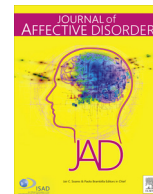




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Research paper

Vigilance-avoidance and disengagement are differentially associated with fear and avoidant behaviors in social anxiety

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ABSTRACT

Background: Individuals with Social Anxiety Disorder (SAD) often exhibit preferential attention for social threat, demonstrating abnormal orientation to threat (i.e., vigilance-avoidance) and/or difficulty disengaging from threat. However, no research has compared the relationship between attention indices (i.e., vigilance-avoidance, difficulty disengaging from threat) and characteristic features of the disorder such as fear during social situations (social fear) and avoidant behaviors (social avoidance).

Method: To address this issue, seventy adults (19.29 ± 1.47 years, 33 females) were separated into low ($n=37$) or high ($n=33$) socially anxious groups using clinical cutoff scores on the Social Interaction Anxiety Scale (SIAS). Participants in both groups completed a dot-probe task with congruent, incongruent, and neutral trials to obtain measures of vigilance-avoidance and difficulty disengaging. Using linear regression, we examined the associations each attention index shared with self-reported social fear and social avoidance.

Results: Exclusively in the high anxious group, greater vigilance towards threat was associated with higher self-reported social fear, but not with social avoidance. However, difficulty disengaging was not associated with either social measure. In the low anxiety group, no relationships between attention indices and either social measure emerged.

Limitations: Future research with clinical samples is necessary to replicate and extend these findings. The small sample size studied may have limited our ability to detect other smaller effects.

Conclusions: Indices of attention bias may contribute differently to the etiology and maintenance of SAD, which offers important implications for novel treatments that target attention.

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1. Introduction

Social Anxiety Disorder (SAD) is characterized by excessive fear and avoidance of social situations, which cognitive models and empirical research suggest are causally influenced by maladaptive patterns of attention (Clark, 2001). In social anxiety, research has identified perturbations in both the initial orientation towards social threat and the disengagement of attention away from social threat. Compared to non-anxious individuals, separate studies have demonstrated faster or slower initial orientation to social threat (vigilance-avoidance), as well as slower disengagement from social threat (difficulty disengaging). It remains unclear, however, which index of attention is most closely associated with impairing features that characterize the disorder (Cisler and Koster, 2010). To address this issue, the aim of the current study is to

characterize the relationship between attention bias indices (vigilance-avoidance and difficulty disengaging) and key features of SAD (fear and avoidance of social situations).

In social situations, individuals with SAD fear negative social evaluation which elicits a negative emotional reaction (social fear). As a means to reduce or prevent social fear, individuals with SAD often make a decision to avoid social situations (social avoidance). Social fear and social avoidance may stem from preferential attention for social threats (e.g. negative facial expressions). Cognitive models of SAD propose that socially anxious individuals devote greater attentional resources to detecting social threats in the environment, which generates negative self-perceptions underlying social fear (Rapee and Heimberg, 1997). Moreover, greater detection of social threats is proposed to facilitate social avoidance to prevent negative social consequences (Rapee and Heimberg, 1997). Taken together, cognitive models suggest that preferential attention for social threat may be associated with both social fear and social avoidance.

Preferential attention for social threats is commonly assessed

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with a modified dot-probe task (MacLeod et al., 1986). In the dot-probe task, participants view a pair of images, one threatening and one non-threatening, followed by a probe in one of the locations previously occupied by the image. Most typically, attention bias in dot-probe paradigms is measured following 500 ms presentations of the faces (Bar-Haim et al., 2007). Vigilance to threat is indicated by faster responses to detect the probe in the location of the threatening, compared to non-threatening stimuli (for a review, see Cisler and Koster, 2010). Experimental research using the dot-probe task has demonstrated a causal relationship between attention patterns and stress reactivity in social anxiety (Amir et al., 2008; Heeren et al., 2011; Schmidt et al., 2009). However, other studies failed to demonstrate relationships between attention patterns and social anxiety (Heeren et al., 2015a, 2015b; Miloff et al., 2015). These mixed findings may stem from a failure to separately examine key components of attention bias.

Preferential attention for threat is purportedly comprised of different attention patterns with distinct underlying cognitive processes: initial orientation that is either faster or slower towards threat (*vigilance-avoidance*) and *difficulty disengaging* from threat (Cisler et al., 2009). Specifically, vigilance and avoidance are conceptualized as opposite patterns of initial orientation towards a stimulus (*vigilance-avoidance*), whereas disengagement is conceptualized as a separate, shifting of attention away from a stimulus once attention has been captured (Koster et al., 2004). When attention is measured at the same time point (e.g. 500 ms after stimulus), some studies demonstrate that individuals with SAD orient faster to social threat (i.e. vigilance); whereas other studies demonstrate slower orientation to social threat (i.e. avoidance) compared to non-anxious individuals (Klumpp and Amir, 2009; Vassilopoulos, 2005). These seemingly contradictory findings can be reconciled by recent research suggesting individual differences in attention within SAD whereby, some socially anxious individuals demonstrate vigilance and others demonstrate avoidance (Price et al., 2011). Additionally, individuals with social anxiety exhibit difficulty disengaging attention from social threat as evidenced by slower shifts in attention away from social threats (Amir et al., 2003; Buckner, et al., 2010). In contrast, non-anxious individuals do not demonstrate abnormalities in any of these attention indices (Chen et al., 2002; Mansell et al., 1999). Of note, research has also demonstrated that different patterns of attention may be observed depending on stimulus duration (e.g. 200 ms vs. 2000 ms). For example, longer stimulus durations facilitate measurement of avoidance, but preclude measurement of difficulty disengaging attention (Mogg et al., 2004; Koster et al., 2006; Weinberg and Hajcak, 2011; Koster et al., 2004; Matlow et al., 2012). Studies that decompose attention indices primarily utilize a stimulus duration of 500 ms given that it allows assessment of individual differences in both orientation and disengagement of attention (e.g. Koster et al., 2004; Matlow et al., 2012; Taylor et al., 2015; Cisler and Olatunji, 2010).

In social anxiety, initial orientation and disengagement from threats may stem from different underlying cognitive processes. The initial orientation of attention towards threat may be a predominantly automatic response, whereas disengagement of threat may involve greater involvement of attentional control via top-down mechanisms (Cisler and Koster, 2010; Vroman et al., 2015). Consistent with this view, attentional control moderates disengagement of attention from social threat, but not initial orientation towards social threat in social anxiety (Taylor et al., 2015). Conclusions from this study suggest that the ability to exert top-down processes to shift attention does not influence initial vigilance or avoidance (i.e. maladaptive orientation), but specifically influences difficulty disengaging or “strategic” avoidance following attentional capture (i.e. maladaptive disengagement). Given these differences in underlying cognitive processes, each index of attention

bias may differentially influence features of SAD such as fear and avoidance of social situations that produce impairment. For example, research suggests that directing attention towards negative content increases negative reactivity, whereas directing attention away from negative content serves as a fear reduction strategy (Aue et al., 2013; Ferri et al., 2013).

In social anxiety, faster initial orientation (vigilance) towards social threat may be associated with experiencing greater social fear, whereas slower initial orientation to threat (avoidance) may be associated with experiencing less social fear (Rapee and Heimberg, 1997). However, top-down processes involved in the disengagement of attention may interact to either disrupt or strengthen the relationship between attention and fear (Bishop et al., 2004; Taylor, et al., 2015; Vroman et al., 2015). For example, difficulty disengaging produces longer visual engagement with negative stimuli, which allows the deployment of cognitive reappraisals that reduces negative affect in *non-anxious* individuals (Manera, et al., 2014). However, research has not identified a consistent link between utilization of cognitive reappraisal and social anxiety (Farmer and Kashdan, 2012). Therefore, it remains unclear how disengagement from social threat may influence features of social anxiety such as social fear and social avoidance.

Although research has compared anxiety-related differences in the *strength* of each attention bias index (i.e. attention bias scores), no research has compared the *relationship* each attention index shares with key features of social anxiety such as social fear and social avoidance. Individuals with SAD may demonstrate both abnormal orientation and engagement of attention, but only one attention index may produce functional consequences (e.g. experiencing greater fear in a social context). However, it remains uncertain if these attention indices play a similar, additive, or differential role in the etiology and maintenance of social anxiety. Comparing the functional consequences associated with attention indices may offer important implications for treatments that target attention in social anxiety (e.g., Attention Bias Modification; ABM), which have offered promising, albeit mixed, results.

To address this issue, we conducted a study to characterize how different indices of attention bias (i.e., vigilance-avoidance and difficulty disengaging) are associated with social fear and social avoidance at both low and high levels of social anxiety. Based on differences in underlying cognitive processes, we hypothesized that vigilance-avoidance and difficulty disengaging from threat would demonstrate differential relationships with social fear and social avoidance. Specifically, we hypothesized that vigilance-avoidance would be associated with greater and lower levels of self-reported social fear respectively. Given the close relationship between social fear and social avoidance, we expected a similar pattern of results for self-reported social avoidance. Given the greater influence of top-down processes on disengagement of attention, we predicted that difficulty disengaging would demonstrate a different pattern of relationships compared to vigilance-avoidance. However, we did not have *a priori* hypotheses about the specific direction of these differences given the lack of research comparing interactions among these factors in social anxiety.

2. Method and materials

2.1. Sample

Seventy six undergraduate students (19.29 ± 1.47 years, 33 females) at the University of Miami were recruited to participate in the current study. From a larger attention study, this sub-set of participants was selected for reporting low or clinically elevated levels of social anxiety on the Social Interaction Anxiety Scale (SIAS; Mattick and Clarke, 1998). Participants who reported SIAS

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