform disorders were more accurate than healthy controls at estimating their muscle tension during a biofeedback task.

Taken together, these studies provide only limited empirical evidence for the idea that somatoform symptoms are associated with excessive body focus. One problem is that most of the research in this area relies on subjective scales or paradigms, such as the emotional Stroop task, that do not provide a direct test of body-focused attention. Similarly, research showing that individuals with hypochondriacal or somatoform tendencies are more likely to report symptoms when instructed to focus on the body provides only indirect evidence for this hypothesis. As such, there is an urgent need for research using direct and objective methods to inform our understanding of how body focus contributes to somatoform illness. To this end, the current paper presents findings from a novel method for measuring body-focused attention that yields fresh insights into the relationship between body-related threat, somatosensory amplification, and somatoform symptoms.

Recent research on attention suggests that people are able to selectively attend to a specific sensory modality [25]. It has been shown that people respond more rapidly to stimuli in an expected (i.e., attended) sensory modality than when that modality is unexpected [26,27]. This methodology was developed in the current task to examine whether viewing pictures of threatening and/or body-related stimuli can lead to bias in attention towards the tactile modality (i.e., body focus). In addition, we assessed whether performance on the task varied according to scores on the SSAS and a proxy measure of somatoform symptomatology [Somatoform Dissociation Questionnaire (SDQ-20)] [28].

Participants viewed pictures followed by either a tactile (vibration to the thumb) or a visual [illumination of a light-emitting diode (LED)] target stimulus presented to the left or the right. Participants were asked to make a speeded judgement about the location of the target stimulus, irrespective of presentation modality. Responses to visual and tactile targets were then compared to give an indication of attention towards touch versus vision. Using this approach, disproportionate body focus for certain individuals or picture types would be indicated by relatively quicker and more accurate responses to tactile targets than to visual targets.

The content of the pictures was varied such that half were body-relevant (photographs of body parts) and half were body-irrelevant (photographs of scenes). We also varied picture valence, with half of the pictures being threatening (e.g., wounded hand; house on fire) and half being neutral (e.g., normal hand; normal house). We also varied the time between the picture cue and target stimuli [stimulus onset asynchrony (SOA)]. In this way, we tested whether individuals scoring high on a proxy measure of somatoform symptoms showed a greater bias towards tactile stimuli than low scorers and whether this bias was apparent (a) following all picture types; (b) following body-relevant pictures only; or (c) following threatening body-relevant pictures only. The