Short communication

Attentional biases in illness anxiety: Null findings from the dot probe paradigm

Ryan J. Jacoby [a,*], Michael G. Wheaton [a,b], Jonathan S. Abramowitz [a]

[a] University of North Carolina at Chapel Hill, Davie Hall, Campus Box 3270, Chapel Hill, NC 27599, United States
[b] Ferkauf Graduate School of Psychology, Yeshiva University, Bronx, NY 10461, United States

ARTICLE INFO

ABSTRACT

Consistent research using a variety of computer-based tasks demonstrates that individuals with anxiety symptoms exhibit attentional biases towards threatening stimuli. Whether or not attentional biases contribute to the development and maintenance of illness anxiety (IA), however, remains unclear given inconsistent findings in previous studies. The present study used the dot-probe paradigm to investigate the association between IA and selective attention to illness-relevant threat words. Contrary to hypotheses, higher levels of IA were not associated with preferential attention (i.e., faster reaction times for trials with short stimulus duration and longer reaction times for trials with long stimulus duration) to illness-specific threat words (e.g., "cancer") more so than to general-threat or neutral words. Given the variety of methodologies and mixed findings regarding attentional biases in individuals with IA, such reporting of null findings is important to elucidate where true relationships exist.

© 2016 Elsevier Inc. All rights reserved.

1. Introduction

Illness anxiety (IA; also known as "health anxiety") is characterized by excessive fear and preoccupation with the idea that one might have a serious medical disease (e.g., AIDS). Such concerns are typically triggered by unexplained bodily sensations or perturbations. Individuals with IA engage in excessive health-related safety seeking behaviors including body checking (e.g., inspecting moles for skin cancer) and reassurance seeking (e.g., from doctors) in order to reduce distress. They may also avoid situations and stimuli that trigger health-related concerns (e.g., hospitals, news stories about illnesses). Although safety behaviors and avoidance often engender an immediate reduction in anxiety, they maintain IA in the long-run by preventing its natural extinction (Abramowitz, Schwartz, & Whiteside, 2002; Deacon, & Abramowitz, 2008). Although fears of illness and disease are common in the general population, the clinical diagnosis of Illness Anxiety Disorder (IAD; formerly termed hypochondriasis) is used when IA (a) is extreme relative to any objective medical threat, and (b) persists despite appropriate medical evaluation and assurance of good health (American Psychiatric Association, 2013).

Although considered a Somatic Symptom Disorder in DSM-5 (American Psychiatric Association, 2013), previous authors have discussed the topographic and functional commonalities between IA and the Obsessive Compulsive and Related Disorders (OCRDs; Abramowitz & Braddock, 2006; Abramowitz & Jacoby, 2014; Abramowitz et al., 2002; Deacon & Abramowitz, 2008; Noyes, 2001; Olatunji, Deacon, & Abramowitz; 2009). Indeed, in the proposal for the World Health Organization (WHO)'s upcoming revision of the International Classification of Diseases and Related Health Problems (ICD-11) recommends the removal of IAD from the Somatoform Disorders grouping and reclassifying it as an OCRD. The working group's justification of this move is due to the shared core features of unwanted thoughts and functionally related repetitive behaviors that are targets for clinical intervention in both obsessive compulsive disorder (OCD) and IAD (Stein et al., 2016).

Cognitive-behavioral models of IA (e.g., Abramowitz et al., 2002) propose that one primary maintaining factor of this problem is attentional bias for threat, which refers to the preferential processing of danger-related stimuli over neutral stimuli when both types of stimuli are competing for processing priority (MacLeod, Mathews, & Tata, 1986). More specifically, individuals with IA are thought to hold health-related dysfunctional beliefs (e.g., "To be in good health means one should be symptom-free") that lead to hypervigilance to both external (e.g., hearing about a deadly flu strain on the news) and internal somatic cues (e.g., headache). This hypervigilance increases opportunities to notice and make catastrophic misinterpretations of benign bodily changes (Deacon & Abramowitz, 2008; Olatunji, Deacon, Abramowitz, & Valentiner, 2007). As a result, individuals with IA experience difficulty

disengaging from somatic stimuli. The resulting anxious arousal they experience while worrying about illness further reinforces beliefs that there is something seriously wrong with their health, maintaining the vicious cycle.

Research consistently suggests that individuals with anxiety demonstrate attentional biases towards fear-relevant threatening stimuli (Pergamin-Hight, Naim, Bakermans-Kranenburg, van IJzendoorn, & Bar-Haim, 2015). Two computer-based laboratory paradigms are most frequently used to quantify this bias. First, in the emotional Stroop task (MacLeod, 1991; Williams, Mathews, & MacLeod, 1996), participants are instructed to name the color of a word as quickly and accurately as possible, while ignoring its semantic meaning. Anxious participants tend to have slower reaction times (RTs) during trials involving threatening (vs. neutral) words, theoretically due to their attention being diverted to the word's meaning. Second, in the dot probe task (MacLeod et al., 1986) participants are asked to rapidly discriminate between two letters (i.e., probes) that follow two stimulus words (one threatening and one neutral). Anxious participants tend to selectively attend to the location of the more threatening stimulus word, and thus respond more quickly when the probe letter appears in the same location of the threatening (vs. neutral) word. In contrast, individuals without anxiety tend to show equal RTs regardless of probe location, indicating no preferential bias towards threat (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007).

More recently, dot probe studies in particular have begun to elucidate the temporal characteristics of attentional bias by examining various stimulus durations. These studies differentiate between *automatic* processing of stimuli that occur in the early stages of attention processing (i.e., outside conscious control) versus later *strategic* (goal-directed) processing (i.e., that can be effortfully controlled; McNally, 1995). Better understanding attentional biases at early versus late stages of information processing would facilitate an examination of the *mechanisms* by which an attentional bias occurs. Some authors have found preliminary support for a "vigilant-avoidant pattern" of cognitive bias in anxious individuals (Koster, Verschuere, Crombez, & Van Damme, 2005; Mogg, Bradley, Miles, & Dixon, 2004) in which they initially automatically orient toward threat cues, and then subsequently direct attention away from threat as a strategic attempt to alleviate anxiety. In other words, during early stages of information processing (e.g., 17 ms) anxious individuals are hypothesized to demonstrate bias *towards* threat because of facilitated detection (i.e., hypervigilance). Then at medium stimulus durations (e.g., 500 ms) they are expected to show bias towards threat due to difficulty disengaging from the threat. Finally, at longer stimulus latencies (e.g., 1250 ms) these individuals are expected to have a bias *away* from threat due to purposefully attending away from threatening cues (i.e., avoidance; Cisler & Koster, 2010).

There are methodological advantages to using experimental procedures and measures to identify cognitive processes in IA versus relying on self-report measures. First, cognitive (e.g., "When I feel pain in my chest, I worry that I'm going to have a heart attack") and symptom (e.g., "Do you worry a lot about your health?") self-report measures of IA are limited by their considerable conceptual overlap (Marcus, Gurley, Marchi, & Bauer, 2007), which may artificially inflate relationships among these constructs. Second, attentional processes may operate outside of conscious awareness, and thus individuals may be inaccurate in their self-assessment of their own attention to body-related cues.

To date, however, there has been limited and conflicting research regarding attentional bias in IA. On the one hand, studies have found support for attentional biases in individuals with elevated health concerns (Gropalis, Bleichhardt, Hiller, & Witthöft,

2013; Jasper & Witthöft, 2011; Karademas, Christopoulou, Dimostheni, & Pavlu, 2008; Kaur, Butow, & Sharpe, 2013; Kim, Kim, & Lee, 2014). For example, one study using the emotional Stroop task reported that individuals high in IA attended more to illness-relevant threat stimuli compared to those with moderate and low IA (Owens, Asmundson, Hadjistavropoulos, & Owens, 2004). That is, these individuals were significantly slower to color-name illness words (e.g., "cancer") compared to neutral (e.g., "chair") and general threat words (e.g., "knife"). Yet, several other studies find that attention bias is associated with some measures of IA, but not with others (Lecci & Cohen, 2002; Lee et al., 2013; Lees, Mogg, & Bradley, 2005), and other investigations suggest that participants high in IA do *not* differ from a low IA group in attentional bias (Witthöft, Rist, & Bailer, 2008). Only one study on IA has included more than one duration of dot probe stimuli (Jasper & Witthöft, 2011), and findings supported the vigilance-avoidance pattern mentioned previously; thus research is needed to clarify mechanisms of attentional biases in IA samples.

In light of this mixed literature, the present study used the dot probe paradigm to further investigate the extent to which IA is associated with preferential attention to illness-relevant threat stimuli. Strengths of the study are the inclusion of: (1) both general and illness threat words to investigate whether attention bias towards threat is specific to illness-related stimuli, and (2) multiple stimulus durations (17 ms, 500 ms, and 1250 ms, described below) in order to determine the extent to which IA attentional biases have an automatic versus goal-directed mechanism (Cisler & Koster, 2010). Due to computer error, however, the data from the 17 ms trials were unusable (described further below); thus, the results of the current study focus on the 500 ms and 1250 ms trials.

We tested two sets of primary hypotheses: first, on 500 ms trials, we predicted that higher levels of IA would be associated with faster RTs on trials in which the probe appears in the same spatial location of a threat word (i.e., *probe-in-threat vicinity*) compared to when the probe appears in the same spatial location of a neutral word (i.e., *probe-in-neutral vicinity*), indicating fast orienting to threat at short stimulus durations. We expected that individuals with lower levels of IA would not display this bias. We expected the opposite results for the 1250 ms trials. Specifically, on 1250 ms trials, we predicted that higher levels of IA would be associated with *slower* RTs for probe-in-threat compared to probe-in-neutral trials indicating effortful avoidance of illness threat words at longer stimulus durations (and that individuals with lower IA would not display this bias). In other words, we expected that IA would be a factor in attention towards threat generally (i.e., averaging across threat word type) and that this effect would differ depending on the stimulus duration (vigilance for threat at 500 ms vs. avoidance of threat at 1250 ms), resulting in a 3-way (IA × probe vicinity × stimulus duration) interaction (Hypothesis 1).

For our second set of hypotheses, we predicted that the differential associations expected in Hypothesis 1 would be especially pronounced when the threat word was *illness-specific* (e.g., tumor) versus a general threat word (e.g., knife). In other words, we hypothesized that IA would be a factor in attention toward illness-specific threat (vs. general threat), and that this effect would differ depending on the stimulus duration (vigilance for threat at 500 ms vs. avoidance of threat at 1250 ms), resulting in a 4-way (IA × probe vicinity × stimulus duration × threat word type) interaction (Hypothesis 2).