Journal of Anxiety Disorders 25 (2011) 579–583

Contents lists available at ScienceDirect

Journal of Anxiety Disorders

The factor structure of the Social Interaction Anxiety Scale and the Social Phobia Scale

Thomas Heidenreich[a,*], Karin Schermelleh-Engel[b], Elisabeth Schramm[c], Stefan G. Hofmann[d], Ulrich Stangier[e]

[a] Faculty of Social Work, Health Care and Nursing Sciences, University of Applied Sciences Esslingen, Flandernstrasse 101, 73732 Esslingen am Neckar, Germany
[b] Department of Psychology, Unit of Psychological Research Methods and Evaluation, Johann Wolfgang Goethe-University of Frankfurt/Main, Mertonstrasse 17, 60054 Frankfurt/Main, Germany
[c] Department of Psychiatry and Psychotherapy, University of Freiburg Medical Center, Hauptstr. 5, 79104 Freiburg, Germany
[d] Department of Psychology, Boston University, 648 Beacon Street, Boston, MA 02215, USA
[e] Department of Psychology, Unit of Clinical Psychology and Psychotherapy, Johann Wolfgang Goethe-University of Frankfurt/Main, Varrentrappstr. 40-42, 60486 Frankfurt/Main, Germany

ARTICLE INFO

Article history:
Received 5 January 2010
Received in revised form 22 January 2011
Accepted 24 January 2011

Keywords:
Social anxiety disorder
Social phobia
Confirmatory factor analysis
Multi-sample analysis
Interaction anxiety
Performance anxiety

ABSTRACT

The Social Interaction Anxiety Scale (SIAS) and the Social Phobia Scale (SPS) are two compendium measures that have become some of the most popular self-report scales of social anxiety. Despite their popularity, it remains unclear whether it is necessary to maintain two separate scales of social anxiety. The primary objective of the present study was to examine the factor analytic structure of both measures to determine the factorial validity of each scale. For this purpose, we administered both scales to 577 patients at the beginning of outpatient treatment. Analyzing both scales simultaneously, a CFA with two correlated factors showed a better fit to the data than a single factor model. An additional EFA with an oblique rotation on all 40 items using the WLSMV estimator further supported the two factor solution. These results suggest that the SIAS and SPS measure similar, but not identical facets of social anxiety. Thus, our findings provide support to retain the SIAS and SPS as two separate scales.

Although social anxiety disorder (SAD) is considered a diagnostic entity, social anxiety is a multifaceted and multidimensional construct (for a review, see Hofmann, Heinrichs, & Moscovitch, 2004). Patients with this disorder fear and avoid a range of different social situations to different degrees, and self-report instruments have to account for the heterogeneity of individuals who receive this diagnostic label. Numerous attempts have been made to classify the feared situations into distinctive domains. Most of the classifications comprised two or three types of situations, including performance and public speaking, interaction, and being observed while performing acts such as writing or eating. (Hofmann et al., 2004). Such categorization might be a useful basis for the specification of different subtypes of SAD. Currently, the DSM-V Work Group on Anxiety found strong support for the definition of a subtype "predominantly performance" and some evidence for another subtype "fear of showing anxiety symptoms" (e.g., blushing), whereas most patients suffer from fears across domains, including interaction anxiety (Bögels et al., 2010). As a consequence, to investigate the diagnostic and etiological relevance of situational domains, assessment instruments are needed which discriminate between social fears in performance and interaction situations.

Two of the most commonly used self-report instruments for measuring social anxiety are the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) and the Social Phobia Scale (SPS; Mattick & Clarke, 1998). The purpose of the latter one is to measure fears of being scrutinized during activities and performance tasks, whereas the SIAS was created to assess fears of more general social interactions (Mattick & Clarke, 1998). While the SIAS was not specifically designed for individuals with a clinical diagnosis of social anxiety disorder, the SPS was specifically developed for this population. However, studies that have used the SPS in social phobic samples and non-social phobic samples yielded with very similar psychometric properties and factor structures (e.g., Carleton et al., 2009). Research has yielded broad support for the reliability and validity of both the SIAS and the SPS. The two scales are highly internally consistent and show good retest-reliability (Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992; Mattick & Clarke, 1998). In addition, the SIAS and SPS are able to discriminate between individuals with SAD and healthy controls (Heimberg et al., 1992) as well as between patients with SAD and those with other forms of anxiety disorders (Mattick & Clarke, 1998; Stangier, Heidenreich,

* Corresponding author. Tel.: +49 711 397 4575; fax: +49 711 397 4595.
E-mail address: thomas.heidenreich@hs-esslingen.de (T. Heidenreich).

0887-6185/$ – see front matter © 2011 Elsevier Ltd. All rights reserved.
doi:10.1016/j.janxdis.2011.01.006

Berardi, Golbs, & Hoyer, 1999). No significant correlation was found between self-reported SAD as measured by SIAS and SPS and social desirability (Heimberg et al., 1992; Mattick & Clarke, 1998). Furthermore, Heimberg et al. (1992) found that the SIAS correlated more highly with a measure of interaction anxiety than with a measure of performance anxiety, whereas the SPS was only correlated with a measure of performance anxiety. In a similar fashion and based on behavioral assessment tests, Ries et al. (1998) observed that the SIAS was correlated with verbal reports regarding positive and negative thoughts in speech and conversation situations while the SPS was only related to verbal reports in the speech task (negative correlation with speech duration). Brown et al. (1997) have argued that the SIAS and SPS constitute subscales of a higher-order construct social anxiety.

However, despite these positive psychometric characteristics, the assumption of two underlying dimensions for the SIAS and SPS (Social Interaction Anxiety and Social Performance Anxiety, respectively) has yet to be adequately addressed. All published reports have found high to very high intercorrelations between the SIAS and SPS (Brown et al., 1997: $r = .72$; Heimberg et al., 1992: $r = .41$ social phobic group, $r = .89$ community sample; Peters, 2000: $r = .73$; Ries et al., 1998: $r = .66$; Stangier et al., 1999: $r = .78$ social phobic group, $r = .69$ clinical control group). While the amount of explained variance evidently varies according to the respective sample, there is clear evidence of a large amount of shared variance. Furthermore, there is little evidence that the SIAS and SPS differ significantly with respect to important clinical domains, such as treatment sensitivity (Stangier, Schramm, Heidenreich, Berger, & Clark, in press).

So far, only one study has investigated the joint factor structure of the SIAS and the SPS (Safren, Turk, & Heimberg, 1998). In this study, a confirmatory factor analysis (CFA) failed to adequately support the hypothesis of two distinct constructs. However, in light of the very large number of parameters (81) to be estimated in their CFA comprising all 40 SIAS and SPS items, the sample size of $N = 167$ might have simply been too small for these tests (cf. Muthén & Muthén, 2002). While a large number of degrees of freedom may compensate for a small sample size (MacCallum, Browne, & Sugawara, 1996), power may have been too low to obtain precise parameter estimates. In the same trial (Safren et al., 1998), a three-factor solution was obtained using exploratory factor analysis (EFA) with varimax rotation. The first factor consisted of 17 SIAS items ("interaction anxiety"), the second factor of 11 SPS items ("being observed by others"), and the third factor of 5 SPS Items ("fear that others will notice anxiety symptoms"); 3 SIAS and 4 SPS items were eliminated due to high cross-loadings. More recently, two reports (Rodebaugh, Woods, & Heimberg, 2007; Rodebaugh, Woods, Heimberg, Liebowitz, & Schneier, 2006) questioned the factorial structure of the SIAS. Results of CFAs from both studies provide strong evidence that there are systematic differences between responses to negatively worded items in comparison to positively worded items of the scale. In addition, the negatively worded items showed consistently weaker relationships with a variety of comparison measures. The authors concluded that only the 17 positively worded items of the SIAS should be used.

Given the high intercorrelations found in all studies employing the SIAS and SPS and the problem that previous studies predominantly applied EFA for construct validation, evidence to date does not allow firm conclusions regarding the factorial structures of SIAS and SPS. It also remains unclear whether both scales assess the same or different underlying constructs. Hence, the primary objective of the present study was to examine whether the existence of two separate scales is justified by investigating the latent factor structures of the SIAS and the SPS using CFA. We further examined possible response pattern biases due to similar wording.

1. Materials and methods

1.1. Participants and instruments

The sample consisted of 577 patients (318 women, 256 men, 3 individuals with missing data) with a mean age of 38.73 years ($SD = 10.94$) who sought treatment at the behavior therapy outpatient clinic of the Goethe University in Frankfurt, Germany. Fifty-five percent of participants ($N = 315$) received a principal diagnosis of SAD according to DSM-IV (American Psychiatric & Association, 1994), while 45% ($N = 262$) were diagnosed with other non-psychotic disorders (anxiety disorders other than SAD, depression, or somatoform disorders) with no comorbid SAD. Diagnoses were made using the Structured Clinical Interview for DSM-IV (SCID-IV, First, Williams, & Spitzer, 1997). Comorbid diagnoses were permitted, with the exception of bipolar disorders, psychotic disorders, and drug or alcohol dependence. All clinical interviews and measures were administered by Ph.D. clinical psychologists or students in postgraduate clinical training. Raters received an intense training in administering clinical interviews (2-day training and follow-up) and interviews were closely supervised by T.H. and U.S. Self-rated measures comprised German translations of the SIAS (Stangier et al., 1999) and the SPS; the German versions of both scales showed very similar psychometric characteristics as their original English versions (Stangier et al., 1999).

1.2. Statistical analyses

1.2.1. Missing data

Our sample included 18 cases (3.12% of $N = 577$) for which missing values were imputed using the estimation maximization (EM) algorithm of the PRELIS 2.54 program (Jöreskog & Sörbom, 1996; see also Du Toit & Du Toit, 2001). As we employed different analyses on the same data (i.e., confirmatory factors analysis, exploratory factor analyses, and logistic regression), we were not able to apply a full information maximum likelihood approach, since this method simultaneously estimates missing data and model parameters (cf. Schafer, 1997; Schafer & Graham, 2002).

1.2.2. Factor analyses

Using CFA to assess the factorial structure of both scales separately, we tested whether (1) all SIAS items loaded onto one common factor (Model 1a) and (2) whether all SPS items loaded onto one common factor (Model 2a). In view of the fact that both scales measure quite heterogeneous constructs, we tested several hypothesized multidimensional structures of both scales: Regarding the SIAS, we further tested whether the negatively worded items of this scale also load onto a method (residual) factor (Model 1b) or whether negatively worded and positively worded items measure two method (residual) factors in addition to the common social interaction construct (Model 1c; as suggested by Rodebaugh et al., 2007). Additionally, we also investigated the one-factor solution (Model 1d) suggested by Safren et al. (1998).

Regarding the SPS, we further tested Safren et al.'s (1998) two-dimensional structure (Model 2b) with 11 items measuring "being observed by others" and 5 Items measuring "fear that others will notice anxiety symptoms"; 4 items that had cross-loadings on the SIAS or the SPS scales had been eliminated according to Safren et al.'s (1998) recommendation.

In order to examine the factorial structure of both scales simultaneously, we tested whether all SIAS and SPS items loaded onto one single common factor (Model 3a) or onto two correlated factors (Model 3b). We further tested Safren et al.'s (1998) three factor model by combining Model 1a and Model 2b (Model 3c).

Finally, we employed EFA with an oblique rotation on all 40 items. All CFA and EFA models were fitted to polychoric correlations using the robust weighted least squares mean and