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Measurement invariance of the Social Phobia and Anxiety Inventory

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ABSTRACT

The Social Phobia and Anxiety Inventory (SPAI) is a commonly used self-report measure of social phobia that has demonstrated adequate reliability, convergent validity, discriminant validity, and criterion-related validity. However, research has yet to address whether this measure functions equivalently in (a) individuals with and without a diagnosis of social phobia and (b) males and females. Evaluating measurement equivalence/invariance is necessary in order to determine that the construct of social anxiety is interpreted similarly across these populations. The results of the current investigation, using a series of nested factorial models proposed by Vandenberg and Lance (2000), provide evidence for strong equivalence across 420 individuals with and without diagnoses of social phobia and across male and female samples. Accordingly, these results provide psychometric justification for comparison of SPAI scores across the symptom continuum and sexes.

1. Introduction

Social phobia (also known as social anxiety disorder) is characterized by an intense fear and apprehension of social situations in which one might be criticized or evaluated by others (DSM-IV-TR; American Psychiatric Association [APA], 2000). Hallmarks of the disorder include physiological (e.g., palpitations, trembling, muscle tension, sweating, stomach aches, and blushing; Beidel, Turner, & Morris, 1999; Ginsburg, Riddle, & Davies, 2006), cognitive (e.g., rumination and attentional biases; Abbott & Rapee, 2004; Clark & Wells, 1995), as well as behavioral (e.g., escape, avoidance; Beidel, Rao, Scharfstein, Wong, & Alfano, 2010) symptoms. In combination, these symptoms create significant functional impairment (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Lecrubier, 1998; Rao et al., 2007; Safren, Heimberg, Brown, & Holle, 1996; Stein, Torgrud, & Walker, 2000; Wong, Sarver, & Beidel, 2011) and hinder the development of social skills (Beidel et al., 2010; Turner, Beidel, Dancu, & Stanley, 1989).

Social phobia is a prominent public health issue that results in substantial functional impairment. It is the third most common psychiatric disorder in the United States with prevalence ranging from 1 to 15% of the general population (Costello, Egger, & Angold, 2004; Costello, Egger, & Angold, 2005; Grant et al., 2004; Heimberg, Stein, Hiripi, & Kessler, 2000; Kessler, 2003) and 18–32% in clinical populations (Kendall et al., 1997; Weiss & Last, 2001). In addition to the high prevalence of social phobia diagnoses, symptoms of social anxiety that do not meet criteria for social phobia exist among the general population as well (Dell'Osso et al., 2003; Fehm, Beesdo, Jacobi, & Fiedler, 2008; Heiser, Turner, & Beidel, 2003; Heiser, Turner, Beidel, & Roberson-Nay, 2009; Merikangas, Avenevoli, Acharyya, Zhang, & Angst, 2002; Stein, Walker, & Forde, 1996; Stein et al., 2000; Stemberger, Turner, Beidel, & Calhoun, 1995; Turner, Beidel, & Townsley, 1990). These data indicate that, at certain times, between 25.9% (Heiser et al., 2009) and 39% (Stein et al., 2000) of the general population experiences mild to moderate symptoms of social anxiety (e.g., public speaking, job interviews, meeting new people; Stein et al., 1996; Stein et al., 2000) that do not rise to the threshold of a diagnosis (Dell'Osso et al., 2003; Merikangas et al., 2002; Stein et al., 2000).

One research paradigm used to examine the characteristics of social phobia is to assess individuals with and without symptoms of the disorder (e.g., Beidel et al., 2010; Beidel, Borden, Turner, & Jacob, 1989; Gamer, Schmukle, Luka-Krausgrill, & Egloff, 2008; Osman, Barrios, Aukes, & Osman, 1995; Osman et al., 1996; Roberson-Nay, Strong, Nay, Beidel, & Turner, 2007; Rodebaugh, Chambless, Terrill, Floyd, & Uhde, 2000; Turner, Beidel, et al., 1989). This research is based on the assumption that the measurement of social anxiety is equivalent across those with no disorder and those with social phobia. Assuming measurement equivalence/invariance means that (a) items on an inventory hold the same meaning for individuals diagnosed with a disorder as for individuals with no psychiatric diagnosis, (b) numerical ratings used to indicate the severity or frequency symptoms/conditions hold the same meaning for individuals with and without a diagnosis, and (c) the constructs that

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are represented by the items are perceived similarly across those with and without a diagnosis. When this assumption is violated, between-group comparisons are questionable, and inaccurate statistical and practical inferences may result (Horn & McArdle, 1992; Vandenberg & Lance, 2000).

Similar to the above comparison, assessing measurement equivalence/invariance between females and males is equally important because the prevalence of social phobia across sexes has varied. Some data suggest that social phobia presents at higher rates in females compared to males (e.g., 3:2 ratio; Kessler et al., 2005; Mannuzza, Fyer, Liebowitz, & Klein, 1990), while other data suggest equal prevalence for males and females (Bourdon, Boyd, Rae, Burns, & Erbaugh, 1988; Thyer, Parrish, Curtis, Nesse, & Cameron, 1985). In addition to differing prevalence, there is evidence of symptom variation across sexes (e.g., types of feared situations and responses to feared stimuli). Specifically, females with social phobia appear to have more severe fear and avoidance of particular social situations (e.g., speaking with authority figures, presenting in front of an audience or group, working while being observed, being the center of attention, and speaking up at a meeting) whereas males have greater fear and avoidance in other social situations (e.g., using public restrooms, returning goods to a store, and dating situations; Turk et al., 1998; Wittchen, Stein, & Kessler, 1999; Xu et al., 2012). Females also endorse elevated co-morbidity and functional impairment in comparison to males (Yonkers, Dyck, & Keller, 2001), who endorse elevated levels of self-reported embarrassment and less ability to cope in embarrassing social situations (Edelmann, 1985). Furthermore, females report higher ratings of anxiety both before and during social interaction tasks in comparison to males (Turk et al., 1998). Thus, the current investigation examines measurement equivalence/invariance across males and females to determine whether observed sex differences represent true differences or reflect nonequivalence in the measurement process.

There are many available methods by which to assess social phobia symptoms, but self-report instruments remain among the most popular. Initial inventories (e.g., Social Avoidance and Distress Scale, Watson & Friend, 1969; Fear of Negative Evaluation Scale, Watson & Friend, 1969; Social Interaction Self-Statement Test, Glass, Merluzzi, Biever, & Larsen, 1982; Interaction Anxiousness Scale, Leary, 1983; Fear Questionnaire-Social Phobia Subscale, Marks & Mathews, 1979; Liebowitz Social Anxiety Scale, Liebowitz, 1987; Social Interaction Anxiety Scale, and Social Phobia Scale, Mattick & Clarke, 1989) assessed the presence of social distress but often lacked specificity and the ability to discriminate across diagnostic groups (e.g., Turner, McCanna, & Beidel, 1987). To address the limitations of the existing measures, the Social Phobia and Anxiety Inventory (SPAI; Turner, Beidel, et al., 1989; Turner, Beidel, & Dancu, 1996) was designed to assess the broad range of situations associated with social phobia. In addition, because previous instruments were not able to differentiate individuals with social phobia from individuals with agoraphobia, who also endorsed anxiety in social settings but for very different reasons, the SPAI specifically included items to allow for this discrimination. The SPAI includes 45 items rated on a 7-point scale reflecting the frequency of the rater's experiences (i.e., 0 = Never, 1 = Very Infrequent, 2 = Infrequent, 3 = Sometimes, 4 = Frequent, 5 = Very Frequent, 6 = Always). The first 32 items of the SPAI constitute the social phobia subscale and assess cognitive (e.g., "I experience troubling thoughts when I am in a social setting"), physiological (e.g., "I experience [sweating] in a social situation"), affective (e.g., "I feel anxious when making a speech in front of an audience"), and behavioral (e.g., "I feel so anxious in social situations that I leave the social gathering") symptoms. Items are rated for four different populations (strangers, authority figures, opposite sex and people in general). The 13 agoraphobia items are rated using the same 7-point Likert scale. These items assess various anxiety provoking situations which are commonly endorsed by patients diagnosed with agoraphobia (e.g., "I feel anxious when I am on any form of public transportation [i.e., bus, train, airplane]" and "I feel anxious when I am in crowded public places [i.e., stores, church, movies, restaurants, etc.]"). The final score for the SPAI (known as the difference score) is derived by subtracting the agoraphobia subscale total from the social phobia subscale total. This difference score provides a more pure measure of social phobia (Turner, Beidel, et al., 1989; Turner et al., 1996).

The SPAI has been the subject of extensive psychometric testing including normative data (Gillis, Haaga, & Ford, 1995; Turner, Beidel, et al., 1989), reliability (Turner, Beidel, et al., 1989), convergent validity (Herbert, Bellack, & Hope, 1991; Osman et al., 1995; Osman et al., 1996), construct validity (Turner, Stanley, Beidel, & Bond, 1989), discriminant validity (Beidel, Borden, et al., 1989; Peters, 2000; Osman et al., 1995; Osman et al., 1996; Rodebaugh et al., 2000; Turner, Beidel, et al., 1989), and robust prediction of social phobia symptoms and diagnosis (Beidel, Borden, et al., 1989; Beidel, Turner, Stanley, & Dancu, 1989; Herbert et al., 1991; Rodebaugh et al., 2000).

Although the SPAI was developed with an emphasis on two dimensions (i.e., social phobia and agoraphobia; Turner, Beidel, et al., 1989), the 32-item social phobia subscale has also been the subject of factor analyses. The result of these investigations typically revealed the existence of five factors (i.e., related to individual interactions, cognitive and somatic complaints, group interactions, avoidance, and being the focus of attention; Turner, Stanley, et al., 1989) rather than a single latent factor. Results of the six-factor model (i.e., five social phobia factors and one agoraphobia factor) have been replicated in another investigation (i.e., Osman et al., 1995) whereas other studies have also found support for the two-factor model (Osman et al., 1995; Osman et al., 1996). What remains unclear is whether the previously found acceptable fit of the two-factor model is masking alternative underlying structures that would be more appropriate for certain subsamples. Particularly, it is unclear whether the hypothesized two-factor structure is appropriate for both non-clinical and clinical samples as well as for both male and female subgroups. The importance of examining this two-factor model is especially salient as scores derived from these factors are used regularly by both clinicians and researchers. To date, no study has examined the measurement invariance/equivalence of the SPAI between clinical and non-clinical samples of adults. Moreover, measurement equivalence/invariance has not been established between females and males despite mixed results concerning sex differences in social phobia.

1.1. Aims of the current investigation

The current investigation attempts to test the theoretical model of the SPAI within these groups (i.e., control, social phobic, male, and female) to confirm whether the conceptual space of the SPAI as consisting of social phobia and agoraphobia is equivalent across control and social phobic groups, as well as across female and male groups. The first aim is to replicate previous findings supporting the two-factor structure of the SPAI between control and socially phobic samples. The second aim is to examine this two-factor structure in both females and males (including clinical and non-clinical participants). The third aim is to test the overall measurement equivalence/invariance of the two-factor structure of the SPAI between the control and socially phobic samples. Finally, the fourth aim is to test the overall measurement equivalence/invariance of the SPAI between females and males. These analyses will determine the invariance in the measurement of these symptoms in order to