Journal of Anxiety Disorders 25 (2011) 1131–1138

Contents lists available at ScienceDirect

Journal of Anxiety Disorders

Health anxiety and attentional bias: The time course of vigilance and avoidance in light of pictorial illness information☆

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ARTICLE INFO

Article history:
Received 9 March 2011
Received in revised form 4 August 2011
Accepted 4 August 2011

Keywords:
Dot-probe task
Selective attention
Attentional bias
Health anxiety
Hypochondriasis
Anxiety sensitivity

ABSTRACT

Cognitive-behavioral models of health anxiety stress the importance of selective attention not only towards internal but also towards external health threat related stimuli. Yet, little is known about the time course of this attentional bias. The current study investigates threat related attentional bias in participants with varying degrees of health anxiety. Attentional bias was assessed using a visual dot-probe task with health-threat and neutral pictures at two exposure durations, 175 ms and 500 ms. A baseline condition was added to the dot-probe task to dissociate indices of vigilance towards threat and difficulties to disengage from threat. Substantial positive correlations of health anxiety, anxiety sensitivity, and absorption with difficulties to disengage from threat were detected at 500 ms exposure time. At an early stage (i.e., at 175 ms exposure time), we found significant positive correlations of health anxiety and absorption with orientation towards threat. Results suggest a vigilance avoidance pattern of selective attention associated with pictorial illness related stimuli in health anxiety.

1. Introduction

From a cognitive perspective (Beck, 1976), health anxiety occurs because a particular internal stimulus (i.e., a body sensation) is misjudged to be a threat to health (i.e., a symptom of illness) and one's ability to prevent the feared illness is perceived as insufficient (Warwick, 1989). A cognitive-behavioral model of hypochondriasis and health anxiety that helps to explain how hypochondriasis develops and is maintained was proposed by Salkovskis and Warwick (2001). In this model, not only internal stimuli (i.e., bodily sensations) but also external stimuli (e.g., images, information about illness) act as triggering events in a vicious circle of body sensations, their catastrophic interpretation, and affective, attentional, behavioral, and physiological consequences that foster the detection of more body sensations (Warwick, 1989, p. 708). Additionally, not only external but also internal intrusive images seem to play an important role in health anxiety as Muse, McManus, Hackmann, Williams, and Williams (2010) and Wells and Hackmann (1993) concluded in studies with patients suffering from hypochondriasis. In this regard, Muse et al. (2010) reported that 72% of the patients with hypochondriasis experienced recurrent, intrusive images that were either a memory of an earlier situation or strongly related to such a memory.

Regarding the distribution of health anxiety, the model of Warwick and Salkovskis (1990) assumes that health anxiety represents a continuous construct ranging from mild and transient symptoms to full-blown hypochondriasis. This continuum hypothesis of health anxiety has recently also been empirically confirmed by two independent taxometric analyses (Ferguson, 2008; Longley et al., 2010). The model of Warwick and Salkovskis (1990) is very similar to other models of hypochondriasis and health anxiety, e.g., the conceptual hypochondriasis model by Abramowitz, Schwartz, and Whiteside (2002) and a cognitive development model by Williams (2004). All of these models agree on the assumption that an attentional bias towards both, internal and external health threat stimuli is one key aspect in the development and maintenance of health anxiety and hypochondriasis. It is therefore reasonable to assume that the attentional system of health anxious people is distinctively sensitive to and biased in favor of health threat-related stimuli (for a review of cognitive abnormalities in health anxiety see Marcus, Gurley, Marchi, & Bauer, 2007). Somatosensory amplification (Barsky, Wyshak, & Klerman, 1990) is an example for how symptom focused attention plays an important role in health anxiety. Somatosensory amplification refers to the tendency to experience weak somatic sensation as unusually intense and involves bodily hypervigilance to those sensations which are often interpreted as signs of a severe illness. This attentional bias operates as a confirmatory filter: i.e., it exaggerates

☆ The authors would like to thank Andrea Lees, Karin Mogg and Brendan P. Bradley who allowed us to use the pictures from their study.
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doi:10.1016/j.janxdis.2011.08.004

sensations that confirm the hypothesis of an illness and suppresses contradictory sensory input (Barsky, 2001).

1.1. Attentional biases in general anxiety and health anxiety

As described in a recent meta-analysis (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007), a large amount of research exists demonstrating the presence of attentional bias across different types of anxiety disorders and with different experimental paradigms. Given these findings, it is surprising that there has not been much research concerning the role of attentional bias in health anxiety. Most studies investigating the relation between health anxiety and attentional bias used the emotional Stroop task (e.g., Lecci & Cohen, 2002, 2007; Witthöft, Rist, & Bailer, 2008) which is based on the assumption that the emotional intrusion of salient stimuli leads to a slowing of color naming RTs. However, the emotional Stroop task falls short of dissociating the detailed processes involved in selective attention (e.g., processes of engagement and disengagement). Additional research on attentional bias in health anxious subjects stems from a study by Brown, Kosslyn, Delamater, Fama, and Barksy (1999) who compared hypochondriacal patients and controls using a degraded word task. They report an unexpected bias against reporting health-threat words in the hypochondriacal group. Other experimental paradigms as the spatial cueing task (Posner, 1980) or visual search tasks (e.g., Öhman, Flykt, & Esteves, 2001) have provided support for the presence of an attentional bias towards threatening information in anxious subjects (Cisler & Koster, 2010) but yet have not been applied to the study of health anxiety. To the best of our knowledge there exists only one study (Lees, Mogg, & Bradley, 2005) examining the relationship of attentional bias and health anxiety using a dot-probe paradigm with illness related word and picture stimuli. Nevertheless, there are studies that report a relationship between anxiety sensitivity (which is defined as the fear of anxiety symptoms, e.g., Reiss, 1987) and the dot-probe task featuring words as stimuli in both, non-clinical participants (Hunt, Keogh, & French, 2006; Keogh, Dillon, Georgiou, & Hunt, 2001; Roelofs, Peters, van der Zijden, Thielen, & Vlaeyen, 2003) and a sample including controls and patients suffering from chronic headache (Asmundson, Carleton, & Ekong, 2005). There seems to be a close relationship between anxiety sensitivity and health anxiety for patients suffering from panic disorder (Otto, Pollack, Sachs, & Rosenbaum, 1992, p. 98) and depression (Otto, Demopulos, McLean, Pollack, & Fava, 1998). Stewart, Sherry, Watt, Grant, & Hadjistavropoulos (2008) studied the relationship between anxiety sensitivity and health anxiety in a student sample and also reported large correlations between both constructs. Nevertheless, they concluded that both constructs are better represented by two correlated but distinct traits compared to one single construct. Keogh et al. (2001) conducted a dot-probe task with physical-threatening words as stimuli (e.g., agony, harm, and hurt injury) and report a significant correlation of $r = .28$ for the dot-probe index (i.e., an attentional shift towards health threat words) with the physical facet of anxiety sensitivity in a sample of healthy psychology students. Lees et al. (2005) compared the attentional bias of participants who scored either high or low in the Illness Attitude Scales (IAS, Kellner, 1981). They only found a significant group effect in the dot-probe task with picture stimuli (instead of word stimuli) in the 500 ms exposure condition (instead of 1250 ms) after they reallocated the participants of the experimental groups by their scores on an anxiety sensitivity test. No effect was found for illness related word stimuli, which is supported by the findings of Bar-Haim et al. (2007) who reported a stronger attentional bias towards threat stimuli when using pictorial stimuli. In an attempt to replicate and extend the findings of Lees et al. (2005), we therefore decided to use a dot-probe task with pictorial stimuli and enlarged the number of trials instead of additional non-pictorial trials. A positive side effect of this procedure should be an enhancement of the reliability of the dot-probe task. The reliability of the dot-probe paradigm is an important and well known problem in both, clinical and non clinical-samples (e.g., Schmukle, 2005; Staugaard, 2009). As Schmukle (2005) points out, the reliability of experimental measures as the dot-probe task is usually not reported. This is surprising because there are no technical reasons that hinder the calculation of such measures.

1.2. Processes of engagement and disengagement and the time course of attentional biases

While it is agreed upon that attentional bias towards threat exists, there is still an ongoing debate if it comprises facilitated attention to threat, difficulty in disengagement from threat or even both (Cisler, Bacon, & Williams, 2009; Cisler & Koster, 2010; Fox, Russo, & Dutton, 2002). Traditionally, the dot-probe effect is calculated as the mean reaction time difference between the trials when the probe appears instead of the neutral stimulus and when it appears instead of the threat stimulus (MacLeod, Mathews, & Tata, 1986). Recent findings by Koster, Crombez, Verschuere, and Houwer (2004), Koster, Crombez, Verschuere, and Houwer (2006) suggest that one should add baseline trials to the dot-probe procedure that only include neutral stimuli to identify if the dot-probe effect is a result of vigilance towards threat or difficulty to disengage from the threat stimuli. The average RT difference between the baseline (only neutral pairs) and trials where the probe appears at the former position of the health-threat stimuli can be called *orienting index* with a positive value indicating an orienting towards the threat. Additionally, the average difference in RT between the mixed neutral-threat trials where the probe appears at the position of the neutral stimulus and the baseline is called *disengagement index*, and a positive value indicates difficulties to disengage from the threat stimuli (Koster et al., 2004). In order to distinguish between disengagement from and orienting towards the threat, we added baseline trials to the original dot-probe procedure (Lees et al., 2005; MacLeod et al., 1986). Koster et al. (2004) reported evidence for a difficulty to disengage from threat as an explanation of the dot-probe effect in a student sample. This pattern also occurred when they compared preselected high and low trait anxious students (Koster et al., 2006). Salemink, van den Hout, and Kindt (2007) examined the two indices in a study that compared high and low anxious participants. They also reported evidence for a difficulty to disengage from threat as the rationale underlying the dot-probe paradigm. Accordingly, we especially expect positive correlations between the disengagement index (i.e., slower disengagement) and the measures of health anxiety and anxiety sensitivity. Bar-Haim et al. (2007, p. 10) reported group differences between anxious and control participants in dot-probe experiments that were significant for the traditional exposure time of 500 ms (MacLeod et al., 1986) and shorter presentations but failed to reach significance with longer exposure times (>1.000 ms). As pointed out by Bradley, Mogg, and Millar (2000), the exposure time of 500 ms in the dot-probe task is quite long and more than one shift of attention could occur in this timeframe which complicates the interpretation of the task. Thus, it can be regarded as a shortcoming of the dot-probe task itself (Cooper & Langton, 2006) that it only offers information about the attentional process at one particular point in the time course of attention (e.g., 500 ms after threat exposure). This shortcoming can only be bypassed by the implementation of more than one exposure duration. Weierich, Treat, and Hollingworth (2008) explain that disengagement and orienting processes do not have to contradict each other because one could expect vigilance towards a stimulus at an early stage of