Theory of Mind Impairments in Social Anxiety Disorder

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Social anxiety disorder (SAD) is a common psychiatric disorder characterized by a persistent, excessive fear and avoidance of social and performance situations. Research on cognitive biases indicates individuals with SAD may lack an accurate view of how they are perceived by others, especially in social situations when they allocate important attentional resources to monitoring their own actions as well as external threat. In the present study, we explored whether socially anxious individuals also have impairments in theory of mind (ToM), or the ability to comprehend others' mental states, including emotions, beliefs, and intentions. Forty socially anxious and 40 non-socially-anxious comparison participants completed two ToM tasks: the Reading the Mind in the Eyes and the Movie for the Assessment of Social Cognition. Participants with SAD performed worse on ToM tasks than did non-socially-anxious participants. Relative to comparison participants, those with SAD were more likely to attribute more intense emotions and greater meaning to what others were thinking and feeling. These group differences were not due to interpretation bias. The ToM impairments in people with SAD are in the opposite direction of those in people with autism spectrum conditions whose inferences about the mental states of other people are absent or very limited. This association between SAD and ToM may have important implications for our understanding of both the maintenance and treatment of social anxiety disorder.

SOCIAL ANXIETY DISORDER (SAD) affects 6.8% of American adults annually, and its lifetime prevalence is 12.1% (Kessler, Berglund, et al., 2005; Kessler, Chiu, Demler, & Walters, 2005). SAD is characterized by a marked, persistent fear of scrutiny and humiliation and by avoidance of social and performance situations (American Psychiatric Association, 2000). Cognitive-processing biases figure in the onset and maintenance of SAD (Constans, Penn, Ihen, & Hope, 1999). Attentional (Amir, Foa, & Coles, 1998; Hope, Rapee, Heimberg, & Dombeck, 1990), memory (Foa, Gilboa-Schechtman, Amir, & Freshman, 2000; Kim, 2004), imagery (Hirsch, Meynen, & Clark, 2004; Makkar & Grisham, 2011; Wells & Papageorgiou, 1999), and interpretive biases (Amir et al., 1998; Constans et al., 1999; Stopa & Clark, 2000; Voncken, Bogels, & de Vries, 2003) for threat-relevant information are evident in SAD.

Studies on interpretive bias suggest that people with SAD construe neutral and ambiguous stimuli as more threatening than do non-socially-anxious individuals. For example, Niels-Christensen, Stein, and Means-Christensen (2003) found that socially anxious individuals evaluated themselves negatively, and erroneously believed that others judged them negatively in a social interaction, implying they seemingly lack an accurate view of how others view them, consistent with an interpretation bias. Other research has suggested that socially anxious people possess abnormal processing of positive stimuli, including fearful responses to favorable feedback (for a review, see Kashdan, Weeks, & Savostyanova, 2011) and the absence of a positive interpretation bias that nonanxious individuals possess (Hirsch

& Mathews, 1997, 2000). It is also possible, however, that socially anxious individuals have difficulty comprehending the mental states of others irrespective of the valence or ambiguity of the stimulus. That is, they may be impaired in inferring and reasoning about others' beliefs, emotions, and intentions, and hence in predicting their thoughts and actions, especially in social situations. The cognitive capacity to identify and reason about mental states in other people is called theory of mind (Premack & Woodruff, 1978).

A term coined by researchers studying the cognitive abilities of chimpanzees, theory of mind (ToM) is both a critical adaptation for social functioning and an important developmental milestone in humans. Sabbagh (2004) delineates two component processes of ToM: "(1) detecting or decoding others' mental states based on immediately available observation information and (2) reasoning about those mental states in the service of explaining or predicting others' actions" (p. 210). Decoding abilities refer to basic skills, such as identifying facial expressions or following eye gaze, whereas reasoning abilities require higher-order skills such as detecting sarcasm or inferring that someone is upset because they did poorly on a job review (Sabbagh, 2004; Washburn, 2012).

People with ToM deficits have difficulty evaluating others' thoughts, and thereby experience social impairment that may contribute to functional impairment seen in autism (Baron-Cohen, 1995, 2005; Baron-Cohen, Leslie, & Frith, 1985; Frith, 1989) and schizophrenia (Brune, 2005; Corcoran, 2000; Couture, Penn, & Roberts, 2006). Likewise, it is possible that if individuals have trouble identifying and reasoning about others' emotions and intentions that they may experience anxiety when in social situations. Social anxiety and ToM ability correlate inversely among people with schizophrenia spectrum disorders; one interpretation of this finding is that "… fully intact ToM capacities have a protective effect against paranoia or that high levels of social anxiety have a negative impact on ToM" (p. 84; Lysaker et al., 2010). Similarly, others (Samson, Lackner, Weiss, & Papousek, 2012) found that people with high levels of social anxiety rated cartoons requiring an understanding of others' mental states ("ToM cartoons"), but not other cartoons, as less humorous than did people without social anxiety. However, only one study has examined ToM in individuals with diagnosed SAD (Washburn, 2012). This study found that nondepressed, socially anxious participants performed worse than nonanxious participants on one decoding measure of ToM, whereas individuals with comorbid depres-

sion and anxiety performed better on the task (one interpretation of enhanced decoding abilities in individuals with depression is that these individuals may be especially attentive to subtle social cues). However, the nondepressed, socially anxious group, which consisted of only nine participants, was rather small and hence perhaps underpowered to reveal group differences in the two other reasoning ToM tasks used in the study.

In the present study, we compared socially anxious and non-socially-anxious participants' performance on socially relevant ToM tasks that require participants to both decode others' emotions and reason about their mental states. We attempted to extend the findings of Washburn (2012) with the addition of a cognitive load condition. According to cognitive-behavioral models, people with SAD disproportionately allocate attentional resources to monitoring self-image, external threat, and personal expectations of how others will react to them in social situations (Rapee & Heimberg, 1997). This increased cognitive load, in turn, impairs performance on unrelated, complex cognitive tasks. Hope, Heimberg, and Klein (1990) found that socially anxious participants reported increased self-focused attention and performed less accurately than did nonanxious participants on a recall task following a social interaction. Hence, increased allocation of attentional resources may impair the processing of social information. If self-preoccupation impairs the ability to make accurate inferences about the mental states of other people, we would expect cognitive load to impair ToM ability in both non-socially-anxious comparison and socially anxious participants. To test this hypothesis, we gave half of the participants a memory task prior to completing the ToM measures. If, on the other hand, socially anxious participants have impairments in ToM irrespective of cognitive load, we would expect them to perform worse than non-socially-anxious participants in the no-load condition when they are presumably not self-monitoring.

Unlike interpretation bias paradigms, the tasks used in this study require that participants identify not only the emotions, but also the thoughts and intentions of others, irrespective of valence. By analyzing the errors that people make on these ToM tasks, one can discern whether participants' errors are due to an interpretation bias (in which case we would expect that they would choose answers more negative in valence than the correct answer) as well as the extent to which they are taking the perspective of others. These ToM tasks are ecologically valid in that they require that participants make real-time assessments of what other people are thinking and feeling and why they