Social anxiety and social cognition: The influence of sex

Scott R. Sutterby, Jeffrey S. Bedwell *, Jesse S. Passler, Andrew E. Deptula, Franklin Mesa

Department of Psychology, University of Central Florida, 4000 Central Florida Blvd., Orlando, FL 32816-1390, USA

ARTICLE INFO

ABSTRACT

Current theoretical models predict a negative relationship between social anxiety and performance on measures of social cognition, yet there appears to be relatively little research that directly examines this relationship and the potential interaction of sex. Two samples of undergraduates self-reporting either a high ($n = 27$; 59% female) or low ($n = 29$; 62% female) level of social anxiety on the abbreviated Social Phobia and Anxiety Inventory completed two social cognition measures: the Reading the Mind in the Eyes Test (Eyes Test) and The Awareness of Social Inference Test—Parts 2 and 3). A multivariate analysis of variance revealed a significant group by sex interaction on overall social cognition performance. Follow-up analyses indicated that males with high and low levels of social anxiety did not differ on any of the social cognition measures. In contrast, females with high social anxiety performed significantly better on the Eyes Test and the TASIT—Part 3 than females with low social anxiety. Contrary to expectations, results of this study suggest that females with high social anxiety may exhibit better-developed social cognition abilities than those with low social anxiety. These preliminary results have clinical implications in the treatment of individuals with social phobia.

© 2012 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

Social anxiety is a dimensional personality trait that involves a fear of negative evaluation by others in social or performance situations. In its mild form, the term is often considered to be synonymous with shyness, and the presence of mild social anxiety may even be adaptive when building social relationships (Vertue, 2003). However, those who fall toward the upper extreme of the continuum may experience a level of social anxiety that interferes with their daily functioning and causes marked distress; these individuals may subsequently be diagnosed with psychiatric disorders such as *social phobia* or the more chronic and pervasive *avoidant personality disorder* (American Psychiatric Association, 2000). There is evidence that the development of social anxiety begins early in infancy; data suggest that the emergence of social anxiety in adolescence and early adulthood can be predicted by an inhibited temperament in early childhood (Fox et al., 2005; Hirshfeld-Becker et al., 2007). It would stand to reason that this early inhibition, and later social anxiety, would decrease one's level of social experience and thus the development of social cognition—a term that generally refers "to the mental operations underlying social interactions, which include processes involved in perceiving, interpreting, and generating responses to the intentions, dispositions, and behaviors of others" (Green et al., 2005). This developmental relationship seems particularly possible given recent evidence that social cognition abilities also emerge early in life and continue to develop well into late adolescence (Dumontheil et al., 2010).

Previous research has provided initial support for the notion that elevated social anxiety may be associated with decreased performance on specific tests of social cognition across the stages of development. For example, Melfsen and Florin (2002) found that children with higher levels of social anxiety exhibited significantly longer reaction times during a facial affect recognition task, while Simonian et al. (2001) reported that level of social anxiety was negatively correlated with accuracy scores on a similar facial affect recognition task administered to children and adolescents. Furthermore, Banerjee and Henderson (2001) found that increased social anxiety, particularly among children reporting more frequent experiences of negative affect related to shyness, was negatively correlated with performance on a task assessing their understanding of others' motives for deceptive self-presentational displays as well as on a task assessing their ability to identify and interpret the consequences of an unintended faux pas committed by a character in a story.

Social cognition appears to be related to social anxiety in adulthood as well, as suggested by studies examining the relationship between social anxiety and specific components of emotional intelligence—a concept broadly defined as the ability to accurately process, monitor, and distinguish one's own emotions as well as the emotions of others. For instance, Summerfeldt et al. (2006) found a significant negative relationship between social anxiety and emotional intelligence; their results suggested that both the interpersonal (i.e., social awareness of other's emotions) and intrapersonal (i.e., self-awareness and self-expression of emotions) components of

---

* Corresponding author at: Department of Psychology, University of Central Florida, P.O. Box 161390, Orlando, FL 32816-1390, USA. Tel.: +1 407 823 5858; fax: +1 407 823 5862.

E-mail address: Jeffrey.Bedwell@ucf.edu (J.S. Bedwell).

emotional intelligence were highly related to social interaction anxiety. In addition, severity of social anxiety has been found to be negatively correlated with experiential emotional intelligence (i.e., basic-level emotional processing) among adults diagnosed with generalized social phobia (Jacobs et al., 2008). While these components of emotional intelligence are not necessarily representative of the full spectrum of social cognition abilities, these findings appear to lend support to the contention that social anxiety and compromised social cognition abilities may be linked.

The prediction of a negative relationship between social anxiety and performance on measures of social cognition is strengthened further by empirical findings suggesting that individuals with high social anxiety have a tendency to direct their attention away from social cues while simultaneously shifting their attention toward internal physiological processes, self-doubts, and negative thoughts regarding their own social performance (Amir et al., 1998; Mogg and Bradley, 2002; Vassilopoulos, 2005). Individuals with high social anxiety also appear to perceive and rate socially relevant stimuli as more negative than do controls (Coles et al., 2008; Heinrichs and Hofmann, 2001; Hirsch and Clark, 2004). In addition, recent research has reported dysfunctional activation in specific brain areas within the 'default mode network' among individuals with high social anxiety (Evans et al., 2009; Gentili et al., 2009; Sripada et al., 2009), and this brain network has been shown to be heavily involved with social cognition abilities in nonpsychiatric adults (Ochsner et al., 2004; Rilling et al., 2008). Given the extant literature demonstrating biased information processing associated with high social anxiety, it is reasonable to expect that these individuals may also experience difficulty when attempting to infer the attitudes, beliefs, and intentions of others. Preliminary findings from a recent study support this notion, and have suggested a negative relationship between social cognition performance and magnitude of an attention bias for socially relevant information among nonpsychiatric adults (Ribeiro and Fearon, 2010).

Despite these important clues in the empirical literature, there appears to be a paucity of published research that has examined whether social cognition performance appears to be linked with level of social anxiety. Although behavioral deficits in social skills have been noted in a subset of patients with social phobia (Beidel et al., 2010), it remains unclear whether these skill deficits are secondary to experiencing acute anxiety in social situations or enduring developmental deficits in social cognition. Research on this topic has the potential to inform psychosocial treatment techniques for individuals diagnosed with related psychiatric disorders by informing clinicians whether the focus should be on improving end-stage social behavior or on improving earlier-stage social cognition. The current study begins to address this question by assessing whether the personality trait of social anxiety relates to social cognition performance in a nonpsychiatric sample. Based on current theoretical models as well as recent empirical findings, we hypothesized that individuals reporting a high degree of social anxiety would perform worse on measures of social cognition as compared to individuals reporting a low degree of social anxiety.

We also planned to examine the effect of sex in our analyses as previous research has suggested that females generally outperform males on various tests of social cognition abilities, including empathy, cognitive and emotional perspective-taking, social inference, and 'mindreading' abilities, among others (Bosacki, 2000; Charman et al., 2002; Derntl et al., 2010; Ragsdale and Foley, 2011; Voracek and Dressler, 2006; Wakabayashi and Katsumata, 2011). Therefore, we predicted a main effect of sex such that females would outperform males on measures of social cognition across all participants. We also hypothesized a statistically significant social anxiety group by sex interaction, such that the predicted negative relationship between level of social anxiety and social cognition would be weaker in females than males, as their higher baseline levels of social cognition abilities may serve as a buffer against any detrimental influences of social anxiety upon social cognition test performance.

2. Method

2.1. Participants

A large number of undergraduate students ($N = 1523$) completed an online screening survey in exchange for academic credit; the survey included a basic demographic questionnaire, the Social Phobia and Anxiety Inventory-23 (SPAI-23; Roberson-Nay et al., 2007) to assess for the presence and severity of social anxiety symptoms, and a validity scale (Infrequency Scale; Jackson, 1984) to assess for evidence of a random response style. A total of 221 responses (14.51%) were excluded from the analysis for incomplete ($n = 114$) or invalid ($n = 107$) responding, resulting in a final recruitment pool of 1302 participants from the initial online screening phase.

Two groups were then defined for recruitment for social cognition testing in the laboratory: a low social anxiety group scoring in the bottom 10% on the SPAI-23 (i.e., raw score of 21 or below), and a high social anxiety group scoring in the top 10% (i.e., raw score of 39 or above). Recruitment efforts resulted in a final sample of 29 individuals in the low social anxiety group (62.1% female) and 27 individuals in the high social anxiety group (59.3% female) completing the social cognition tasks. A comparison of mean SPAI-23 scores between individuals in the final sample and nonrecruited individuals was not statistically significant, $t(222) = 1.64$, $P = 0.10$. The majority of participants in the final sample identified themselves as Caucasian (73.2%); 8.9% identified themselves as Hispanic/Latino, 7.1% as African American, 5.4% as Asian/Pacific Islander, and 5.4% as biracial. Participant age ranged from 18 to 25 years ($M = 19.07$, S.D. $= 1.57$). Exclusionary criteria for all participants included: (1) a history of significant head injury, neurological illness, or systematic medical diseases that may affect neurocognitive functioning; (2) being currently prescribed certain classes of medication that have a strong potential to decrease cognitive performance (i.e., benzodiazepines, tranquilizers, antipsychotics, or narcotic pain medications); and (3) reporting significant alcohol consumption or any other substance use within the past 24 hours.

2.2. Measures

2.2.1. The Reading the Mind in the Eyes Test—Revised Adult Version (Eyes Test; Baron-Cohen et al., 2001)

The Eyes Test assesses social sensitivity to facial expression, and was originally validated to measure social cognition abilities in nonpsychiatric adults as well as those diagnosed with Asperger's disorder and high-functioning autism. In this test, participants are presented with 36 black-and-white photographs depicting only the eye region of adult faces. Participants are asked to choose what the person is thinking or feeling from a list of four possible adjectives. Adults with Asperger's disorder and high-functioning autism tend to score lower than nonpsychiatric adults, and nonpsychiatric women generally score higher than nonpsychiatric men on this measure (Baron-Cohen et al., 2001).

2.2.2. The Awareness of Social Inference Test—Social Inference Tests (TASIT-SI; McDonald et al., 2006)

The TASIT-SI is comprised of 31 videotaped vignettes of social interactions, and is divided into two subtests: the Minimal Test (TASIT-Part 2) and the Enriched Test (TASIT-Part 3). For each vignette, the participant is asked to make judgments determining what the individual in the scene (1) believed or knew, (2) meant by what he or she said, (3) intended to do, and (4) actually felt. While the complete TASIT also has a subtest asking participants to judge the emotion expressed by actors (TASIT-Part 1; Emotion Evaluation Test [EET]), we excluded this subtest from the current study since it measures a similar subtype of social cognition as the Eyes Test.

The TASIT-SI Minimal Test is comprised of 15 short (i.e., 20–60 seconds) vignettes of professional actors engaging in various exchanges that represent a typical real-life conversation, five of which are sincere (i.e., the script and context are consistent), while the remaining 10 vignettes display sarcastic scenes (i.e., the meaning is opposite from the actors' actual dialogue).

The TASIT-SI Enriched Test is comprised of 16 short (i.e., 15–60 seconds) vignettes very similar to those presented in the Minimal Test. However, half of the scenes from the Enriched Test depict situations in which an actor is lying (i.e., the dialogue is contrary to what the actor believes), while the other half represent scenes in which an actor is expressing sarcasm (i.e., the dialogue is contrary to the message the actor intends to display). In addition, the Enriched Test vignettes provide additional contextual cues to assist in the differentiation between lying and sarcasm (e.g., a video edit showing the true nature of affairs within the scene).

2.3. Procedure

After obtaining informed consent, participants completed a general demographic survey. The Eyes Test and TASIT-SI were then completed, and the order in which these two tests were administered was counterbalanced by participant.

3. Results

The descriptive statistics of performance on the social cognition measures by group and sex can be found in Table 1. Correlation