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Attentional control moderates the relationship between social anxiety symptoms and attentional disengagement from threatening information



Charles T. Taylor^{a,*}, Karalani Cross^a, Nader Amir^{a,b}

^a University of California, San Diego, Department of Psychiatry, 8939 Villa La Jolla Drive, Suite 200, La Jolla, CA 92037, USA

^b San Diego State University, Department of Psychology, 6386 Alvarado Court, Suite 301, San Diego, CA 92120-4913, USA

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ABSTRACT

Background and objectives: Social anxiety is characterized by biased attentional processing of social information. However, heterogeneity of extant findings suggests that it may be informative to elucidate individual difference factors that modulate the processing of emotional information. The current study examined whether individual differences in components of attentional control (AC – shifting and focusing) moderated the link between social anxiety and attentional engagement and disengagement biases for threat-relevant cues.

Methods: Seventy-five undergraduate students completed well-established measures of social anxiety symptoms, AC, and attentional bias for social threat information (modified probe detection task).

Results: Moderation analyses revealed that at low levels of AC-shifting, increased social anxiety was associated with slower disengagement from threat-relevant compared to neutral social cues. In contrast, at high levels of AC-shifting, social anxiety was associated with faster disengagement from threat-relevant compared to neutral stimuli. Individual differences in AC-focusing did not moderate the social anxiety-attentional bias link.

Limitations: Causal inferences cannot be made given the cross-sectional study design. The sample comprised individuals displaying a range of self-reported social anxiety symptoms; thus, generalizability to clinical samples remains to be established. The measurement of AC relied on subjective participant report.

Conclusions: The current findings underscore the importance of AC processes in understanding the nature of attentional bias mechanisms in anxiety.

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1. Introduction

The tendency to preferentially attend to threat-relevant social information is hypothesized to play an important role in the onset and maintenance of social anxiety disorder (SAD; Clark, 2001; Clark & Wells, 1995; Hofmann, 2007; Rapee & Heimberg, 1997). Although research generally supports this proposal (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007; Cisler & Koster, 2010), the corpus of extant studies points to variability in both the nature and magnitude of attentional biases that characterize individuals with elevated social anxiety symptoms (Chen,

Ehlers, Clark, & Mansell, 2002; Gotlib et al., 2004; Mansell, Clark, Ehlers, & Chen, 1999; Ononaiye, Turpin, & Reidy, 2007; Pineles & Mineka, 2005; Yuen, 1994). To the extent that attentional processes are important in understanding the etiology and/or persistence of SAD, it may be informative to elucidate individual difference variables that account for differential patterns of attentional responding to threat cues. Thus, the goal of the present study was to examine whether individual differences in components of attentional control, i.e., the capacity to use attentional resources to modulate processing of emotional stimuli (Derryberry & Reed, 2002), account in part for differential patterns of attentional biases observed across individuals with elevated social anxiety symptoms.

A commonly used paradigm to assess attentional bias for emotional information is the modified probe detection task

* Corresponding author.

E-mail address: c1taylor@ucsd.edu (C.T. Taylor).

(MacLeod, Mathews, & Tata, 1986; for a review see Bar-Haim et al. 2007). In this task, response latencies to identify a visual probe replacing one of two simultaneously presented stimuli are used to measure prioritization of attentional allocation for emotional compared to neutral stimuli. Although prior studies tend to support a link between social anxiety and preferential attentional allocation toward social threat relative to neutral information (Asmundson & Stein, 1994; Mogg & Bradley, 2002; Mogg, Philippot, & Bradley, 2004; Pishyar, Harris, & Menzies, 2004; see Bar-Haim et al., 2007 for a meta-analysis), there is also evidence to suggest that socially anxious individuals display an attentional bias away from threat-relevant social information (Chen et al., 2002; Mansell et al., 1999; Yuen, 1994), or do not display biased attentional responding to social threat versus neutral stimuli when compared to non-anxious control participants (Gotlib et al., 2004; Ononaiye et al., 2007; Pineles & Mineka, 2005). Together, these findings suggest that individual differences may contribute to varying patterns of attentional processing across individuals who experience elevated social anxiety symptoms.

Aside from examining the general association between social anxiety and attentional biases for threat, researchers have attempted to disentangle subcomponents of attentional mechanisms using variants of the probe detection task, namely enhanced engagement with threat-related stimuli (i.e., an attentional shift toward threat-related stimuli), or impaired disengagement from threat-related stimuli (i.e., difficulties shifting attention away from threat-related stimuli; Grafton & MacLeod, 2014; Grafton, Watkins, & MacLeod, 2012). Klumpp and Amir (2009) found that socially anxious individuals displayed increased engagement with threat-relevant faces in comparison to individuals without social anxiety. In contrast, other studies using similar methodology found that increased trait anxiety was associated with difficulty disengaging from threat-related information, but not engagement for threat-related stimuli (e.g., Koster, Crombez, Verschuere, & De Houwer, 2004; Salemink, van den Hout, & Kindt, 2007; see also Amir, Elias, Klumpp, & Przeworski, 2003 for similar findings using a spatial cueing task in a socially anxious sample). More recent refinements of the probe detection task designed to better disambiguate attentional engagement and disengagement mechanisms (Clarke, MacLeod, & Guastella, 2013) revealed that anxiety was associated with *both* increased attentional engagement with negative images as well as increased impairment with disengaging attention from negative images (Rudaizky, Basanovic, & MacLeod, 2014).

To summarize, previous studies suggest that (1) social anxiety is associated with distinct patterns of attentional processing in the context of threat-relevant social information in comparison to non-anxious individuals, including biases either toward or away from threat-relevant information; (2) these patterns of attentional processing may reflect enhanced engagement with and/or difficulties disengaging attention from threat-relevant information, or both; and (3) even within socially anxious samples, individuals vary considerably in the nature and degree of biased attentional processing. What might account for individual variability in patterns of attentional processing associated with social anxiety? As a step toward addressing this question, and to further understand the nature of extant findings and clarify the role of attentional processes in social anxiety, we drew on attentional control theory (Eysenck, Derakshan, Santos, & Calvo, 2007) as a model for understanding and making predictions about individual variation in attentional bias patterns associated with social anxiety.

Attentional control (AC) is defined as the ability to effortfully regulate attention to override automatic emotional responses (Derryberry & Reed, 2002). Corbetta and Shulman (2002) found evidence for stimulus-driven (i.e., a bottom-up process driven by

salient information) and goal-directed (i.e., a top-down process directed by knowledge and current goals) attentional systems. AC theory posits that anxiety disturbs the equilibrium between these two systems, such that the stimulus-driven system is more influential on attentional processing than the goal-directed system (Eysenck et al., 2007). By this account, a stimulus-driven attentional system characterized by hyper-responsiveness to emotionally salient stimuli paired with decreased regulation by the goal-driven system may lead to biased processing of salient, threat-relevant stimuli for anxious individuals.

Researchers have found that AC plays an important role in the relationship between anxiety and the processing of emotional information. In an influential study, Derryberry and Reed (2002) found that attentional bias for threat-related stimuli exhibited by individuals with elevated trait anxiety was moderated by AC. Individuals with higher AC were better at disengaging from threat in comparison to individuals with lower AC. Most relevant to the current study, past research has examined the role of AC in the relationship between anxiety and attentional bias to threat using probe detection paradigms. For example, Bardeen and Orcutt (2011) found that self-reported AC moderated the relationship between attentional bias for threat and posttraumatic stress symptoms (PTSS) such that individuals with low AC and high PTSS were more likely to attend to threat relative to neutral stimuli at shorter (i.e., 150 ms) stimulus presentation durations. Similarly, other studies have also shown AC as a moderator of the relationship between anxiety and attentional bias for threat-related stimuli (Hou et al., 2014; Schooli, Putman, Van Der Werff, & Van Der Does, 2014). These findings converge with a growing literature across numerous paradigms and measures suggesting that AC plays a role in the relationship between anxiety and the processing of emotional information (Reinholdt-Dunne, Mogg, & Bradley, 2009).

Despite growing evidence supporting the role of AC in modulating anxiety-related attentional processes, several questions remain unanswered. First, although AC has been shown to modulate affective and behavioral responses in relation to social anxiety (Jones, Fazio, & Vasey, 2012; Morrison & Heimberg, 2013), no studies to our knowledge, have examined the influence of AC on the relationship between social anxiety and attentional processes. Addressing this issue may explain, in part, variability in extant studies investigating the relationship between social anxiety and attentional biases. Second, AC has not been examined in relation to subcomponents of attentional processes linked to anxiety, namely attentional engagement and disengagement from threat-relevant stimuli. Thus, it remains to be established whether AC modulates specific attentional mechanisms (e.g., disengagement) or exerts more generic control over attentional processing. Third, AC itself is a multifaceted construct, and prior research supports empirically distinct dimensions underlying AC. Most relevant to the current study, factor analytic studies of the Attention Control Scale (ACS; Derryberry & Reed, 2002), a well-established self-rated measure of AC, revealed two dimensions underlying AC, namely shifting and focusing (Judah, Grant, Mills, & Lechner, 2014; Olafsson et al., 2011). The *shifting* dimension measures the ability to flexibly distribute attentional processes across multiple tasks that compete for cognitive processing resources (e.g., “It is easy for me to read or write while I’m also talking on the phone”), whereas the *focusing* dimension measures the ability to maintain attentional resources on task-relevant demands (e.g., “My concentration is good even if there is music in the room around me”). Examining subcomponents of both AC and threat-related attentional biases may provide a more precise understanding of information processing mechanisms that characterize social anxiety.

The goal of the present study was to examine whether dimensions of AC moderate the relationship between social anxiety

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