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Journal of Anxiety Disorders 22 (2008) 1075–1086

Journal of Anxiety Disorders

Psychometric properties of the Social Phobia and Anxiety Inventory for Children using a non-American population-based sample

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Received 23 July 2007; received in revised form 13 November 2007; accepted 15 November 2007

Abstract

Although previous studies have examined the factor structure of the SPAI-C, adequate factor analytic methodology has not been employed. This study explored the psychometric properties of the Social Phobia and Anxiety Inventory for Children (SPAI-C), using a non-American population-based sample of older children and young adolescents 11–14 years of age. Initially an exploratory factor analysis was conducted followed 1 year later by a confirmatory factor analysis. Five factors labeled *Assertiveness*, *Public Performance*, *Physical/Cognitive Symptoms*, *Social Encounter*, and *Avoidance* were retained and confirmed. The *Public Performance* and *Assertiveness* factors were the most stable and consistent factors or traits of social anxiety over a 1-year period. Results revealed adequate concurrent validity, internal consistency and moderate 12-month test–retest reliability of the SPAI-C total scale. The SPAI-C was found to assess levels of both social anxiety and social anxiety disorder according to DSM-IV criteria. Findings suggest that the SPAI-C is applicable in clinical treatment studies designed to assess sensitivity to change in various aspects of social anxiety disorder.

Keywords: Psychometric properties; Social Phobia Anxiety Inventory for Children; Social anxiety; Children and adolescents

1. Introduction

The Social Phobia and Anxiety Inventory for Children (SPAI-C) (Beidel, Turner, & Fink, 1996; Beidel, Turner, & Morris, 1995; Beidel, Turner, & Morris, 1998) is the only empirically derived self-report measure for the assessment of social anxiety disorder according to the DSM-IV criteria (American Psychiatric Association, 1994) in children and young adolescents. Previous studies, which have examined the psychometric properties of the SPAI-C, have demonstrated high internal consistency (alpha .95), excellent 2-week test–retest ($r = .86$) and moderate ($r = .63$) 10-month test–retest reliability coefficients (Beidel et al., 1996, 1995). Other studies (Beidel, Turner, Hamlin, & Morris, 2000) have indicated that the SPAI-C discriminates between socially phobic children and those with other anxiety disorders, and correlates moderately and significantly with the SASC-R ($r = .63$, Morris & Maisa, 1998), and the SAS-A ($r = .74$ and .79, Storch, Masia-Warner, Dent, Roberti, & Fisher, 2004 and Inderbitzen-Nolan, Davies, & McKeon, 2004, respectively). Overall classification accuracy has been reported to be 55% (Beidel et al., 1996), and the

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doi:10.1016/j.janxdis.2007.11.006

sensitivity and specificity .62 and .83, respectively (Inderbitzen-Nolan et al., 2004). However, later conducted studies have shown lower 2-week ($r = .78$; Gauer, Picon, Vasconcellos, Turner, & Beidel, 2005) and 1-year test–retest reliability coefficients ($r = .47$; Storch et al., 2004). Further, the majority of the studies, investigating the psychometric properties of the SPAI-C, have only used young children aged 8–12 years old (Johnson et al., 2006). Except the principal component analysis (PCA) performed on a Brazilian sample by Gauer et al. (2005), no study has compared and validated the SPAI-C in countries other than the USA, or in other languages.

Only four studies (Beidel et al., 1996, 1995; Gauer et al., 2005; Storch et al., 2004) have examined the factor structure of the SPAI-C. Using mixed and quite small samples of children, Beidel et al. (1996, 1995) reported a five- and a three-factor structure, respectively. The differences in factor structure between the two studies were assumed to be caused by differences in the characteristics of the samples used (Beidel et al., 1996, 1998). In addition, several items did not semantically and conceptually fit the factors with which they were linked. Storch et al. (2004) confirmed a five-factor solution using a confirmatory factor analysis on a relatively large community sample of adolescents. These five factors were labeled *Assertiveness*, *General Conversation*, *Physical and Cognitive Symptoms*, *Behavior Avoidance*, and *Public Performance*. Although Storch et al. (2004) reported an acceptable fit for the five-factor structure model, their results should be interpreted with some caution. First, the sample included subjects aged 13–17 years of age, while the SPAI-C was constructed mainly for children and young adolescents aged 8–14 years old. Second, some semantic modifications of the SPAI-C inventory were made in order to make the items more suitable for this particular sample. Third, the total sample consisted of 75% females, and the limited number of male participants ($n = 239$) were not equally represented across the various ages. Fourth, only 10% of the total sample, mainly females, was retested 12 months later. Moreover, Storch et al. (2004) did not explicitly explain why they chose to confirm a five- and not a three-factor solution. However, six items loaded almost equally on two factors in the three-factor solution found by Beidel et al. (1995), while two items loaded equally on two factors in the five-factor solution found by Beidel et al. (1996). Using a PCA, as Beidel et al. (1996, 1995) did, Gauer et al. (2005) reported a four-factor structure model using a sample consisting of 1871 Brazilian school children enrolled in third to eighth grade. In contrast to the five-factor model found by Beidel et al. (1996), the *General Conversation* factor was not found in the study of Gauer et al. (2005).

All three previous studies may be criticized for using inadequate statistical methods to assess the factor structure of the SPAI-C. Specifically, they all made use of principal component analysis (PCA) with varimax rotation and employed Kaiser's criterion to determine the number of factors to retain. A PCA is a data reduction method which does not attempt to model the structure of correlations among variables. It may thus produce "some misleading factor analytic results" (Preacher & MacCallum, 2003, p. 14). When the main aim is to arrive at a parsimonious representation of the associations among variables, an exploratory factor analysis (EFA) is recommended (Cattell, 1978; Fabrigar, Wegener, MacCallum, & Strahan, 1999; Gorsuch, 1983; Widaman, 1993). Moreover, since the factors and items are assumed to be moderately correlated, it is more appropriate to apply an oblique rotation, rather than the varimax rotation used in previous studies. Further, using Kaiser's cut-off criterion as the only method to estimate the number of factors is not recommended and rarely works well (Fabrigar et al., 1999; Widaman, 1993).

When a factor structure has been identified by means of an EFA, a good fit of the model to data from a new sample drawn from the same population indicated by a confirmatory factor analysis constitutes a methodological strengthening of the results.

The aim of this study was fourfold. The first aim was to explore the factor structure of the SPAI-C, using an EFA with an oblique rotation solution as well as a PCA with a varimax rotation, the latter in order to facilitate comparison with the results of Gauer et al. (2005) and Beidel et al. (1996, 1995). The second aim was to apply a confirmatory factor analysis (CFA) to a sample consisting of participants from the initial sample 1 year later. The third aim was to examine the 12-month test–retest reliability scores for both the total SPAI-C and all the extracted factors. The fourth aim was to examine the concurrent validity of the Norwegian SPAI-C version by examining the relationship between the SPAI-C and other self-report measures of anxiety (SCARED), depression (SMFQ), and the Strength and Difficulties Questionnaire (SDQ) as well as a clinical interview (ADIS-C; Child Version).

2. Method

2.1. Participants

All sixth to ninth grade children ($n = 2148$) in two counties in central Norway were asked to participate in