



Sex differences in emotional and physiological responses to the Trier Social Stress Test[☆]

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Abstract

Women are more likely than men to be diagnosed with depression and anxiety-related disorders, and it has been hypothesized that this difference is related to sex differences in stress reactivity. Women typically report higher levels of negative affect than men in response to psychosocial stressors, but the evidence for sex differences in physiological reactivity to stressful situations is not consistent. The present study sought to expand this work by evaluating sex differences in reactivity to a social stress challenge across neuroendocrine, autonomic and affective response domains. Participants (32 women, 30 men) completed a standardized psychosocial stress challenge (i.e., the Trier Social Stress Test (TSST)), during which several physiological (e.g., cortisol reactivity, heart rate) and psychological (e.g., depression, irritability, anger, fear) measures were assessed. The findings demonstrated that cortisol reactivity and the magnitude of autonomic responding failed to reliably discriminate between women and men. However, women reported more fear, irritability, confusion and less happiness immediately following the TSST compared to men. The broader implications of these results and how they relate to sex differences in the etiology and clinical presentation of anxiety and mood disorders are discussed.

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1. Introduction

Women are diagnosed with anxiety- and mood-related pathology at higher rates than men, with many epidemiological studies indicating that the female-to-male ratio is approximately 2:1 for mood and anxiety disorders (Gater et al., 1998; Weissman et al., 1996). Differences in a variety of neurobiological (e.g., hormonal and genetic) (Seeman, 1997; Silberg et al., 1999) and psychosocial (e.g., social reinforcement contingencies, emotion regulation strategies) (Chambless & Mason, 1986; Craske, 2003; Thomsen, Mehlson, Viidik, Sommerland, & Zachariae, 2005) processes have been proposed to contribute to this gender-based divergence.

Psychological stress has been clearly linked to the development of clinical depression and anxiety, with associations reported between increased stress responses, hypothalamic–pituitary–adrenal (HPA) axis hyperactivity and dysregulation and the occurrence of psychopathology (Feijó de Mello, Feijó de Mello, Carpenter, & Price, 2003). The results of human stress studies have largely indicated that men and women do not differ in their physiological responses to acute stress, showing, for instance, little difference in cortisol reactivity (Kirschbaum, Kudielka, Gaab, Schommer, & Hellhammer, 1999; Kirschbaum, Wüst, & Hellhammer, 1992; Stoney, Davis, & Matthews, 1987). However, there is some evidence that younger men have elevated adrenocorticotropin (ACTH) stress responses compared to younger women (Kirschbaum et al., 1999; Kudielka, Buske-Kirschbaum, Hellhammer, & Kirschbaum, 2004a). Similarly, there has been a lack of clear evidence for sex differences on measures of autonomic responding to acute stress, with several studies demonstrating no differences in physiological reactivity (Hedlund & Chambless, 1990; Katkin & Hoffman, 1976; Kelly, Forsyth, & Karekla, 2006; Sgoifo et al., 2003), although age-related sex differences in heart rate responses have been observed in response to laboratory social stressors (Kudielka, Buske-Kirschbaum, Hellhammer, & Kirschbaum, 2004b).

Despite conflicting evidence on physiological reactivity to human stress challenge paradigms, studies have consistently demonstrated that women report more distress to fear-producing and stressful experiences than men (Kelly et al., 2006; Kudielka et al., 2004a). In addition, research has shown that women tend to report more depressive and anxiety-related symptoms (Fujita, Diener, & Sandvik, 1991; Thomsen et al., 2005; Turgeon, Marchand, & Dupuis, 1998), demonstrating a female tendency to experience negative emotions at a greater frequency and intensity than men (Barlow, 2001; Craske, 2003; Nolen-Hoeksema, Larson, & Grayson, 1999).

These links suggest the hypothesis that sex differences in stress reactivity may contribute to the female predominance of diagnoses of major depression and anxiety disorders. It is therefore valuable to extend this research using experimentally controlled procedures known to induce stress and anxiety (e.g., a social stress challenge), while concurrently assessing autonomic, neuroendocrine and affective responses. Moreover, as existing mood and anxiety disorders are known to influence stress reactivity, it is important to study individuals without current psychopathology in order to identify potential risk factors.

In light of these considerations, the aim of the present study was to evaluate sex differences in autonomic, neuroendocrine and self-report responses to a social stress task (i.e., Trier Social Stress Test (TSST)) in a healthy, nonclinical sample. We hypothesized that women would manifest greater subjective distress than men in response to the task.

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