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Attentional blink impairment in social anxiety disorder: Depression comorbidity matters



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ABSTRACT

Background and objectives: Difficulties with attentional control have long been thought to play a key role in anxiety and depressive disorders. However, the nature and extent of attentional control difficulties in social anxiety disorder (SAD) are not yet well understood. The current study was designed to assess whether attentional control for non-emotional information is impaired in SAD when taking comorbid depression into account.

Methods: Individuals with SAD and healthy controls (HCs) were administered an attentional blink (AB) task in which they identified number targets in a rapid serial visual presentation stream of letters.

Results: Individuals with SAD and current comorbid depression exhibited reduced accuracy to identify a target that fell within the AB window after the presentation of a first target compared to individuals with SAD without current comorbid depression, as well as to HCs. The latter two groups did not differ from each other, and the three groups did not differ in accuracy for the second target when it was presented after the AB window.

Limitations: Although we included two clinical groups and the sample size for the non-comorbid SAD group was large, the comorbid SAD group was relatively small.

Conclusions: These results suggest that impaired attentional control among individuals with SAD may be limited to those suffering from current comorbid depression.

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1. Introduction

One mechanism thought to underlie social anxiety disorder (SAD) is attentional dyscontrol. In particular, heightened self-focused attention accompanied by undue capture of attention by social threat-relevant information in the environment is thought to contribute to difficulties maintaining attention on task-relevant goals in social situations (Clark & Wells, 1995; Heimberg, Brozovich, & Rapee, 2014). Moreover, post-event processing, or the ruminative review of one's actions and the reactions of others that occurs between social situations and that is typical of persons with SAD (Brozovich & Heimberg, 2008), has the potential to

perpetuate attentional dyscontrol even outside of the context of social situations.

Attentional control theory (Eysenck & Derakshan, 2011; Eysenck, Derakshan, Santos, & Calvo, 2007) provides a useful framework for conceptualizing attentional processing in SAD. Attentional control theory posits that high levels of anxiety impair the goal-directed attentional system (i.e., attentional control) by increasing the influence of the stimulus-driven attentional system. This imbalance results in biased attention toward salient stimuli, typically defined in terms of central location in the visual field, but also in terms of threat relevance. Highly anxious individuals are purported to have difficulties inhibiting and shifting attention away from task-irrelevant stimuli, especially when such stimuli are threat-relevant (Eysenck et al., 2007). In light of the suggestion that attentional dyscontrol in SAD may extend into the relative calm that separates anxiety-provoking experiences, it is plausible that difficulties with attentional control may occur not only in the

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context of task-irrelevant threat distractors, but also in the context of neutral distracting information. Whereas there are many studies on the former hypothesis, albeit with sometimes inconsistent results, far less is known about the latter hypothesis. If the broader tenets of attentional control theory extend to SAD, this could illuminate a potential transdiagnostic mechanism involved in the maintenance of anxiety disorders. In what follows, we review the literatures on attentional control in the context of 1) emotional task-irrelevant (threat) distractors and 2) non-emotional task-irrelevant (neutral) distractors, attempting to unify the findings under the framework of attentional control theory.

Evidence of attentional dyscontrol in SAD in the context of emotional task-irrelevant stimuli comes primarily from studies of attention bias to threat. Meta-analytic results on the dot-probe task, spatial cuing task, and emotional Stroop task indicate a moderate between-group effect size of attention bias to threat in individuals with SAD compared to non-anxious individuals ($d = .46$; Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007). Biases toward threat in individuals with SAD or elevated social anxiety have also been reported in various other paradigms, such as the emotional antisaccade task (Wieser, Pauli, & Mühlberger, 2009), emotional attentional blink task (for review see Van Bockstaele et al., 2014), and eye-tracking studies (e.g., Gamble & Rapee, 2010). Consistent with attentional control theory, observed biases have been attributed to biased engagement of attention with threat (enhanced stimulus-driven attention), difficulties disengaging attention from threat (impaired shifting away from threat), or both (e.g., Clarke, MacLeod, & Guastella, 2013).

Nevertheless, studies on attention bias to threat in SAD are not equivocal, with several studies reporting null results (e.g., Heeren, Mogoase, McNally, Schmitz, & Philippot, 2015) or attention biases away from threat (see Bögels & Mansell, 2004). These discrepancies are important, as they suggest the possibility of moderators of attention bias to threat. One likely moderator that is often neglected is depression comorbidity (Bar-Haim et al., 2007). Approximately 40–50% of individuals with a principal diagnosis of SAD also have major depressive disorder (MDD) or dysthymic disorder (Brown, Campbell, Lehman, Grisham, & Mancill, 2001), and depression has been associated with broad impairments in executive functioning (for a review, see Snyder, 2013). Indeed, attention bias toward threat in individuals with elevated social anxiety was nullified, or at least dampened, in those with comorbid depression (Grant & Beck, 2006; LeMoult & Joormann, 2012; Musa, Lépine, Clark, Mansell, & Ehlers, 2003).

In contrast to the vast attention bias literature, no study to date has examined whether attentional control in the context of neutral task-irrelevant stimuli in SAD is impaired. Three studies in undergraduate samples suggest this may be the case. In two studies, self-reported attentional control was negatively correlated with social anxiety, even after statistically controlling for the effects of depression (Moriya & Tanno, 2008; Morrison & Heimberg, 2013). In a third study, social anxiety was positively correlated with difficulty disengaging attention from non-emotional, task-irrelevant stimuli being held in working memory (Moriya & Sugiura, 2012). However, this effect was not moderated by working memory load. In theory, higher working memory load should be associated with a stronger association between anxiety and inhibitory difficulties, as attentional control resources are more consumed. Taken together, there is preliminary evidence of general attentional control difficulties in individuals with elevated social anxiety, but this research has been mostly limited to self-report studies, and the effects of depressive symptoms has only been considered through analyses of covariance, which may be

inappropriate in this context (Miller & Chapman, 2001).¹

To further our understanding of attentional dyscontrol in SAD, we sought to address the question of whether attentional control in the context of non-emotional stimuli is impaired in individuals with SAD, while also accounting for the often neglected and likely moderating effects of comorbid depression. Further, given criticisms of the psychometric properties of attention bias tasks often used in the anxiety disorders (e.g., Schmukle, 2005), we sought to use a well-established measure of attentional control, namely, the attentional blink (AB) task (see Martens & Wyble, 2010). The AB refers to the robust finding that accuracy to identify a second target (T2) following a first target (T1) in a rapid serial visual presentation (RSVP) stream of non-targets is relatively reduced when the lag between T1 and T2 is short (200–500 ms) compared to when it is long (over 500 ms). The reduced accuracy for short-delay T2 is thought to result from a temporary loss of attentional control (Di Lollo, Kawahara, Ghorashi, & Enns, 2005).

In the current study, we examined AB performance in non-anxious, non-depressed healthy control participants (HCs) and in individuals with generalized SAD, either with or without current comorbid depression (MDD or dysthymic disorder). We hypothesized that, compared to HCs, individuals with SAD would (a) exhibit impaired attentional control (i.e., reduced accuracy for T2 presented within the AB window compared to a baseline condition) and (b) this relative impairment would be greatest for those with current comorbid depression.

2. Methods

2.1. Participants

Participants were 166 individuals who met *Diagnostic and Statistical Manual for Mental Disorders*, Fourth Edition (DSM-IV; American Psychiatric Association, 1994) criteria for a principal diagnosis of generalized SAD, as well as 37 healthy control (HC) participants who met no criteria for any current or past psychiatric disorders. Participants with SAD were recruited as part of one of two larger randomized controlled trials, either comparing cognitive behavioral group therapy (CBGT) with mindfulness-based stress reduction (MBSR) and a waitlist control condition (Goldin et al., under review) or comparing MBSR to aerobic exercise (Jazaieri, Goldin, Werner, Ziv, & Gross, 2012). Of those with SAD, 26 (16%) met criteria for current comorbid MDD or dysthymic disorder (COM).

All SAD participants were excluded for any comorbid psychiatric disorders other than secondary diagnoses of generalized anxiety disorder, specific phobia, obsessive compulsive disorder, panic disorder, MDD, and dysthymic disorder. Additional exclusion criteria included previous completion of an MBSR course or regular meditation practice. For the Jazaieri et al. sample, individuals were also excluded for previous regular physical exercise practice, and for the Goldin et al. sample, past CBT for SAD. All participants were required to be between 21 and 55 years of age, speak fluent English, pass a magnetic resonance imaging safety screen, be right-handed, and report no current pharmacotherapy, current psychotherapy, or history of neurological or cardiovascular disorders. Participants provided informed consent in accordance with the Institutional Review Board at Stanford University. Participants with SAD were

¹ Moriya and Tanno (2010, 2011) found that individuals high in social anxiety exhibited relatively *enhanced* attentional resources under high perceptual load. However, perceptual load is thought to modulate early attentional resources (e.g., at the level of visual cortex), so these findings do not reflect attentional control at the cognitive level (Berggren & Derakshan, 2013).

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