

Psychometric properties of the Liebowitz Social Anxiety Scale¹

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ABSTRACT

Background. The present study provides data on the reliability, validity and treatment sensitivity of the Liebowitz Social Anxiety Scale (LSAS), one of the most commonly used clinician-administered scales for the assessment of social phobia.

Method. Three hundred and eighty-two patients from several studies of the treatment of social phobia were evaluated. An independent assessor administered the LSAS to each patient prior to the initiation of treatment. Patients also completed other measures of social anxiety and avoidance, although the specific measures varied across samples.

Results. The LSAS and its subscales were normally distributed and demonstrated excellent internal consistency. The convergent validity of the LSAS was demonstrated via significant correlations with other commonly-used measures of social anxiety and avoidance. These correlations also tended to be larger than correlations with measures of depression, especially after treatment. However, the pattern of correlations of LSAS subscales with one another and with the other measures suggest that the fear subscales and the avoidance subscales may not be sufficiently distinct in clinical samples. The LSAS was also demonstrated to be sensitive to the effects of pharmacological treatments of social phobia over time and in comparison to double-blind pill placebo.

Conclusion. The LSAS appears to be a reliable, valid and treatment sensitive measure of social phobia. Further study of the LSAS, both in samples with severe social phobia and in community samples, is needed.

INTRODUCTION

Social phobia received little research attention and was not officially classified as a psychiatric disorder until the publication of the DSM-III (American Psychiatric Association, 1980). However, recent years have witnessed a significant increase in clinical research, and since that time, there have been substantial contributions to the diagnosis, assessment and treatment of social

phobia (Liebowitz *et al.* 1985; Heckelman & Schneier, 1995; Heimberg & Juster, 1995; Heimberg *et al.* 1995; Herbert, 1995; Potts & Davidson, 1995; Stein, 1995).

Social phobia is defined by a persistent fear of embarrassment or negative evaluation while engaged in social interaction or public performance. Activities such as meetings or interactions with strangers, attending social gatherings, formal presentations and those requiring assertive behaviour are commonly feared by individuals with social phobia (Rapee, 1995). The recent National Comorbidity Survey (Kessler *et al.* 1994) reported a lifetime prevalence of 13.3% for social phobia as defined in

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| | FEAR OR ANXIETY | | AVOIDANCE | |
|---|--|-------------|---|-----------|
| | 0 = None 1 = Mild 2 = Moderate 3 = Severe | | 0 = Never (0%) 1 = Occasionally (1-33%) 2 = Often (33-67%) 3 = Usually (67-100%) | |
| | ANXIETY (S) | ANXIETY (P) | AVOID (S) | AVOID (P) |
| 1. Telephoning in public (P) | | | | |
| 2. Participating in small groups (P) | | | | |
| 3. Eating in public places (P) | | | | |
| 4. Drinking with others in public places (P) | | | | |
| 5. Talking to people in authority (S) | | | | |
| 6. Acting, performing or giving a talk in front of an audience (P) | | | | |
| 7. Going to a party (S) | | | | |
| 8. Working while being observed (P) | | | | |
| 9. Writing while being observed (P) | | | | |
| 10. Calling someone you don't know very well (S) | | | | |
| 11. Talking with people you don't know very well (S) | | | | |
| 12. Meeting strangers (S) | | | | |
| 13. Urinating in a public bathroom (P) | | | | |
| 14. Entering a room when others are already seated (P) | | | | |
| 15. Being the center of attention (S) | | | | |
| 16. Speaking up at a meeting (P) | | | | |
| 17. Taking a test (P) | | | | |
| 18. Expressing a disagreement or disapproval to people you don't know very well (S) | | | | |
| 19. Looking at people you don't know very well in the eyes (S) | | | | |
| 20. Giving a report to a group (P) | | | | |
| 21. Trying to pick up someone (P) | | | | |
| 22. Returning goods to a store (S) | | | | |
| 23. Giving a party (S) | | | | |
| 24. Resisting a high pressure salesperson (S) | | | | |
| Total Performance (P) Subscore | | | | |
| Total Social Interaction (S) Subscore | | | | |
| TOTAL SCORE | | | | |

FIG. 1. The Liebowitz Social Anxiety Scale. (From M. R. Liebowitz (1987). Social phobia. *Modern Problems in Pharmacopsychiatry* 22, 141-173. Published by S. Karger AG: Basel, Switzerland and reproduced here with the permission of the publishers.)

DSM-III-R (APA, 1987), and its prevalence appears to be increasing (Magee *et al.* 1996). Social phobia is highly co-morbid with other anxiety disorders, depression and substance

abuse, and it significantly increases the risk for these disorders (Schneier *et al.* 1992). It runs a chronic course and is associated with significant impairments in functioning and overall quality

of life, as well as an increased risk of suicidal ideation and attempts (Liebowitz *et al.* 1985; Cox *et al.* 1994; Schneier *et al.* 1994; Safren *et al.* 1997). As research in this area continues to gain momentum, it is imperative that psychometrically sound assessments of social phobia be developed and utilized (Cox & Swinson, 1995; Greist *et al.* 1995).

Assessments of social phobia have most commonly been conducted in self-report or clinician-administered format. To date, the self-report measures have received more extensive examination, and several are considered to be psychometrically sound (see reviews by Cox & Swinson, 1995; McNeil *et al.* 1995). Two clinician-administered scales have been commonly used in studies of the pharmacotherapy of social phobia, but relatively little information has yet been published regarding their psychometric characteristics. These are the Liebowitz Social Anxiety Scale (LSAS) (Liebowitz, 1987) and the Brief Social Phobia Scale (Davidson *et al.* 1991, 1997). The purpose of the present study is to examine the reliability, validity and treatment sensitivity of the LSAS.

The LSAS, the first clinician-rating scale developed for the assessment of social phobia (Greist *et al.* 1995), was designed to assess the range of social interaction and performance situations that individuals with social phobia may fear and/or avoid (Liebowitz, 1987). Its 24 items are divided into two subscales that address social interactional (11 items) and performance (13 items) situations. The clinician asks the patient to rate fear and avoidance during the past week on 0–3 Likert-type scales; however, the clinician is given latitude to question the patient's responses and adjust the ratings accordingly. Thus, the LSAS provides six subscale scores: total fear, fear of social interaction, fear of performance, total avoidance, avoidance of social interaction and avoidance of performance. An overall total score is often calculated by summing the total fear and total avoidance scores, and this index is the one most commonly employed in studies of the pharmacotherapy of social phobia. The LSAS is shown in Fig. 1.

The LSAS has been widely used in studies of pharmacological treatment of social phobia (Reich & Yates, 1988; Munjack *et al.* 1991; Liebowitz *et al.* 1992; Versiani *et al.* 1992; Davidson *et al.* 1993; Lott *et al.* 1997; Noyes *et*

al. 1997) and has also been used in studies of cognitive behavioural group treatment for social phobia (Brown *et al.* 1995; Heimberg *et al.* 1998), but there has been little formal evaluation of its psychometric properties. In the studies of pharmacological treatments, the LSAS has been responsive to change both within treatments and in comparisons between active treatment and placebo. However, demonstration of change or treatment-placebo differences does not assure that an assessment device provides valid measurement unless we also know that it is reliable and relates to criterion measures (i.e. external indicators) in a predictable manner.

Other studies have reported data directly relevant to the psychometric properties of the LSAS. Heimberg *et al.* (1992) reported that scores on LSAS subscales were significantly correlated with scores on the Social Interaction Anxiety Scale and the Social Phobia Scale (Mattick & Clarke, 1998), two self-report measures of social phobia with demonstrated reliability and validity. It is of interest that the fear of social interaction subscale of the LSAS was more strongly related to the Social Interaction Anxiety Scale, which measures anxiety in interactions in dyads or groups, while the fear of performance subscale of the LSAS was more strongly related to the Social Phobia Scale, a measure of the fear of being observed or scrutinized by others. Holt *et al.* (1992) reported that LSAS total fear scores discriminated between three groups of participants with social phobia: those with non-generalized social phobia, those with generalized social phobia, and those with both generalized social phobia and avoidant personality disorder (for information on subtypes of social phobia, see Heimberg *et al.* 1993; Schneier *et al.* 1996). Brown *et al.* (1995) reported that both the total fear and total avoidance scores of the LSAS discriminated among these three groups. In contrast, Herbert *et al.* (1991) reported in their psychometric study of the Social Phobia and Anxiety Inventory (Turner *et al.* 1989) that all measures except the LSAS correlated significantly with this self-report scale. These studies provide data relevant to the psychometric properties of the LSAS, but no studies to date have specifically focused on evaluating its psychometric adequacy.

The LSAS's central position in social phobia research requires that its psychometric properties

be formally evaluated. The present study provides data on the distribution characteristics, reliability, validity and treatment sensitivity of the LSAS in a large sample of patients with social phobia. Patients were pooled from several treatment studies conducted by the authors to provide a large enough sample for effective psychometric analysis. We addressed the following questions: (1) What is the nature of the distribution of scores on the LSAS and its various subscales?; (2) What is the internal consistency of the LSAS and its subscales? (3) Do the fear and avoidance subscales of the LSAS provide distinct information?; (4) Does the LSAS correlate with other measures of fear and avoidance in social interaction and performance situations?; (5) Does the LSAS correlate more strongly with other measures of social anxiety and social phobia than it does with measures of a different disorder (depression)?; and (6) Does the LSAS demonstrate sensitivity to the effects of treatment comparable to that of other measures of social phobia?

METHOD

Subjects

Three hundred and eighty-two subjects were administered the LSAS by an independent assessor prior to the initiation of treatment for social phobia. Patients were pooled from several studies of social phobia treatment: (1) a study comparing phenelzine, atenolol and pill placebo ($N = 91$) (Liebowitz *et al.* 1992); (2) the Albany, New York, site of a collaborative study comparing cognitive-behavioural group therapy, education supportive group therapy, phenelzine and pill placebo ($N = 57$) (Heimberg *et al.* 1998) and other studies of the efficacy of cognitive-behavioural group treatment conducted in Albany ($N = 86$) (Brown *et al.* 1995; Juster *et al.* 1995; Leung & Heimberg, 1996) (total $N = 143$); (3) the New York site of the collaborative study described above ($N = 73$); and (4) a study comparing moclobemide and pill placebo ($N = 75$) (Schneier *et al.* 1998). Pre-treatment data were included for all samples as were post-treatment data from the collaborative study.

All subjects met criteria for a DSM-III-R or DSM-IV (APA, 1994) diagnosis of social phobia as determined by either the Schedule for Affective Disorders and Schizophrenia, Lifetime version (modified for the study of anxiety

disorders) (SADS-LA; Mannuzza *et al.* 1986), the Structured Clinical Interview for DSM-III-R (SCID) (Spitzer *et al.* 1992), the Anxiety Disorders Interview Schedule-Revised (ADIS-R; DiNardo & Barlow, 1988), or the Anxiety Disorders Interview Schedule for DSM-IV; Lifetime Version (ADIS-IV-L; DiNardo *et al.* 1994). Specific inclusion and exclusion criteria differed from sample to sample. Demographic data for each sample are presented in Table 1.

Assessment of social phobia

Assessor-administered measures

In addition to the LSAS, the independent assessor also completed the Clinician's Severity Rating, a 0–8 Likert-type rating included in the ADIS-R or ADIS-IV-L interview. This rating indexes distress and impairment experienced by the patient as a result of his/her social phobia and is widely used in studies of cognitive-behavioural treatment of social phobia (e.g. Heimberg *et al.* 1990). Scores on the assessor-administered Hamilton Anxiety Scale (HAMA; Hamilton, 1959) (pre-treatment only) and the Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960) were also available for collaborative study patients.

Self-report questionnaires

Several commonly-used self-report measures of social anxiety and avoidance were also administered, and these data were used to evaluate the validity and treatment sensitivity of the LSAS. These include the Social Interaction Anxiety Scale (SIAS), which measures the anxiety experienced in social interactional situations (Heimberg *et al.* 1992; Brown *et al.* 1997; Mattick & Clarke, 1998); the Social Phobia Scale (SPS), which measures the levels of anxiety when people are scrutinized by others (Heimberg *et al.* 1992; Brown *et al.* 1997; Mattick & Clarke, 1998); the Social Avoidance and Distress Scale (SADS), which measures the level of anxiety and distress people feel when in social situations and their desire to avoid these situations (Watson & Friend, 1969); the Fear of Negative Evaluation Scale (FNE), which measures the concerns people have about the disapproval of others (Watson & Friend, 1969); and the social phobia subscale of the Fear Questionnaire (FQ-So), which, despite its name, is a measure of the extent of avoidance of feared

Table 1. *Demographic characteristics of patients with social phobia*

| | Total sample (<i>N</i> = 382) | | Sample 1 (<i>N</i> = 91) | | Sample 2 (<i>N</i> = 143) | | Sample 3 (<i>N</i> = 73) | | Sample 4 (<i>N</i> = 75) | |
|----------------------|-----------------------------------|------|------------------------------|------|-------------------------------|------|------------------------------|------|------------------------------|------|
| Age (yr) | | | | | | | | | | |
| Mean | 35.1 | | 34.7 | | 36.3 | | 33.7 | | 34.7 | |
| s.d. | 9.4 | | 9.0 | | 9.7 | | 10.0 | | 8.5 | |
| Range | 18–61 | | 19–54 | | 18–61 | | 19–61 | | 19–59 | |
| | <i>N</i> | % | <i>N</i> | % | <i>N</i> | % | <i>N</i> | % | <i>N</i> | % |
| Gender | | | | | | | | | | |
| Women | 165 | 43.4 | 29 | 32.6 | 68 | 47.6 | 38 | 52.1 | 30 | 40.0 |
| Men | 215 | 56.6 | 60 | 67.4 | 75 | 52.4 | 35 | 47.9 | 45 | 60.0 |
| Marital status | | | | | | | | | | |
| Single | 115 | 54.8 | — | — | 71 | 49.7 | 44 | 65.7 | — | — |
| Married | 71 | 33.8 | — | — | 54 | 37.8 | 17 | 25.4 | — | — |
| Divorced | 23 | 11.0 | — | — | 17 | 11.9 | 6 | 9.0 | — | — |
| Widowed | 1 | 0.5 | — | — | 1 | 0.7 | 0 | 0 | — | — |
| Employment | | | | | | | | | | |
| Full-time | 129 | 59.7 | — | — | 87 | 60.8 | 42 | 57.5 | — | — |
| Part-time | 27 | 12.5 | — | — | 21 | 14.7 | 6 | 8.2 | — | — |
| Homemaker | 4 | 1.9 | — | — | 3 | 2.1 | 1 | 1.4 | — | — |
| Student | 32 | 14.8 | — | — | 20 | 14.0 | 12 | 16.4 | — | — |
| Retired | 2 | 0.9 | — | — | 2 | 1.4 | 0 | 0 | — | — |
| Unemployed | 22 | 10.2 | — | — | 10 | 7.0 | 12 | 16.4 | — | — |
| Education | | | | | | | | | | |
| Some high school | 5 | 2.4 | — | — | 2 | 1.4 | 3 | 4.3 | — | — |
| High school graduate | 21 | 9.9 | — | — | 14 | 9.8 | 7 | 10.1 | — | — |
| Some college | 46 | 21.7 | — | — | 25 | 17.5 | 21 | 30.4 | — | — |
| College graduate | 74 | 34.9 | — | — | 57 | 39.9 | 17 | 24.6 | — | — |
| Graduate work | 66 | 31.1 | — | — | 45 | 31.5 | 21 | 30.4 | — | — |

*N*s vary because of missing data.

— These data were not available for specific samples.

social situations (Marks & Mathews, 1979). The Beck Depression Inventory (BDI; Beck *et al.* 1961) was also administered to patients in the collaborative study and is used here to examine the discriminant validity of the LSAS.

Data analyses

Psychometric analysis is essentially a statistical undertaking, and a range of statistical techniques were employed. Preliminary analyses involved the examination of the demographic characteristics of the study sample and of differences among the various subsamples. Subsample differences in response to the LSAS were also evaluated. Chi-square tests were employed for categorical variables and analyses of variance (ANOVAs) for continuous variables. Significant *F* tests were followed with Duncan's Multiple Range Tests to examine differences between pairs of means with alpha levels controlled ($P < 0.05$).

Primary analyses addressed the characteristics of the LSAS in the full sample ($N = 382$) (all analyses were also conducted separately for each

subsample; results are available from Richard Heimberg). Skewness (the accumulation of cases in a tail of the distribution) and kurtosis (the tendency for cases to accumulate in the centre of the distribution) were examined. These indices describe deviations from the normal distribution. Non-significant skewness and kurtosis indices (< 1.0) suggest that the distribution is normal and that parametric statistics may be properly applied to the data. Internal consistency (the reliability of a test based on the correlations among all items) of the LSAS was evaluated with Cronbach's (1951) alpha coefficient. Alpha coefficients of approximately 0.80–0.85 or higher may be considered sufficiently reliable for use in clinical settings (Rosenthal & Rosnow, 1991). However, alpha increases as a function of scale length (Cronbach, 1970), and direct comparisons of alpha coefficients for LSAS subscales of differing length should not be undertaken.

Person product-moment correlations were calculated among the LSAS subscales, between LSAS subscales and other measures of social anxiety and avoidance and between LSAS

subscales and the measures of general anxiety and depression. Differences in the magnitude of specific pairs of correlations were evaluated with Hotelling's t test (Rosenthal & Rosnow, 1991).

We examined treatment sensitivity, the ability of a measure to detect the effects of an intervention, in two different ways. First, we examined whether the LSAS was sensitive to change over time (uncontrolled within-treatment comparisons). Effect sizes were calculated for each of the LSAS subscales. Effect sizes were also calculated for the other measures of social anxiety to provide a context within which the effect sizes for the LSAS could be evaluated. This analysis was conducted on pre-treatment and post-treatment data for patients treated with phenelzine in the collaborative study. The within-treatment effect size (d) was calculated from means (M) and standard deviations ($S.D.$) using the following formula (Cohen, 1988):

$$d = \frac{(M_{\text{Pre-treatment}} - M_{\text{Post-treatment}})}{\sqrt{(S.D.^2_{\text{Pre-treatment}} + S.D.^2_{\text{Post-treatment}})/2}}.$$

A within-treatment effect size is analogous to the change demonstrated by a patient in an open trial. A d of +1.0 represents improvement equal to 1.0 standard deviation unit from pre-treatment to post-treatment. A 95% confidence interval (CI) was also calculated for the effect size associated with each measure. The degree of change on any measure is significantly different ($P < 0.05$) from zero if the CI for that measure does not include zero (Alliger, 1995).

The second analysis of treatment sensitivity examined the ability of the LSAS to detect the effect of active treatment over and above the effects of a control condition. For this purpose, we derived effect sizes for phenelzine in comparison to pill placebo after 12 weeks of treatment. Between-treatment effect sizes and CIs were calculated to the following formula (Hedges & Olkin, 1985):

$$\text{Effect size} = \frac{(M_{\text{Control}} - M_{\text{Treatment}})}{S.D._{\text{Pooled}}},$$

where

$$S.D._{\text{Pooled}} = \frac{((N_{\text{Treatment}} - 1)(S.D._{\text{Treatment}})^2 + (N_{\text{Control}} - 1)(S.D._{\text{Control}})^2)}{(N_{\text{Treatment}} + N_{\text{Control}} - 2)}.$$

A between-group effect size indexes the amount of change by which a treatment surpasses the effects of placebo. Therefore, it is inherently more conservative than the within-treatment effect size. A between-treatment effect size of +1.0 represents that the score of the phenelzine group is 1.0 standard deviation unit better than that of the placebo group at post-test.

CIs were calculated according to the formula offered by Alliger (1995) which corrects for extreme conservatism in the use of CIs in the comparison of between-condition effect size estimators. The difference between the effect sizes for any two measures is significant ($P < 0.05$) if the CIs for the measures do not overlap, and the difference between treatments on any measure is significant if the CI for that measure does not include zero (Alliger, 1995).

RESULTS

Demographic characteristics

Demographic data are presented in Table 1 for the total sample and each subsample. Data on age and gender were collected for all subsamples. No differences in age were detected ($F(3, 375) = 1.35$, NS). The overall sample mean was 35.1 years ($S.D. = 9.4$). Neither were there significant differences in the gender composition of the subsamples ($\chi^2(3, N = 380) = 7.82$, NS). Overall, 56.6% of patients were male. Remaining demographic data were reported only for Albany patients (sample 2) and patients from the New York site of the collaborative study (sample 3). These subsamples did not differ in education ($\chi^2(2, N = 212) = 0.47$, NS) or in the percentage of patients employed on a full-time basis ($\chi^2(1, N = 216) = 0.10$, NS). However, a somewhat larger percentage of Albany patients (37.8%) than New York patients (25.4%) were married ($\chi^2(2, N = 210) = 4.74$, $P < 0.10$).

Subsamples differences in LSAS scores

One-way ANOVAs were conducted on each of the pre-treatment LSAS scores of the four subsamples (see Table 2). All analyses revealed significant differences. Duncan Multiple Range Tests ($P < 0.05$) demonstrated that patients from the moclobemide study (sample 4) achieved the highest scores in every analysis.

Table 2. Means (*M*), standard deviations (*s.d.*), and analyses of variance for the Liebowitz Social Anxiety Scale (LSAS) and subscales

| LSAS subscale | Total sample (<i>N</i> = 382) | | Sample 1 (<i>N</i> = 91) | | Sample 2 (<i>N</i> = 143) | | Sample 3 (<i>N</i> = 73) | | Sample 4 (<i>N</i> = 75) | | Analyses of variance | |
|---------------------------------|-----------------------------------|-----------------|------------------------------|-----------------|-------------------------------|-----------------|------------------------------|-----------------|------------------------------|-----------------|-------------------------|----------|
| | <i>M</i> | (<i>s.d.</i>) | <i>M</i> | (<i>s.d.</i>) | <i>M</i> | (<i>s.d.</i>) | <i>M</i> | (<i>s.d.</i>) | <i>M</i> | (<i>s.d.</i>) | <i>F</i> | <i>P</i> |
| LSAS total score | 67.2 | (27.5) | 65.0a | (27.9) | 63.0a | (23.5) | 66.5a | (28.0) | 78.4b | (30.7) | 5.7 | 0.001 |
| Total fear | 35.5 | (13.6) | 34.2a | (14.2) | 34.0a | (11.6) | 35.3a | (13.7) | 40.1b | (15.2) | 3.8 | 0.05 |
| Fear of social interaction | 16.9 | (7.7) | 15.7a | (7.6) | 16.4a | (6.9) | 17.0ab | (8.1) | 19.0b | (8.7) | 2.9 | 0.05 |
| Fear of performance | 18.6 | (6.8) | 18.5a | (7.6) | 17.5a | (5.6) | 18.3a | (6.5) | 21.0b | (7.5) | 4.6 | 0.05 |
| Total avoidance | 31.6 | (14.5) | 30.8a | (14.2) | 28.9a | (12.7) | 31.1a | (14.7) | 38.3b | (16.2) | 7.4 | 0.001 |
| Avoidance of social interaction | 15.7 | (8.2) | 15.1a | (8.2) | 14.6a | (7.3) | 15.6a | (8.5) | 18.5b | (9.0) | 4.0 | 0.05 |
| Avoidance of performance | 16.0 | (7.3) | 15.6a | (6.9) | 14.4a | (6.5) | 15.6a | (7.2) | 19.7b | (8.2) | 9.8 | 0.001 |

Means followed by different letters are significantly different ($P < 0.05$) according to Duncan's Multiple Range Test.

LSAS distribution characteristics

LSAS total scores were normally distributed (skewness = 0.17; kurtosis = -0.26), as were total fear (skewness = 0.10; kurtosis = -0.22) and total avoidance scores (skewness = 0.23; kurtosis = -0.38). Fear and avoidance scores for both social interaction and performance were similarly distributed, with minor positive skew and minor negative kurtosis.

Table 3. Cronbach's alpha coefficients for the Liebowitz Social Anxiety Scale (LSAS) and subscales

| LSAS subscales | Total sample (<i>N</i> = 382) α |
|---------------------------------|---|
| LSAS total score | 0.96 |
| Total fear | 0.92 |
| Fear of social interaction | 0.89 |
| Fear of performance | 0.81 |
| Total avoidance | 0.92 |
| Avoidance of social interaction | 0.89 |
| Avoidance of performance | 0.83 |

Internal consistency

Alpha coefficients for all LSAS scores were uniformly high. Alphas for performance scores were somewhat lower than alphas for social interaction scores, but all were in the excellent range (see Table 3).

Correlations among LSAS subscale scores

Table 4 presents the correlations among the LSAS scales and subscales for the full sample. Correlations were uniformly high, ranging from 0.68 to 0.98. The LSAS total score was so highly correlated with total fear and total avoidance that these indices may be considered interchangeable (both $r_s = 0.98$). The total score was also highly correlated with all other subscales ($r_s = 0.90$ to 0.93). Fear and avoidance ratings were also highly correlated, whether they were examined at the level of totals ($r = 0.91$), within performance situations ($r = 0.88$), or within social interaction situations ($r = 0.92$). Fear ratings in social interaction *v.* performance situations were also highly correlated ($r = 0.73$), as were avoidance ratings in social interactions

Table 4. Correlations among the Liebowitz Social Anxiety Scale subscales (*N* = 382)

| LSAS subscales | Total fear | Fear of social interaction | Fear of performance | Total avoidance | Avoidance of social interaction | Avoidance of performance |
|---------------------------------|------------|----------------------------|---------------------|-----------------|---------------------------------|--------------------------|
| LSAS total score | 0.98 | 0.92 | 0.90 | 0.98 | 0.93 | 0.90 |
| Total fear | — | 0.94 | 0.92 | 0.91 | 0.87 | 0.83 |
| Fear of social interaction | — | — | 0.73 | 0.86 | 0.92 | 0.68 |
| Fear of performance | — | — | — | 0.83 | 0.68 | 0.88 |
| Total avoidance | — | — | — | — | 0.94 | 0.92 |
| Avoidance of social interaction | — | — | — | — | — | 0.74 |

v. performance situations ($r = 0.74$). However, the correlations between fear subscales in social interaction v. performance situations and between avoidance subscales in social interactions v. performance situations were of significantly lesser magnitude than the correlations between fear and avoidance subscales (all P s < 0.00001). Correlations among the LSAS subscales after 12 weeks of treatment in the collaborative study revealed a similar pattern (available from Richard Heimberg).

Convergent validity

Convergent validity of the LSAS was assessed via correlations with other self-report and clinician-rated measures of social anxiety and avoidance (see Table 5). These analyses were conducted on the subgroup of patients who completed the entire assessment battery ($N = 178$) in order to facilitate the testing of the significance of differences between correlations. All correlations between LSAS scores and the measures of social anxiety and avoidance were highly significant ($P < 0.001$).

The relationships between the LSAS subscales and the SIAS and SPS were specifically examined as these correlations have been the focus of previous research. The fear of social interaction subscale of the LSAS correlated 0.76 with the SIAS, a measure of anxiety in social interaction, but only 0.50 with the SPS, a measure of anxiety while being observed ($t(175) = 5.81$, $P < 0.000001$). The avoidance of social interaction subscale of the LSAS correlated 0.77 with the SIAS, but only 0.47 with the SPS ($t(175) = 6.79$, $P < 0.000001$). For the performance subscales, this pattern was reversed. The fear of performance subscale correlated 0.52 with the SIAS but 0.65 with the SPS ($t(175) = 2.54$, $P < 0.012$). The avoidance of performance subscale's correlations with the SIAS ($r = 0.55$) and the SPS ($r = 0.60$) were not significantly different. When examined from another perspective, both performance subscales were more highly correlated with the SPS than the corresponding social interaction subscale, and both social interaction subscales were more highly correlated with the SIAS than the corresponding performance subscale (all t s > 2.66 , 175 df, all P s < 0.009).

The relative strength of the relationship of the LSAS subscales to the other measures of social anxiety and avoidance was also examined with a

series of significance tests. Because of the large number of these tests, P was set at 0.003 (0.05/15 tests of differences for each LSAS subscale = 0.003. Details of these tests can be obtained from Richard Heimberg). The LSAS total score was more strongly correlated with the SIAS than with the ADIS Clinician's Severity Rating or the FNE. Total fear was more strongly correlated with the SIAS than with the ADIS Clinician's Severity Rating, the SADS, or the FNE. The fear of social interaction subscale was more strongly related to the SIAS than to any other measure. The fear of performance subscale was more strongly related to the SPS than the ADIS Clinician's Severity Rating, the SADS, or the FNE. Results were similar for the avoidance subscales. However, there were generally fewer significant findings for avoidance than fear subscales. There were no differences in the magnitude of correlations between the LSAS fear and avoidance subscales and the FQ-So, the only measure of avoidance included in our battery.

Correlations of the LSAS subscales with the other measures of social anxiety and avoidance were also calculated for the sample of patients who completed 12 weeks of treatment in the collaborative study (available from Richard Heimberg). We wished to examine the possibility that the correlations reported in Table 5 might have been suppressed because of range restriction (all patients in treatment-seeking samples may receive high scores, artificially restricting sample variance; improvement as a function of treatment by some patients may increase sample variance, allowing stronger relationships to be recognized). In fact, post-treatment correlations were substantially higher between the ADIS Clinician Severity Rating and the LSAS subscales (r s ranged from 0.74 to 0.81 at post-test compared to 0.40–0.52 for the full sample before treatment). Smaller increases in magnitude were also noted for correlations between the LSAS scales and the SADS and FQ-So.

Discriminant validity

Discriminant validity of the LSAS was examined by its correlations with the HAMA, a measure of general anxiety, and the BDI and HRSD, measures of depression. The discriminant validity of the LSAS is supported to the extent that its correlations with other measures of social

Table 5. *Correlations between Liebowitz Social Anxiety Scale (LSAS) and subscales and measures of social anxiety and avoidance (N = 178)*

| LSAS subscales | ADIS CSR | SADS | SIAS | SPS | FNE | FQ-So |
|---------------------------------|----------|------|------|------|------|-------|
| LSAS total score | 0.52 | 0.63 | 0.73 | 0.61 | 0.49 | 0.63 |
| Total fear | 0.50 | 0.59 | 0.70 | 0.62 | 0.51 | 0.61 |
| Fear of social interaction | 0.50 | 0.62 | 0.76 | 0.50 | 0.50 | 0.55 |
| Fear of performance | 0.40 | 0.45 | 0.52 | 0.65 | 0.43 | 0.59 |
| Total avoidance | 0.51 | 0.64 | 0.72 | 0.58 | 0.45 | 0.61 |
| Avoidance of social interaction | 0.50 | 0.67 | 0.77 | 0.47 | 0.46 | 0.52 |
| Avoidance of performance | 0.42 | 0.49 | 0.55 | 0.60 | 0.35 | 0.60 |

ADIS CSR, Independent assessor rating of overall distress and interference from the Anxiety Disorders Interview Schedule; SADS, Social Avoidance and Distress Scale; SIAS, Social Interaction Anxiety Scale; SPS, Social Phobia Scale; FNE, Fear of Negative Evaluation Scale; FQ-So, social phobia subscale of the Fear Questionnaire. All correlations significant at $P < 0.001$.

Table 6. *Within-treatment effect sizes for the Liebowitz Social Anxiety Scale (LSAS) and other measures of social anxiety for social phobic patients treated with phenelzine*

| Measure | Effect size | 95 % CI |
|---|-------------|-----------|
| LSAS | | |
| Total score | 1.34 | 1.00–1.67 |
| Total fear | 1.38 | 0.99–1.72 |
| Fear of social interaction | 1.18 | 0.78–1.57 |
| Fear of performance | 1.40 | 1.05–1.75 |
| Total avoidance | 1.26 | 0.95–1.57 |
| Avoidance of social interaction | 1.15 | 0.82–1.48 |
| Avoidance of performance | 1.24 | 0.92–1.56 |
| ADIS CSR | 1.72 | 1.31–2.13 |
| Social Interaction Anxiety Scale | 1.35 | 0.83–1.88 |
| Social Phobia Scale | 0.92 | 0.43–1.41 |
| Fear of Negative Evaluation Scale | 1.11 | 0.55–1.67 |
| Fear Questionnaire – Social Phobia Subscale | 1.18 | 0.68–1.68 |
| Social Avoidance and Distress Scale | 1.76 | 1.29–2.24 |

ADIS CSR, independent assessor rating of overall distress and interference from the Anxiety Disorders Interview Schedule.

anxiety and avoidance are higher than its correlations with the HAMA, HRSD and BDI. Tests for differences between correlations were conducted in a subset of patients from the collaborative study who completed the requisite measures at pre-treatment ($N = 94$) and after 12 weeks ($N = 83$). Because of the large number of these tests, P was set at 0.0083 (0.05/6 tests of differences for each LSAS subscale for each of the discriminant measures = 0.0083).

At pre-treatment, the correlations of the LSAS total score with the HAMA, HRSD and BDI were 0.48, 0.39 and 0.52, respectively. These correlations may be contrasted with the correlations of the LSAS total score with the other measures of social anxiety and avoidance in this

sample of 94 patients, which ranged from 0.46 to 0.68, with a median of 0.57. However, in only one of 18 tests was the LSAS's correlation with the social anxiety measure significantly greater than the correlation with the discriminant measure. After 12 weeks of treatment, the LSAS, the BDI and HRSD, and the other measures of social anxiety and avoidance were readministered, and the pattern was more clear-cut. The correlation of the LSAS total score with the HRSD was 0.52 and its correlation with the BDI was 0.56. These correlations contrast with the correlations of the LSAS total score with the other measures of social anxiety and avoidance, which ranged from 0.45 to 0.82 in this sample, with a median of 0.76. Statistical tests revealed that the correlation with the social anxiety measure was significantly greater than the correlation with the discriminant measure in 8 of 12 instances, clearly supporting the discriminant validity of the LSAS total score. The HAMA was not administered at post-test.

Results for the remaining LSAS subscales were generally similar to those for the LSAS total score, although somewhat weaker for the avoidance subscales than for the fear subscales. These data are available from Richard Heimberg.

Treatment sensitivity

Within-treatment (uncontrolled) effect sizes

As seen in Table 6, patients treated with phenelzine demonstrated significant within-condition effect sizes for all measures. Effect sizes for the LSAS scales ranged from 1.15–1.40. These effect sizes were within the range of effect sizes for the other measures (0.92–1.76) and not significantly different from any.

Table 7. *Between-treatment effect sizes for the Liebowitz Social Anxiety Scale (LSAS) subscales and other measures of social anxiety: phenelzine versus pill placebo*

| Measure | Effect size | 95 % CI | N (Phenelzine/ placebo) |
|---|-------------|-----------|-------------------------------|
| LSAS | | | |
| Total score | 0.67 | 0.56–0.78 | 26/27 |
| Total fear | 0.65 | 0.54–0.76 | 26/27 |
| Fear of social interaction | 0.58 | 0.47–0.69 | 26/27 |
| Fear of performance | 0.69 | 0.58–0.80 | 26/27 |
| Total avoidance | 0.67 | 0.56–0.78 | 26/27 |
| Avoidance of social interaction | 0.65 | 0.54–0.76 | 26/27 |
| Avoidance of performance | 0.61 | 0.50–0.72 | 26/27 |
| ADIS-R CSR | 0.71 | 0.60–0.82 | 25/26 |
| Social Interaction Anxiety Scale | 0.55 | 0.43–0.67 | 22/25 |
| Social Phobia Scale | 0.50 | 0.39–0.61 | 24/25 |
| Fear of Negative Evaluation Scale | 0.39 | 0.28–0.50 | 24/26 |
| Fear Questionnaire – Social Phobia Subscale | 0.61 | 0.50–0.72 | 23/24 |
| Social Avoidance and Distress Scale | 0.80 | 0.68–0.92 | 24/26 |

ADIS CSR, independent assessor rating of overall distress and interference from the Anxiety Disorders Interview Schedule.

Between treatment (controlled) effect sizes

In Table 7, the effect sizes and confidence intervals for these comparisons are listed. The effect sizes for the LSAS subscales ranged from 0.58 to 0.67, indicating that phenelzine was associated with LSAS scores at post-treatment that surpassed those of placebo patients by one-half a standard deviation or more. The other social anxiety measures had a wider range of effect sizes, from 0.39 to 0.80. The FNE was the measure least sensitive to phenelzine-placebo differences, but there were few other differences.

DISCUSSION

In this paper, we have presented the results of several analyses of the psychometric characteristics of the LSAS. Data from nearly 400 patients with social phobia were utilized to examine the distribution characteristics, internal consistency, convergent validity, discriminant validity and treatment sensitivity of the LSAS subscales. The majority of our findings provide strong support for the continued use of the LSAS and provide a degree of confidence in the validity of previous studies that have employed this measure of fear and avoidance associated with social phobia.

Fear and avoidance as measured by the LSAS scales and subscales were normally distributed in this sample. Neither skewness (lack of symmetry of the distribution) nor kurtosis (the

degree to which scores cluster in the centre of the distribution) were problematical, suggesting that parametric statistics may be safely applied to LSAS scores. More importantly, the shape of the distribution suggests that, even within a patient population, fear and avoidance are continuous variables that may differ from patient to patient with social phobia.

The LSAS demonstrated excellent internal consistency for the total score as well as the specific subscale scores (total fear, fear of performance, fear of social interaction, total avoidance, avoidance of performance, avoidance of social interaction). Higher alpha coefficients for the total score, total fear, and total avoidance are a probable artefact of greater scale length. Avoidance subscales demonstrated somewhat lower alphas than the fear subscales, but all were clearly in the acceptable range.

Evidence for the convergent validity of the LSAS was derived from its significant and sometimes substantial correlations with other commonly used self-report and clinician-rated measures of social anxiety and avoidance. Interestingly, the LSAS was more highly correlated with several of the self-report measures than it was with the Clinician's Severity Rating from the Anxiety Disorders Interview Schedule, suggesting that method variance was not a large contributor to the magnitude of these correlations. The relatively modest correlations between the LSAS and the ADIS rating may arise from at least two sources. First, the LSAS

ratings are completed on a situation-by-situation basis whereas the ADIS rating is completed retrospectively after the interview is terminated. Thus, the ADIS rating represents a clinician's global summary of the severity of the patient's social phobia, whereas the LSAS ratings may be more sensitive to situational variability in patients' fear and avoidance. Secondly, while the LSAS ratings specifically index fear and avoidance, the ADIS rating combines distress and impairment into a single rating and does not specifically address either fear or avoidance. After treatment, however, the correlations between the LSAS and the ADIS rating were substantially higher. The smallest correlations of the LSAS scales were with the FNE. While the FNE includes items related to social anxiety, it is often considered to be an index of social anxiety related cognition rather than a measure of anxiety *per se* (Heimberg, 1994).

As we have previously reported (Heimberg *et al.* 1992; Brown *et al.* 1997), the LSAS fear of social interaction and fear of performance subscales demonstrated divergent validity in the patterns of their correlations with other measures. The fear of social interaction subscale correlated more strongly with the SIAS, a measure of anxiety during dyadic and group interactions and significantly less strongly with the SPS, a measure of anxiety while being observed or scrutinized by others. The fear of performance subscale demonstrated the opposite pattern (more strongly correlated with the SPS than the SIAS), although the magnitude of the difference was not as large as in our previous studies. A very similar pattern of correlations was noted for the avoidance of social interaction and avoidance of performance subscales.

We examined the discriminant validity of the LSAS by comparing the magnitude of the correlations of its subscales with the measures of social anxiety and avoidance to the magnitude of the correlation of its subscales with measures of general anxiety and depression. Possibly as a result of range restriction, there were few significant differences in the pre-treatment sample. However, when these analyses (for the depression measures) were repeated after treatment for social phobia, two-thirds of the tests for the LSAS total score and half of the tests for the remaining subscales revealed significant differences. In every significant test, the LSAS

subscale was more highly related to the measure of social anxiety/avoidance than it was to the measure of depression. At least in the post-treatment analyses, the LSAS demonstrated substantial discriminant validity.

We also examined the sensitivity of the LSAS to treatment effects both in terms of magnitude of change over time (uncontrolled within-condition effect sizes) and when an active treatment was compared to placebo (controlled between-condition effect sizes). Data from patients treated with phenelzine or placebo during our collaborative study were used for these purposes. Within-condition effect sizes for the LSAS were within the range of those for the other measures of social anxiety and avoidance. Between-condition effect sizes were generally similar for the LSAS and the other measures, although the FNE was the least sensitive to between-group differences. Davidson *et al.* (1991) also examined the between-condition effect sizes of three LSAS indices (total score, total fear, total avoidance) and two questionnaire measures also included in our study (FQ-So, FNE). Data were drawn from 17 patients treated in their placebo-controlled trial of clonazepam (Davidson *et al.* 1993). Davidson *et al.* (1991) reported between-condition effect sizes of 0.61, 0.64 and 0.59 for LSAS total score, total fear, total avoidance, respectively, compared with 0.67, 0.65 and 0.67 in the current study. Interestingly, they reported much larger effect sizes for the FQ-So and FNE than we obtained, but the meaning of this difference is unclear since Davidson *et al.* (1991) evaluated so few patients.

One purpose of this study was to examine the covariance between the LSAS fear and avoidance subscales in order to determine whether or not they measure distinct constructs. In fact, it appears that they do not, at least in this clinical sample. Fear and avoidance measures were highly correlated, whether total ($r = 0.91$), social interaction ($r = 0.92$), or performance scores ($r = 0.88$) were considered. These correlations were significantly higher than the correlations between fear scores for performance and social interaction ($r = 0.73$) or between avoidance scores for performance and social interaction ($r = 0.74$). Furthermore, there were no apparent differences in the correlations of fear and avoidance scales with other measures of either

social anxiety/avoidance, general anxiety, or depression. The lack of separation of fear and avoidance may or may not reflect the true state of nature. Since avoidance behaviour is the theoretical consequent of fear, the two constructs may actually be highly correlated. However, on occasion in clinical practice, we see social phobia patients whose levels of avoidance do not match their levels of fear (e.g. the highly anxious single mother who endures the anxiety of a stressful job to make certain that her children are fed). It may be that the format of the rating of either fear or avoidance or the collection of avoidance ratings after fear ratings have been obtained may spuriously increase the correlations between these sets of ratings. Alternatively, fear and avoidance may be more strongly related among clinical subjects than among persons whose social fears are not associated with extreme impairment. Study of the responses of normal or normally anxious individuals to the LSAS and of alternative rating formats may shed light on the relationship between fear and avoidance.

The current lack of discriminability between LSAS fear and avoidance raises the question of the utility of the calculation of overall total scores (i.e. adding fear and avoidance scores together). In fact, it appears that there was little to gain in our sample since the correlation of the total score with either fear or avoidance totals was 0.98. Clearly, the LSAS total score performed well in this study. However, since the avoidance scale mimicked the fear scale in most of its relationships with other measures, but seemed to do so a bit less strongly, the addition of avoidance items to fear items added little clarity. However, it remains possible that newer treatments for social phobia may have differential effects on fear and avoidance and future studies should evaluate this prospect.

The data presented here provide support for the use of the LSAS. However, they do not imply that the current subscale structure of the LSAS is the most valid or the most useful. Since the items on the LSAS and the social interaction *versus* performance subscales were rationally rather than empirically generated, it is possible that some items classified as social interactional may actually fit better with the items on the performance scale or vice versa, or that some situations have aspects of both interactional and performance demands, or that the social inter-

actional *versus* performance distinction is not the most efficient construct on which to base separate subscales. In fact, in a recent study of the SIAS and SPS (Safren *et al.* 1998), a confirmatory factor analysis failed to uphold the social interaction *versus* performance distinction and exploratory factor analyses revealed that the SPS (mostly having to do with performing in front of or being observed by others) contained separate factors for anxiety about being observed by others and for fear that others will notice one's anxiety symptoms. A similar analysis of the LSAS will be reported in a separate paper.

While this study was conducted with a large sample of patients and its results are highly supportive of the reliability and validity of the LSAS, it is important to note some limitations. First, we conducted a series of analyses to determine whether the various subsamples involved in the study were equivalent. While this was the case for many measures, there were some differences. Moclobemide study (sample 4) patients scored higher on the LSAS than all of the other subsamples. The reasons for this outcome are unclear. Secondly, the total sample was a relatively well functioning one. Approximately one-half the sample was married; two-thirds had graduated from college, and a similar number were employed on a full-time basis. Although preliminary analyses in our dataset suggest that greater impairment is associated with higher LSAS scores,¹ the reliability, validity, the utility of the LSAS with more severely impaired samples is a topic for future research. Other topics for future studies of the LSAS include the development of a briefer form of the measure, the relative utility of the LSAS as a clinician-administered measure *versus* a self-report questionnaire, and the performance of the LSAS in other cultures.

In conclusion, the LSAS was found to be a reliable and valid measure of social phobia in a large out-patient sample. Our findings support its past and continued use in the assessment of

¹ To examine this issue in a preliminary way in our own sample, we conducted tests of the relationship of education (high school or less *v.* college *v.* post-graduate education), employment (unemployed *v.* employed on a full-time basis), marital status (single *v.* married), and living situation (living alone or with parents *v.* living with spouse, significant others, peers, or children). Poorer functioning in each of these areas was related to higher scores on LSAS subscales. Full details are available from Richard Heimberg.

social phobia. Further development of the LSAS is an important agenda for future research.

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