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Objective and perceived arousal during performance of tasks with elements of social threat: The influence of anxiety sensitivity

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ABSTRACT

Background and objectives: Physiological arousal serves to maintain social anxiety disorder by skewing self-perception. Anxiety sensitivity is associated with the disorder and exaggerated perceptions of arousal, but has not been tested as explaining exaggerated perceived arousal in social contexts. The aim of this investigation was to address this issue.
Methods: A total of 42 individuals participated in three tasks associated with potential social threat (i.e., a speech, typing task, hyperventilation) and completed measures of trait social anxiety and anxiety sensitivity. State anxiety, perceived arousal, and objective arousal were assessed during each task.
Results: Trait social anxiety and anxiety sensitivity were correlated with state anxiety and perceived arousal, but not objective arousal, during the tasks. Anxiety sensitivity mediated the relationships between trait social anxiety and perceived arousal and between trait social anxiety and state anxiety for the typing and hyperventilation tasks.
Limitations: Although the sample likely included a number of individuals with social anxiety disorder, the sample was mostly comprised of individuals without a diagnosis. The current results can be extended to clinical presentations to some extent, but future research is needed to further explore the demonstrated relationships in samples of individuals with social anxiety disorder.
Conclusions: Anxiety sensitivity may play a crucial role in perceptions of arousal and state anxiety in the context of potential social threats, warranting attention from researchers and clinicians focussing on social anxiety disorder.

1. Introduction

Anxiety about social interactions is a ubiquitous and adaptive experience; however, when social anxiety reaches such a degree that it interferes with functioning, it may warrant a diagnosis of social anxiety disorder (American Psychiatric Association, 2000). Social anxiety disorder is a highly prevalent and disabling condition (Kessler et al., 2008; Stein et al., 2005). Cognitive-behavioural models posit that arousal (e.g., shortness of breath, sweating) serves to maintain social anxiety disorder by influencing perceptions of the self and expectations of social failure (Clark & Wells, 1995; Hofmann, 2007; Rapee & Heimberg, 1997). For example, a man in a social encounter may believe that he is perspiring profusely and that others can see his perspiration and must think he is socially inept. This perception of arousal would contribute to perceptions of the self (e.g., "I must look like an idiot") and serve to exacerbate symptoms of anxiety and associated consequences (e.g., avoidance). In line with this example and with contemporary theory, features that impact arousal in social situations would reasonably contribute to clinical levels of social anxiety.

In recognizing the role of arousal, researchers have attempted to test if trait social anxiety (i.e., a long lasting propensity to experience social anxiety) is associated with exaggerated arousal in social contexts. Empirical findings have been incongruent, with some investigations suggesting that trait social anxiety is associated with greater *objective* (i.e., as measured by equipment) arousal during social interactions, and other investigations suggesting there is no such relationship (for a review, see Mauss, Wilhelm, & Groos, 2004). In contrast, investigations are consistent in showing that those with greater trait social anxiety *perceive* their arousal as greater (Anderson & Hope, 2009; Edelmann & Baker, 2002; Mauss et al., 2004; Mulkens, de Jong, Dobbelaar, & Bogels, 1999).

Skewed perceptions of arousal are believed to also be crucial in the maintenance of other anxiety disorders, most notably panic disorder (Reiss, Peterson, Gursky, & McNally, 1986; Taylor, 1999).

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Particular attention has focused on the construct of anxiety sensitivity, which is defined as a trait-like propensity to fear anxiety-related sensations (including arousal) based on the belief that they have harmful consequences (Reiss, 1991; Reiss & McNally, 1985). Anxiety sensitivity is believed to be a diathesis and maintenance factor for numerous anxiety-related disorders by skewing the interpretation of symptoms of anxiety (Naragon-Gainey, 2010; Reiss et al., 1986; Schmidt, Lerew, & Jackson, 1997). Specifically, anxiety sensitivity is thought to amplify anxiety responses by contributing to a self-perpetuating cycle in which symptoms of anxiety contribute to anxiety itself (Reiss et al., 1986). As with trait social anxiety, some research suggests that anxiety sensitivity is associated with exaggerated objective arousal (Conrod, 2006), whereas others research suggests that it is not (Asmundson, Norton, Wilson, & Sandler, 1994; Leen-Feldner, Feldner, Bernstein, McCormick, & Zvolensky, 2005; Stewart, Buffett-Jerrott, & Kokaram, 2001). Notwithstanding, similar to those with greater trait social anxiety, individuals with greater anxiety sensitivity have been consistently found to have exaggerated perceptions of arousal (Asmundson et al., 1994; Carter, Sbrocco, & Ayati, 2009; Leen-Feldner et al., 2005; Stewart et al., 2001).

Anxiety sensitivity has been empirically associated with trait social anxiety in clinical and non-clinical samples (Anderson & Hope, 2009; Carleton, Abrams, Asmundson, Antony, & McCabe, 2009; Moore, Chung, Peterson, Katzman, & Vermani, 2009), and both constructs have been associated with heightened perceptions of arousal. Therefore, it may be possible that anxiety sensitivity explains, at least in part, why individuals with greater trait social anxiety experience exaggerated perceptions of arousal and exacerbated anxiety when facing potential social threats. This has yet to be empirically tested and associated results could have implications for cognitive-behavioural models of social anxiety disorder and associated evidence-based treatments. The aim of the current investigation was to explore the relationships between trait social anxiety, anxiety sensitivity, state anxiety, and perceived and objective arousal. We hypothesized that (1) trait social anxiety and anxiety sensitivity would be significantly positively correlated and each of these constructs would be associated with greater state anxiety and perceived arousal, but not objective arousal; (2) anxiety sensitivity would mediate the relationship between trait social anxiety and perceived arousal; and (3) anxiety sensitivity would mediate the relationship between trait social anxiety and state anxiety. Support for these hypotheses would further improve our conceptual understanding of social anxiety disorder and related evidence-based treatments.

2. Materials and methods

2.1. Participants

Ethical approval for this investigation was obtained from the University Research Ethics Board and all participants provided informed consent prior to participating. Exclusion criteria included: (1) medical conditions suspected to significantly influence physiological arousal patterns or that contraindicate hyperventilation (e.g., intracranial hypertension, recent subarachnoid haemorrhage, sickle cell disease, recent cardiac illness, myocardial infraction or stroke), (2) currently participating in treatment for an anxiety disorder (as treatments may include modules focussing on the interpretation of physiological arousal), (3) reported changes in psychotropic medication use in the past three months, and (4) current or past diagnosis of panic disorder or experiencing a panic attack in the previous twelve months. Participants were recruited through a university-wide email announcement that outlined the need for individuals to participate in a study exploring the relationships between bodily arousal (e.g., heart rate, breathing), anxiety, and performance on tasks. A total of 45 individuals demonstrated interest in participating in the investigation; however, three were excluded after self-reporting medical conditions thought to be associated with differential physiological arousal or that contraindicated hyperventilation (i.e., Parkinson's Disease, sickle cell disease, painful breathing). The final sample comprised 42 individuals (30 women, 12 men; age 18–60; $M_{age} = 24.90$, SD = 9.15). The majority of participants ($n = 32$) self-reported being Caucasian, while other self-reported ethnicities included African ($n = 5$), Asian ($n = 3$), and mixed East Indian and Caucasian ($n = 2$). The majority of participants endorsed being current full-time ($n = 32$) or part-time students ($n = 7$), and a majority endorsed being employed, either part ($n = 20$) or full-time ($n = 4$).

2.2. Measures

2.2.1. Social Interaction Phobia Scale (SIPS; Carleton, Collimore, et al., 2009)

The SIPS is a self-report questionnaire which includes 14-items designed to measure fear associated with social interaction and performance situations (e.g., "*When mixing socially I am uncomfortable*" and "*I would get tense if I had to carry a tray across a crowded cafeteria*", respectively). The SIPS was derived from factor analyses of the Social Phobia Scale and the Social Interaction Anxiety Scale (Mattick & Clarke, 1998), but is much shorter and maintains acceptable psychometric properties (Carleton, Collimore, et al., 2009). Items are rated on five-point Likert scales ranging from 0 ("*not at all characteristic or true of me*") to 4 ("*extremely characteristic or true of me*"). The SIPS has demonstrated acceptable reliability in past studies (Carleton, Peluso, Collimore, & Asmundson, 2011; Reilly, Carleton, & Weeks, 2011) as well as factorial validity and validity in discriminating between individuals with and without social anxiety disorder (Carleton, Collimore, et al., 2009; Reilly et al., 2011).

2.2.2. Anxiety Sensitivity Index ASI-3 (ASI-3; Taylor et al., 2007)

The ASI-3 is an 18-item self-report questionnaire designed to measure anxiety sensitivity. Items are focused on statements relating to anxiety symptoms (e.g., "*When I feel pain in my chest, I worry that I'm going to have a heart attack*"), and are rated on five-point Likert scales ranging from 0 ("*agree very little*") to 4 ("*agree very much*"). The ASI-3 has demonstrated reliability and validity in a number of samples across numerous countries (Taylor et al., 2007).

2.2.3. Measure of perceived arousal

Participants were asked to rate the extent to which they experienced racing heart, sweaty palms, and shortness of breath during each of the periods (described below) by drawing an "X" on a 20-cm line ranging from 0 ("*not at all*") to 100 ("*extreme*"). This measure has been demonstrated as an effective index of perceived arousal in previous investigations utilizing laboratory social threat tasks (Mauss et al., 2004).

2.2.4. Measure of state anxiety

Participants were asked to rate the peak of the anxiety they experienced during each of the periods by drawing an X on a 20-cm line ranging from 1 ("*not at all*") to 100 ("*extremely*"). Single-item visual analogue scales have been demonstrated as good measures of state anxiety and as correlating highly with other measures of state anxiety (Davey, Barratt, Butow, & Deeks, 2007). Furthermore, the visual analogue scale allows the direct assessment of state anxiety while not measuring other aspects of anxiety such as arousal.