

The Influence of Anticipatory Processing on Attentional Biases in Social Anxiety

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Research on cognitive theories of social anxiety disorder (SAD) has identified individual processes that influence this condition (e.g., cognitive biases, repetitive negative thinking), but few studies have attempted to examine the interaction between these processes. For example, attentional biases and anticipatory processing are theoretically related and have been found to influence symptoms of SAD, but they rarely have been studied together (i.e., Clark & Wells, 1995). Therefore, the goal of the current study was to examine the effect of anticipatory processing on attentional bias for internal (i.e., heart rate feedback) and external (i.e., emotional faces) threat information. A sample of 59 participants high (HSA) and low (LSA) in social anxiety symptoms engaged in a modified dot-probe task prior to (Time 1) and after (Time 2) an anticipatory processing or distraction task. HSAs who anticipated experienced an increase in attentional bias for internal information from Time 1 to Time 2, whereas HSAs in the distraction condition and LSAs in either condition experienced no changes. No changes in biases were found for HSAs for external biases, but LSAs who engaged in the distraction task became less avoidant of emotional faces from Time 1 to Time 2. This suggests that anticipatory processing results in an activation of attentional biases for physiological information as suggested by Clark and Wells.

Keywords: social anxiety; attentional bias; anticipatory processing; combined cognitive bias hypothesis

COGNITIVE THEORIES OF PSYCHOPATHOLOGY propose that cognitive processes, including repetitive negative thinking (e.g., rumination, worry) and information processing, play a role in the etiology and maintenance of mental disorders (Clark & Wells, 1995; Rapee & Heimberg, 1997). In support of such theories, research suggests that socially anxious individuals are vigilant for threat information, interpret neutral stimuli as negative, and possibly preferentially remember negative socially relevant information (e.g., Amir & Bomyea, 2010; Amir & Foa, 2001; Cisler & Koster, 2010; Morgan, 2010; Schultz & Heimberg, 2008). Recent research also suggests that various forms of repetitive negative thinking (RNT) influence symptoms of psychopathology (e.g., McEvoy, Watson, Watkins, & Nathan, 2013; Olatunji, Naragon-Gainey, & Wolitzky-Taylor, 2013) and affect cognitive resources (e.g., Watkins, 2008; Watkins & Brown, 2002). Although recent studies have suggested that RNT styles may interact with each other (Grant & Beck, 2010) and/or with cognitive biases (Williams, Mathews, & Hirsch, 2013), research typically examines cognitive processes in isolation (Hirsch, Clark, & Mathews, 2006). The goal of the current report was to expand this literature by evaluating how cognitive processes interact to predict information processing biases among socially anxious individuals.

The social anxiety literature suggests that both cognitive biases and RNT may influence symptoms of social anxiety, but no studies to our knowledge have

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examined both simultaneously. Anticipatory processing has been an understudied component in the SAD literature, but recently researchers have implicated this form of RNT in potentially maintaining symptoms of social anxiety (e.g., Hinrichsen & Clark, 2003; Mills, Grant, Lechner, & Judah, 2013; Vassilopoulos, 2004, 2005a, 2008; Wong & Moulds, 2011, 2012). Clark and Wells (1995) described anticipatory processing as a period of anxious, future-oriented intrusive RNT that individuals with social anxiety engage in prior to a social situation. Anticipatory processing includes memories of past social failures, negative self-images, catastrophic predictions, and plans to escape or avoid the situation (Clark & Wells; Hinrichsen & Clark). Clark and Wells hypothesize that this process results in socially anxious individuals entering a “self-focused processing mode” in which they expect to fail and are less likely to notice signs of acceptance (p. 74). With this description, Clark and Wells suggest that anticipatory processing, an anxiety-related thinking style, is distinct from self-focused attention, which is intense self-monitoring for signs of threat.

Despite the fairly straightforward predictions of Clark and Wells (1995), anticipatory processing has received relatively less empirical attention than other components in the model. Recent studies have identified a wide variety of outcomes and correlates of anticipatory processing, and results generally suggest that this process is an influential component of social anxiety (e.g., Hinrichsen & Clark, 2003; Mills et al., 2013; Mills, Grant, Judah, & Lechner, *in press*; Vassilopoulos, 2004, 2005a, 2008; Wong & Moulds, 2011, 2012). However, this literature has been somewhat limited in the extent to which it has evaluated Clark and Wells’ predictions with respect to anticipatory processing, and the mechanisms linking anticipatory processing to the maintenance of social anxiety symptoms have yet to be explored. One potential mechanism, as originally proposed by Clark and Wells, is attention.

Researchers have generally concluded that individuals high in social anxiety symptoms initially engage in biased information processing toward threatening stimuli (e.g., hypervigilance; Mogg, Philippot, & Bradley, 2004; Vassilopoulos, 2005b; Wieser, Pauli, Weyers, Alpers, & Mühlberger, 2009). Most studies of attentional biases in social anxiety have examined attention toward external threat stimuli, but several studies have attempted to examine attention toward internal threat stimuli, which is generally conceptualized as physiological signs of anxiety. Two studies to our knowledge have evaluated attention toward internal and external stimuli presented simultaneously using tactile probes on participants’ fingers that provided false feedback about physiological changes prior to a social task

(Deiters, Stevens, Hermann, & Gerlach, 2013; Mansell et al., 2003). Both studies found attentional bias for internal stimuli only for socially anxious participants during anticipation of the social task. Similarly, Pineles and Mineka (2005) evaluated internal attentional biases using images of heart rate waveforms (threat) and sound waveforms (neutral), and they informed participants that the heart wave images were depictions of their current heart rate. External threat stimuli were emotional faces, similar to other studies. They also found a bias toward heart rate images for high socially anxious participants (HSAs) anticipating the speech task, but there was no bias for HSAs who were not told of an upcoming speech, suggesting that the social threat initiated the bias. Although the authors in these studies did not manipulate anticipatory processing, it is possible that HSAs began engaging in anticipatory processing prior to the threatened social event, which resulted in the activation of the attentional bias.

To our knowledge, only one study to date has examined the specific relationship between anticipatory processing and attention (Mills et al., *in press*). Participants high in social anxiety symptoms (HSA) and nonanxious controls (NCs) engaged in an anticipatory processing or a distraction task and then completed measures of attentional focus and interpretation bias. HSAs who engaged in anticipatory processing had the highest mean scores for internal focus of attention (e.g., anxiety level, bodily sensations), suggesting that this process facilitated internal focus only for HSAs. Furthermore, HSAs who engaged in anticipatory processing had higher negative interpretation scores than those in the distraction condition, and the relationship between anticipation and negative interpretations was mediated by self-focus scores. These results provide support for Clark and Wells’ (1995) suggestion that anticipatory processing results in an inward shift of attentional focus, which subsequently results in negative interpretations. However, the study relied solely on a brief self-report measure of attention, which limits the generalizability of the results. Furthermore, attention data were collected at only one time point, which prevents any conclusions about changes in attentional focus.

Therefore, the purpose of the current study was to examine the effects of anticipatory processing on attentional biases for internal (i.e., physiology) and external (i.e., emotional faces) stimuli in order to determine how this form of RNT influences attention. These results have the potential to inform cognitive theories and treatments of social anxiety disorder (SAD) by identifying one specific mechanism for the activation of attentional biases, the latter of which have been implicated as a maintenance

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