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Psychometric Properties of the Liebowitz Social Anxiety Scale (LSAS) in a Longitudinal Study of African Americans with Anxiety Disorders

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Abstract

The Liebowitz Social Anxiety Scale (LSAS) is a widely used measure of social anxiety. However, no study has examined the psychometric properties of the LSAS in an African American sample. The current study examined the LSAS characteristics in 97 African Americans diagnosed with an anxiety disorder. Overall, the original LSAS subscales showed excellent internal consistency and temporal stability. Similar to previous reports, fear and avoidance subscales were so highly correlated that they yielded redundant information. Confirmatory factor analyses for three previously proposed models failed to demonstrate an excellent fit to our data. However, a four-factor model showed minimally acceptable fit. Overall, the LSAS performed similarly in our African American sample as in previous European American samples. Exploratory factor analyses are warranted to determine whether a better factor structure exists for African Americans.

Keywords

LSAS; African American; psychometric; confirmatory factor analyses; anxiety

1. Introduction

The Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987) is a commonly used measure of social anxiety symptom severity and treatment outcome (Oakman, van Ameringen, Mancini, & Farvolden, 2003; Baker, Hendrichs, Kim, & Hofmann, 2002). The LSAS comprises 24 social situations that are each rated for level of fear and avoidance. The original scale was developed as a clinician administered measure, although a self-report version has also been validated (Fresco et al., 2001; Oakman et al., 2003). The LSAS differs from most other social anxiety measures in that it assesses anxiety and avoidance in specific social situations (e.g., parties), rather than assessing specific symptoms (e.g., fear of negative evaluation). In social anxiety disorder (SAD) patients, the LSAS showed good

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internal consistency, test-retest reliability, convergent and discriminant validity, and sensitivity to treatment (Heimberg et al., 1999).

1.1 Existing factor structures of the LSAS

The original LSAS model implied by the scoring instructions yields seven different scores. First, a total score is created by summing all 48 responses. Second, fear ratings for all situations are summed to create a Fear subscale. Third, avoidance ratings for all situations are summed to create an Avoidance subscale. Additionally, responses to the 11 social-interaction and 13 performance situations may be summed separately for fear and avoidance, creating four subscales: social interaction fear, social interaction avoidance, performance fear, and performance avoidance.

The original scoring instructions implied two-factors (social interaction, performance) separately for fear and avoidance. Although the measure was designed to provide separate fear and avoidance scores, studies show that these subscales are highly correlated, suggesting significant redundancy between subscales (Heimberg et al., 1999; Oakman et al., 2003). Thus, studies have tested the original 2-factor model (social interaction, performance) examining only fear ratings. Factor analyses have not supported the original 2-factor model and have instead supported a different four-factor structure. Specifically, Safren and colleagues found a superior factor structure that comprised only fear ratings and dropped five items to create the following subscales: social interaction, public speaking, observation by others, and eating/drinking in public (Safren et al., 1999). This structure was preferred in a sample of treatment seeking individuals diagnosed with SAD (Safren et al., 1999) and individuals with a range of anxiety disorders (Oakman et al., 2003). However, in a sample of individuals with SAD, Baker and colleagues (2002) found that a five-factor structure (social interaction anxiety, nonverbal performance anxiety, ingestion anxiety, public performance anxiety, and assertiveness anxiety) demonstrated a better fit than Safren's 4-factor model.

1.2 Measuring Anxiety in African Americans

The majority of previous psychometric evaluations of the LSAS did not provide any information about the ethnicity or race of their participants (Oakman et al., 2003; Heimberg et al., 1999; Safren et al., 1999). One study that provided data on racial composition of their sample included only five African Americans (Baker et al., 2002). Thus, while there are mixed findings for the factor structure of the LSAS in European American samples, our understanding is even less clear in non-European samples. Examining commonly used measures in a cross-cultural manner is crucial to ensure that research based on such measures in these samples yields reliable and valid data. Moreover, examining the factor structure of measures in diverse samples may inform about whether the construct of social anxiety differs across ethnic and racial groups in clinically meaningful ways.

Given the large population of African Americans and the high prevalence of anxiety disorders in the United States, there is a need to examine the psychometric properties of commonly used measures of anxiety in this population. To this end, Chapman and colleagues compared African American and European American samples on several measures of anxiety in a series of studies. Samples significantly varied in the factor structure of the Fear Survey Schedule-Second Edition (Chapman, Kertz, Zurlage, & Woodruff-Borden, 2008), but not the Beck Anxiety Inventory (Chapman, Williams, Mast, & Woodruff-Borden, 2009). African American and European American samples varied in the structural relationship among measures of perceived control, psychological distress, and worry (Chapman, Kertz, & Woodruff-Borden, 2009). Additionally, Carter and colleagues (Carter, Miller, Sbrocco, Suchday, & Lewis, 1999) found poor convergent and discriminant validity of the Anxiety Sensitivity Index in an African American sample.

There is minimal data characterizing social anxiety in African Americans (Chapman et al., 2008). Melka and colleagues (Melka, Lancaster, Adams, Howarth, & Rodriguez, 2010) recently compared the factor structure of two commonly used self-report measures of social anxiety, Fear of Negative Evaluation (FNE) and Social Avoidance and Distress Scales (SADS), in European American and African American samples. Whereas the original factor structures generally held for the European American sample, several items needed to be dropped for the models to fit the African American sample. The original measures yielded significant differences in anxiety level between the groups. When the ill-fitting items were dropped, groups no longer differed in their level of social anxiety on the SADS. These findings highlight the implications of interpreting data obtained from measures that have not been validated for the population under examination. In the case of the SAD, conclusions that differences exist between African Americans and European Americans (e.g., Melka et al., 2010; Chapman et al., 2008) could actually be the result of measurement and structural issues with the instrument.

To our knowledge, no studies have examined the LSAS in an exclusively African American sample. Given the findings of variance across ethnic groups for multiple measures of anxiety, it is important to examine the structure of the LSAS in an African American sample. The current study had two primary aims. First, we sought to evaluate basic psychometric properties of the clinician-administered LSAS in a sample of African Americans with a range of anxiety disorders. Second, we sought to compare the fit of previously proposed factor structures of the LSAS. Based on psychometric examination of other anxiety measures in African Americans, we expected that previous factor structures identified in mostly European samples would not fit well in our sample.

2. Method

2.1 Design

Data were obtained from the ongoing Harvard/Brown Anxiety Research Project-Phase II (HARP-II). HARP-II is a prospective longitudinal observational study of anxiety disorders. The current examination utilized a subsample of the HARP-II study comprising African American participants with at least one LSAS interview. HARP-II was approved by the institutional review board of Brown University. During the early phases of recruitment, participants were referred to the study by site collaborators and affiliated treatment providers. We then added postings in newspapers and on the internet to recruit directly from the community. All participants provided written informed consent prior to enrollment in the study. Once enrolled, participants were contacted for an in-person or telephone follow-up interview annually. The LSAS was administered during the annual follow-up assessments between 2004 and 2008.

2.2 Participants

Criteria to be enrolled in HARP-II included being diagnosed with at least one of the following anxiety disorders, according to the Structured Clinical Interview for the DSM-IV (SCID-IV): Post-Traumatic Stress Disorder (PTSD), SAD, Panic Disorder (PD), Panic Disorder with Agoraphobia (PDA), and Generalized Anxiety Disorder (GAD). To be eligible for the study, participants needed to be at least 18 years of age and English speaking. Participants were excluded from the study if they were diagnosed with schizophrenia, suffering from active psychosis, or had an organic mental disorder. A total of 110 African Americans met these criteria at baseline, and 97 completed at least one LSAS. For most participants ($n=90$), the 12-month follow-up LSAS was available for analysis. For participants who did not complete a 12-month LSAS, we used their first available assessment (24-month follow-up $n=6$; 48-month follow-up = 1) for internal consistency and

correlational analyses. Only participants who had both a 12-month and a 24-month follow-up LSAS were included in the one-year temporal stability analyses.

At baseline, participants ranged in age from 19 to 75 ($M = 45$, $SD = 9.8$) and 75% ($N=73$) were female. Approximately 10% were married; 52% were single; 35% were separated or divorced; and 3% were widowed. Only 29% were employed at baseline. Approximately 83% of participants obtained a high school degree or GED; 30% attended some college; and 16% obtained a bachelor's degree. The most common anxiety disorder at baseline was GAD ($N=52$, 53.6%), followed by SAD ($N=48$, 49.5%), PDA ($N=48$, 49.5%), PTSD ($N=41$, 42.3%), Specific Phobia ($N=38$, 39.2%), and Obsessive Compulsive Disorder ($N=16$, 16.5%). Comorbid Major Depressive Disorder was also common ($N=48$, 49.5%). Of note, HARP-II does not assign primary diagnoses, and thus percentages total greater than 100% due to comorbidity.

2.3 Measures

The LSAS (Liebowitz, 1987) comprises 24 social situations that are each rated for level of fear (0 = none to 3 = severe) and avoidance (0 = none to 3 = usually) for the past week. As reviewed previously, the LSAS has good psychometric properties in European American samples (Heimberg et al., 1999). All clinical diagnoses were established by means of in-person diagnostic interviews that employed the Structured Clinical Interview for the DSM-IV (SCIDIV; First, Spitzer, Gibbon, & Williams, 1996).

Interviews were conducted by trained, experienced clinical interviewers whose educations range from B.A. to M.A. An intensive program for training interviewers has been developed and successfully used for the past 15 years. The training consists of a graduated set of tasks and experiences, beginning with reading relevant papers, studying instruments and instruction booklets, watching training tapes, and reviewing suggestions for handling common interviewing problems. New interviewers discuss videotapes of interviews and conduct mock interviews with experienced interviewers. They are closely supervised during training sessions and initial actual interviews by training supervisors. Senior clinical staff reviewed interview data for clinical and clerical errors, which were corrected before the data were entered on the computer master file. Further details on training procedures for HARP are described by Massion and colleagues (1993). Inter-rater reliability estimates for HARP interviews have been good to excellent, with intraclass correlation coefficients (ICC) ranging from .88 to .95 (Keller et al., 1987).

2.4 Data Analyses

Data were analyzed using SPSS Version 17.0 and AMOS Version 18.0. To examine the psychometric properties of the LSAS, two-tailed correlational analyses were conducted among each subscale; reliability statistics (α) were calculated for each LSAS subscale and total score; and two-tailed correlational analyses were conducted for LSAS subscales at 12-month and 24-month assessments. We examined the concurrent validity by comparing the scores on each proposed LSAS subscale for participants with and without a diagnosis of SAD.

To examine the factor structure, we estimated the sample covariance matrices using a maximum-likelihood solution in AMOS. In line with previous reports and a high correlation between fear and avoidance ratings in our own sample, we tested each model including only fear ratings for each LSAS situation. Three confirmatory factor analyses were conducted: Original 2-factor model (social interaction, performance); Safren 4-factor model (social interaction, speaking, observation by others, eating and drinking); and the Baker 5-factor

model (social interaction, nonverbal performance, ingestion, public performance, assertiveness). For each model, factors were allowed to correlate.

We compared the three models' goodness-of-fit to participants' collective response patterns using Chi-Square, the Comparative Fit Index (CFI), Tucker Lewis Index (TLI), Root Mean-Square Error of Approximation (RMSEA). We also compared the Akaike Information Criterion (AIC) for each model. A significant Chi-Square indicates that the data significantly differ from the proposed model. We followed recommended cut-offs for determining acceptable fit (TLI and CFI > .9, RMSEA < .08). Smaller AIC scores are preferred among competing models. Multiple investigations identified these indices as optimal measures of model fit for structural equation modeling (Hu & Bentler, 1995; Bentler, 1990; Bollen, 1990; Gerbing & Anderson, 1993).

3. Results

3.1 Descriptives, reliability, and temporal stability

Descriptive information (M, SD) and reliability estimates (α) for each LSAS subscale is presented in Table 1. All of the subscales demonstrated normal skew and kurtosis, suggesting normal distributions. They each demonstrated excellent internal consistency, with exception of one Safren subscale (observation by others) and two Baker subscales (nonverbal performance, assertiveness). We examined the 1-year temporal stability of LSAS scores in the 76 participants who had 12-month and 24-month data (Table 1). Overall, LSAS total scores and subscales were quite stable over time ($r_s \geq .5$).

3.2 Intercorrelations and concurrent validity among LSAS subscales

Table 2 presents intercorrelations among the LSAS subscales. Similar to previous reports, the fear and avoidance subscale were very highly correlated ($r = .946, p < .001$). Indeed, all of the original subscales were highly correlated with one another ($r_s > .8$). The Safren and Baker subscales also correlated with one another ($r_s > .4$) and with the original subscales ($r_s > .6$). Overall, the subscales from the Safren and Baker models had far less redundancy (r ranges from .41 to .77) compared to the original subscales (r ranges from .84 to .99). Finally, supporting the concurrent validity of the LSAS, participants diagnosed with SAD scored significantly higher ($p_s > .05$) than participants without SAD on each subscale from the Original, Safren, and Baker models, with the exception of the 'assertiveness' subscale from the Baker 5-factor model ($p = .18$).

3.3 Confirmatory factor analyses

Original 2-factor model—The original 2-factor model was not a good fit for our sample, as none of the goodness-of-fit indices were in the acceptable range ($X^2 = 468, df = 251, p < .001$; CFI = .827; TLI = .793; RMSEA = .089).

Safren 4-factor model—The Safren 4-factor model also showed poor fit on the Chi-Square statistic ($X^2 = 233, df = 146, p < .001$) and TLI (.878). However, this model achieved an acceptable fit as measured by the CFI (.906) and RMSEA (.074). Moreover, the AIC index favored the Safren model (AIC = 358.56) over the Original model (AIC = 613.99) and Baker model (AIC = 450.41).

Baker 5-factor model—The Baker 5-factor model fit our data in a similar manner as the Safren 4-factor model with poor fit on the Chi-Square statistic ($X^2 = 298, df = 199, p < .001$) and the TLI (.886), and acceptable fit on the CFI (.910) and RMSEA (.068).

4. Discussion

The LSAS has been in existence for 25 years and is a widely used treatment outcome measure of social anxiety. To our knowledge, this is the first examination of the LSAS in an African American sample. The LSAS total score and original subscales showed excellent internal consistency and temporal stability. With exception of the ‘assertiveness’ subscale from the Baker (2002) model, participants with SAD scored significantly higher on all subscales compared to participants without SAD. Similar to several previous examinations, the fear and avoidance subscales were quite redundant in this clinical sample.

All three models resulted in significant Chi-Square statistics, suggesting poor fit to our data. The original two-factor (social interaction and performance) model was a particularly poor fit to our data. This finding converges with previous examinations in European American samples (Safren et al., 1999; Baker et al., 2002; Oakman et al., 2003). The Safren four-factor model (social interaction, speaking, observation by others, eating and drinking) has been supported in two studies (Oakman et al., 2003; Safren et al., 1999), but not in a third study (Baker et al., 2002). In our sample, this model showed good fit on two out of three indices. The Safren subscales showed acceptable internal consistency, with the exception of “observation by others.” This subscale also had the poorest reliability in Safren’s study and other reports (Oakman et al., 2003).

The Baker five-factor model (social interaction, nonverbal performance, ingestion, public performance, assertiveness) also demonstrated good fit on two out of three indices. However, only three of the five subscales showed good internal consistency. Given this and that the AIC index favored the Safren model, we concluded that the Safren model was the best fit for our African American sample, albeit not an excellent fit.

All psychometric investigations, including the current one, have repeatedly found that the original fear and avoidance subscales yield redundant information. These findings call into question the original administration and scoring of the LSAS and suggest that perhaps only one subscale is needed. On the other hand, both subscales may be of interest for specific inquiries. For example, one might expect individuals undergoing Cognitive-Behavioral Therapy or acceptance based treatments may show reductions in avoidance before any changes in fear.

Strengths of our study include use of a clinical sample of adults of varying ages and SES, compared to previous studies that utilized undergraduate samples (Melka et al., 2010; Chapman et al., 2009; Chapman et al., 2008; Chapman et al., 2009). Limitations include a modest sample size, which prevented us from conducting exploratory factor analyses. Such analyses are needed given that none of the previously proposed factor structures were good fits for our data. Moreover, it is possible that the Safren and Baker models would have achieved a better fit in a larger sample. Finally, we did not include a European American control group and therefore could not directly examine invariance across ethnicities.

Current findings may be generalizable to other samples comprising mixed anxiety disorders. However, future studies comprising a clinical sample of patients with primary SAD may yield different findings. As the LSAS is a commonly used measure of treatment outcome for SAD, future studies are needed to examine whether the LSAS is sensitive to changes in symptoms during treatment in African Americans. Additionally, future investigations are needed to examine the convergent and divergent validity of the LSAS in African American samples. Future work might also utilize an item-response approach to examine whether LSAS items “behave” in a similar way in African American as in European American populations. Finally, future studies are also warranted to examine the psychometrics of the LSAS in other racial and ethnic samples, i.e., Latinos.

5. Conclusions

The original LSAS subscales demonstrated excellent internal consistency and temporal stability. However, they provided redundant information and did not fit the factor structure of our data well. Overall, the Safren four-factor model demonstrated the best psychometric properties in an African American sample. The LSAS appears to be a reliable measure of social anxiety in this African American sample with a similar factor structure to previous reports from European samples. Given that none of the models were an excellent fit for our data and that the Safren model has not been supported in all previous studies (Baker et al., 2002), future exploratory factor analyses in European and African Americans are warranted to determine whether a superior factor structure exists. Such work may inform about whether the construct of social anxiety is similar and should be measured similarly across racial and ethnic groups.

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Table 1

Descriptive measures and reliability coefficients for the LSAS subscales

	Mean	SD	α	r	Items
<i>Original Model (1987)</i>					
Total Score	43.4	35.53	.975	.757	all 48
Fear Subscale	22.0	17.08	.951	.739	all 24 fear ratings
Social Interaction	9.4	8.19	.905	.694	fear ratings for 5, 7, 10, 11, 12, 15, 18, 19, 22, 23, 24
Performance	12.6	9.52	.908	.746	fear ratings for 1, 2, 3, 4, 6, 8, 9, 13, 14, 16, 17, 20, 21
Avoidance Subscale	21.4	18.93	.949	.732	all 24 avoidance ratings
Social Interaction	9.6	9.15	.904	.653	avoidance ratings for 5, 7, 10, 11, 12, 15, 18, 19, 22, 23, 24
Performance	12.2	10.31	.900	.752	avoidance ratings for 1, 2, 3, 4, 6, 8, 9, 13, 14, 16, 17, 20, 21
<i>Safren et al. (1999) model</i>					
Social Interaction	7.7	6.55	.896	.655	fear ratings for 5, 7, 10, 11, 12, 18, 19, 21
Public Speaking	6.6	4.93	.905	.672	fear ratings for 2, 6, 15, 16, 20
Observation by Others	2.3	2.54	.622	.498	fear ratings for 1, 9, 13, 17
Eating and Drinking in Public	1.1	1.69	.801	.757	fear ratings for 3, 4
<i>Baker et al. (2002) model</i>					
Social Interaction	8.8	7.42	.907	.662	fear ratings for 5, 7, 10, 11, 12, 14, 18, 19, 21
Nonverbal Performance	3.1	2.77	.664	.555	fear ratings for 8, 9, 17
Ingestion	1.1	1.69	.801	.757	fear ratings for 3, 4
Public Performance	5.9	4.23	.903	.665	fear ratings for 6, 15, 16, 20
Assertiveness	1.2	2.05	.672	.596	fear ratings for 1, 13, 22, 24

Note. α = Chronbach's alpha (n's range from 83 to 94); r = temporal stability over a one-year period (n=75)

Table 2

Correlations among the LSAS subscales (n=97)

	Fear	Avoid	SIF	PF	SIA	PA	SI	PS	OBO	ED	BSI	BNP	BI	BPP	BA
<i>Original</i>															
Total	.985	.988	.946	.953	.952	.955	.921	.860	.721	.731	.939	.746	.731	.832	.681
Fear	---	.946	.958	.969	.909	.924	.934	.868	.742	.738	.953	.771	.738	.840	.698
Avoidance	---	---	.911	.913	.967	.958	.885	.831	.684	.684	.902	.705	.706	.803	.648
SIF	---	---	---	.858	.923	.837	.968	.785	.653	.683	.971	.650	.683	.751	.692
PF	---	---	---	---	.836	.938	.842	.882	.766	.737	.874	.823	.737	.864	.656
SIA	---	---	---	---	---	.876	.886	.760	.616	.673	.893	.625	.673	.741	.639
PA	---	---	---	---	---	---	.815	.856	.682	.714	.842	.724	.714	.842	.615
<i>Safren</i>															
SI	---	---	---	---	---	---	---	.769	.608	.628	.994	.637	.628	.729	.581
PS	---	---	---	---	---	---	---	---	.520	.582	.796	.561	.582	.981	.446
OBO	---	---	---	---	---	---	---	---	---	.502	.635	.883	.502	.489	.736
ED	---	---	---	---	---	---	---	---	---	---	.645	.496	1.00	.541	.636
<i>Baker</i>															
BSI	---	---	---	---	---	---	---	---	---	---	---	.663	.645	.758	.595
BNP	---	---	---	---	---	---	---	---	---	---	---	---	.493	.574	.559
BI	---	---	---	---	---	---	---	---	---	---	---	---	---	.541	.636
BPP	---	---	---	---	---	---	---	---	---	---	---	---	---	---	.412

Note. All correlations are significant ($ps < .001$).

Original subscales: SIF = Social Interaction Fear; PF = Performance Fear; SIA = Social Interaction Avoidance; PA = Performance Avoidance. Safren subscales: SI = Social Interaction; PS = Public Speaking; OBO = Observation by Others; ED = Eating and Drinking.

Baker subscales: BSI = Social Interaction; BNP = Nonverbal Performance; BI = Ingestion; BPP = Public Performance; BA = Assertiveness.