Development and Evaluation of the Social Anxiety and Depression Life Interference-24 (SADLI-24) Inventory

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We describe the development of a new self-report instrument, the Social Anxiety and Depression Life Interference-24 (SADLI-24) inventory. We initially retained 30 content specific items for the instrument (Study 1). In Study 2 (N = 438), we established a 2-factor solution, Social Anxiety Life Interference-12 (SALI-12) and Depression Life Interference-12 (DLI-12). We also examined estimates of known-groups and concurrent validity. Confirmatory factor analysis in Study 3 (N = 430) provided support for the oblique two-factor structure. In Study 4 (N = 179), we provided additional support for estimates of known-groups validity. In Study 5 (N = 63), we evaluated estimates of test-retest reliability. Both SADLI-24 scale scores showed good estimates of internal consistency. © 2010 Wiley Periodicals, Inc. J Clin Psychol 67:82–98, 2011.

Keywords: social anxiety disorder; depression; symptom interference; factor analysis

According to the current Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association [APA], 2000), social anxiety disorder (or social phobia) is generally conceptualized as an intense, persistent, and irrational reaction to social situations in which the performance of the individual is perceived to be negatively scrutinized or evaluated by unfamiliar people. We describe the construction and validation of scores on a self-report measure of social anxiety disorder and one of its highly co-occurring internalizing disorders, major depressive disorder.

In recent years, several investigations have reported that social anxiety disorder (or social phobia) is one of the most prevalent anxiety-related disorders in adolescent, young adult, and adult populations (Kessler, Berglund, Demler, Jin, & Walters, 2005; Klein, 2009; Magee, Eaton, Wittchen, McGonagle, & Kessler, 1996). The estimated lifetime prevalence rate for social anxiety in the general population is approximately 6.6% to 14.3% (Essau, Conradt, & Petermann, 1999; Kessler et al., 2005; Wittchen & Fehm, 2001). Previous developmental and clinical studies also suggest that mid-adolescence is the age of onset for social anxiety disorder, and that early onset of this disorder predicts other adult disorders or dysfunctions including major depressive disorder, Axis II disorders, suicidal behavior, functional impairment, and generalized anxiety disorder (APA, 2000; Sumter, Bokhorst, & Westenberg, 2009; Klein; Van Oort, Greaves-Lord, Verhulst, Ormel, & Huizink, 2009; Weeks, Coplan, & Kingsbury, 2009).

Although several social situations (e.g., eating or speaking in public) are linked with social anxiety disorder, the fear (i.e., affective reaction) in social anxiety is focused specifically on the expectation that the individual will be embarrassed or judged negatively in the presence of unfamiliar people. Accordingly, when exposed to specific social or performance situations, individuals with social anxiety disorder tend to avoid the situation altogether or endure significant levels of anxiety-related symptoms, including heart palpitations or a full panic attack.
attack. Formal diagnosis for social anxiety disorder is indicated when the essential symptoms of this disorder interfere considerably with important adaptive (i.e., normal routine) functioning of the individual (APA, 2000).

In terms of related constructs, published studies with adolescents and adults have shown that social anxiety disorder tends to co-occur frequently with major depressive disorder and other psychological distress symptoms (Brown, Chorpita, & Barlow, 1998; Cho & Telch, 2005; Kessler, Stang, Wittchen, Stein, & Walters, 1999; Ranta, Kaltiala, Pelkonen, & Marttunen, 2009; Watson, Gamez, & Simms, 2005). Studies have also shown that the constructs of social anxiety and major depressive disorder share important characteristics that include highly similar types of symptoms, negative impact on the quality of life, and correlates such as hopelessness, social-adjustment difficulties, generalized distress, and substance-related disorders (Barrera & Norton, 2009; Higa-McMillan, Smith, Chorpita, & Hayashi, 2008; Ranta et al.; Weeks et al., 2009). Furthermore, scores on self-report measures of social anxiety disorder have been found to correlate positively (range = .40 to .80) with scores on measures of mood and other internalizing disorders (Brown et al., 1998; Higa-McMillan et al.; Naragon-Gainey, Watson, & Markon, 2009). However, researchers have not constructed scales that could be used to assess both social anxiety disorder and major depressive disorder symptoms simultaneously.1

In recent years, research related to the construction and validation of scores on self-report measures of social anxiety has generally taken two major directions. Specifically, some instruments have been designed to assess only the essential symptoms of anxiety as they occur in a specific social or interactional situation. As an example, Descutner and Thelen (1991) designed the Fear of Intimacy Scale to assess social anxiety symptoms only in intimate relationships. Other multidimensional instruments, however, have been designed to assess social anxiety symptoms across a range of social-interpersonal situations. As an example, Turner, Beidel, Dancu, and Stanley (1989) designed the Social Phobia and Anxiety Inventory (SPAI) to assess symptoms of social anxiety across a range of social situations. Indeed, studies with most of these instruments have reported satisfactory estimates of reliability, test-retest reliability, factor structure, and concurrent validity (Beidel, Borden, Turner, & Jacob, 1989; Doi & Thelen, 1993; Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992; Osman et al., 1996).2

However, as noted previously, there are two major limitations of existing self-report instruments when screening for the social anxiety disorder construct. First is the failure to design instruments that could be used to assess the extent to which the symptoms of social anxiety disorder interfere with the daily or normal routine of an individual. Indeed, consideration of a social anxiety disorder is indicated only to the extent that the essential symptoms of anxiety interfere substantially with the adaptive functioning of the individual, regardless of other response parameters such as symptom severity or intensity (see DSM-IV-TR; APA, 2000). In particular, based on the DSM-IV-TR (APA, 2000) recommendation that “the degree of distress or impairment [in commonly encountered social situations] is insufficient to warrant a diagnosis of Social Phobia” (p. 451), Orsillo and Hammond (2001) have pointed out that most extant instruments that assess only symptom severity or intensity may not be clinically useful when assessing for social anxiety disorder as a distinct psychological construct. Second is the failure of existing self-report instruments to include components of other psychological disorders or symptoms that tend to co-occur frequently, especially in inpatient clinical samples, with social anxiety disorder including major depressive disorder, and avoidant personality disorder (Brown et al., 1998; Naragon-Gainey et al., 2009; Sellbom, Ben-Porath, & Bagby, 2008; Silverman & Ollendick, 2005; Watson et al., 2005).

We describe a series of studies designed to construct and validate scores on a brief self-report instrument that would be useful when using the DSM-IV-TR diagnostic system (APA, 2000) to assess several symptoms of social anxiety disorder and one of the commonly

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1The more recent conceptualization of social phobia as an aspect of self-concealment (see Rodebaugh, 2009) was presented in the extant literature after the current investigations.

2For detailed reviews and psychometric properties of self-report measures of social phobia and related constructs, readers should consult Antony, Orsillo, and Roemer (2001).
co-occurring disorders, major depressive disorder. Accordingly, the specific goals of the current studies were as follows. First, we wanted to develop a multidimensional self-report instrument that comprises several of the *DSM-IV-TR* symptoms for social anxiety disorder and major depressive disorder. To be clinically useful, the response format of the instrument was designed to evaluate the extent to which the symptoms of social anxiety and depression interfere with the normal routine encountered by the individual (APA, 2000; Maser et al., 2009; Orsillo & Hammond, 2001). Second, we wanted scores on the new inventory to have a replicable factor structure, adequate estimates of internal consistency, and concurrent validity. Third, we wanted the instrument to be brief, easy to administer and score. Fourth, given the high similarity between adolescents and adults in the clinical presentations of social anxiety disorder and major depressive disorder symptoms (see *DSM-IV-TR*; APA, 2000), we wanted the instrument to be appropriate for use with clinical and nonclinical samples, ages 14 and older.

**Study 1**  
*Development of the Social Anxiety and Depression Life Interference Inventory*

The purpose of Study 1 was to adopt the steps, recommended by Haynes, Richard, and Kubany (1995), to design and validate scores on a brief self-report measure of the symptoms of social anxiety and major depressive disorder. In particular, several of the steps that we followed included identifying the relevant domains for the potential instrument, generating relevant and representative sets of items for each domain, and empirically evaluating scores on the items.

**Phase 1: Item Generation**

Participants and procedures. The relevant institutional review boards (IRBs) approved all protocols for the development and subsequent cross-validation of the related studies before we initiated data collection. Adults aged 18 years and older provided written informed consent, and adolescents (aged 14–17 years) provided assent and written informed consent of their parents or guardians.

To help identify relevant content and representative sets of items for each domain, the first author formed two groups, each comprising four advanced graduate and undergraduate students with extensive training in a range of psychometric strategies. In particular, students had completed courses or seminars in psychological testing, measurement, and abnormal psychology; they had also received supervision in instrument development. We asked each group to review multiple sources and develop an item pool for the specified social anxiety disorder and major depressive disorder domains (see, DeVellis, 2003; Floyd & Widaman, 1995; Haynes et al., 1995). The primary sources recommended by the first author included the essential symptoms listed in the *DSM-IV-TR* (APA, 2000) for social phobia/anxiety and major depressive disorders. We also asked the groups to identify items from construct relevant social anxiety disorder and major depressive disorder self-report instruments. Examples included the SPAI (Turner et al., 1989), the Self-Consciousness Scale (Fenigstein, Scheier, & Buss, 1975), the Social Phobia Scale (SPS) and Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998), the Mood and Anxiety Symptom Questionnaire-90 (MASQ-90; Watson & Clark, 1991), the Center for Epidemiological Studies Depression Scale (Radloff, 1977), and the Inventory of Depressive Symptomatology (Rush, Gullion, Basco, Jarrett, & Trivedi, 1996).

Additionally, because we wanted to develop a self-report instrument, we asked the groups to include items that could be used to assess only internalizing responses such as thoughts, feelings, and perceptions of behavior. Indeed, most self-report instruments of social anxiety and depression tend to include items that tap mostly internalizing symptoms (Glass, Merluzzi, Biever, & Larsen, 1982; Turner et al., 1989; Watson & Clark, 1991).

At the same time, the first author and two graduate assistants (i.e., students enrolled in clinical practicum courses) reviewed the intake assessment reports of practicing clinical
psychologists \((n = 2)\) and child and adolescent psychiatrists \((n = 3)\) that were placed in the medical charts of psychiatric inpatients with a principal diagnosis of anxiety and mood disorders.

Results

To be useful for research and clinical practice, we selected 30 items (15 items for each domain of the instrument) for retention in the initial item pool that corresponded to several of the *DSM-IV-TR* symptoms for social anxiety disorder and major depressive disorder. In particular, of the original pool of 58 potential items, we dropped overlapping and nonspecific items. To help differentiate between situations that are relevant for individuals with social anxiety from situations that tend to be avoided because of other reasons, we rewrote items that are descriptive of interpersonal-social situations. As an example, the item, “avoids talking to others” was rewritten as, “fear or concerns about talking to people in authority.” Several of the social anxiety disorder items were modeled after items in previous self-report measures such as the SPAI (Turner et al., 1989). The major depressive disorder items were modeled after items in self-report measures of mood such as the MASQ-90 (Watson & Clark, 1991).

In addition to rewriting the items in shorter sentences to enhance clarity and readability, we wrote the instructions and the response format for completing the items. In particular, each item is scored on a 5-point scale based on how the items, in general, “interfere with your daily life or activities” (i.e., school, job, recreational or social-interpersonal relationships), ranging from 1 (never) to 5 (everyday).

Phase 2: Item Evaluation

Participants and procedures. To assess the extent to which the items are relevant and representative of the *DSM-IV-TR* social anxiety disorder and major depressive disorder constructs (Haynes et al., 1995), we recruited two MA-level clinical psychologists and one practicing clinical psychologist \((N = 5)\), who conducted the ratings. Representativeness was defined as the extent to which each item corresponds to the related social anxiety disorder and major depressive disorder constructs, ranging from 1 (least representative) to 5 (most representative). Relevancy was defined as the extent to which each item is assessed as being suitable or appropriate for evaluating the social anxiety disorder and major depressive disorder constructs, ranging from 1 (least relevant) to 5 (most relevant). To assess the extent to which the items are appropriate for use with adolescents and adults, aged 14 years and older, we recruited four senior psychology majors and three senior high school adolescents \((N = 7)\), who provided ratings regarding the clarity of the items. Clarity was defined as the extent to which each item is clear and understandable to the individual, ranging from 1 (not at all) to 5 (very clear).

Results

The mean ratings regarding the representativeness (mean \([M] = 4.21\), standard deviation \([SD] = 0.14\); range = 4.07 to 4.37) and the relevancy \((M = 4.33, SD = 0.16; \text{range} = 4.10 \text{ to } 4.47)\) of the items were high and acceptable (i.e., values > 3.5). The mean ratings regarding the clarity of each item in the new inventory were also high and acceptable \((M = 4.50, SD = 0.14; \text{range} = 3.80 \text{ to } 4.60)\). Together, all 30 items were included in the instrument for the subsequent validation studies. We also constructed the instructions and the response format for rating each item.

Study 2

The major goals of Study 2 were to determine the factor structure and initial scale reliability of scores on the new inventory. Given the high prevalence rate in the general population and the negative impact of social anxiety, nonclinical samples are considered appropriate for validating scores on a measure of social anxiety and depression.
Participants

We recruited a sample of 200 high school and 238 college undergraduate students. In preliminary analyses of the basic demographic variables, we found statistically significant differences on the age variable only, $t(436) = 18.61, p < .001$, Cohen’s $d = 1.79$. Thus, we combined data from the separate samples for the analyses. Men ($n = 144$; $M_{\text{age}} = 18.64, SD = 4.51$ years) and women ($n = 294$; $M_{\text{age}} = 18.58, SD = 4.39$ years) did not differ significantly in age, $t(436) = .13, p = .90$. The age range was 14 to 48 years ($M_{\text{age}} = 18.60, SD = 4.42$). Of the sample, 379 (86.5%) were Caucasian, 30 (6.9%) African American, 14 (3.2%) Hispanic/Latino American, 10 (2.3%) Asian American, and 5 (1.1%) other ethnic groups.

Measures and Procedure

Undergraduate students enrolled in research experience courses conducted all the data collection sessions. Each session included a debriefing period, after completion of informed consent, a brief demographic questionnaire, and the 30-item inventory.

Results

Exploratory Factor Analysis

We used principal components analysis, followed by a minimum rank factor analysis to identify the structure of the final set of items (see Fabrigar, Wegener, MacCallum, & Strahan, 1999; Shapiro & Ten-Berge, 2002; Ten-Berge & Kiers, 1991). The Kaiser-Meyer-Olkin measure of sampling adequacy was adequate ($KMO = .95$), and the Bartlett’s statistic was statistically significant, $p < .001$. Results of the scree plot, parallel analysis (PA), and the minimum average partial (MAP) suggested a two-factor solution. PA was conducted using both the 95th percentile eigenvalues and the bootstrapped sampling procedures. We used two specific criteria to drop an item from the analyses: items loading $< .40$ and/or items with communality values $< .40$ (Clark & Watson, 1995; Floyd & Widaman, 1995). Of the 30 items, six met either one or both prespecified criteria; thus, we dropped these items from the analyses.

For the final 24 items, we adopted the two-factor solution, suggested by the scree plot, PA, and MAP criteria. We used the promax procedure in the minimum rank factor analysis, allowing for correlation of the factors. The first four eigenvalues before rotation were 10.88, 2.55, 1.10, and 1.01. Following the full oblique rotation, the two factors accounted for 74.14% of the common variance. The first factor comprised 12 items and represented the Social Anxiety Life Interference factor (SALI-12). An example SALI-12 item is “fear or concerns about being criticized in social situations.” The second factor also comprised 12 items and represented the Depression Life Interference factor (DLI-12). An example DLI-12 item is “feelings of being tired (or fatigued) more easily than usual.” The inter-correlation between the factors was moderate, .61. Table 1 shows the rotated matrix and communalities ($h^2$) for the two-factor solution. The factor loadings ranged from fair to excellent (i.e., values .45–.54; see Comrey, 1973). The Flesch-Kincaid readability index of 9.0 suggests that the Social Anxiety and Depression Life Interference (SADLI-24) is appropriate for individuals with a ninth-grade reading level (see Appendix).

Internal Consistency and Sample Descriptive Statistics

Cronbach alpha estimates for the SALI-12 ($\alpha = .94$, 95% confidence interval [CI] = .93–.95; average inter-item $r = .55$) and the DLI-12 ($\alpha = .91$, 95% CI = .90–.92, AIC = .46) were excellent (i.e., values $\geq .90$). Likewise, the composite scale reliability estimates ($\rho$; Raykov, 1997) for the SALI-12 ($\rho = .94$, 95% CI = .93–.95) and the DLI-12 ($\rho = .91$, 95% CI = .89–.94) were very strong. The inter-factor correlation was moderate, .60. The 24-item SADLI-24 measures social anxiety and depression interference on a 4-point Likert scale ranging from 1 (not at all) to 4 (very much). The internal consistency and sample descriptive statistics are shown in Table 1.
Scores on items within each scale are summed to obtain a total scale score. Mean total scores on the scales were as follows: SALI-12, $M = 23.77$ (SD = 9.06), and DLI-12, $M = 23.30$ (SD = 7.61). Preliminary analyses of gender differences showed that women reported higher scores than men on the SALI-12 ($M = 24.52$, SD = 9.28 vs. $M = 22.25$, SD = 8.43), $t(436) = 2.48$, $p < .014$, Cohen’s $d = .25$, and the DLI-12 ($M = 23.01$, SD = 7.99 vs. $M = 20.84$, SD = 6.54), $t(436) = 2.83$, $p < .005$, Cohen’s $d = .29$. These group differences, however, were small (i.e., Cohen’s $d$ values <.50).

### Study 3

The purpose of this study was to further examine support for the two-factor structure and reliability estimates of the SADLI-24 scales and to examine psychometric properties of known-groups and concurrent validity.

### Method

**Participants**

Participants were 430 undergraduate students ($M$ age = 19.02, SD = 2.02, range = 18–37 years) recruited from a public university and a community college in the Midwest. We combined data
from the subsamples because there were no statistically significant differences between the groups in all the demographic variables \((p < .05)\). Men \((n = 179)\) and women \((n = 251)\) did not differ significantly in age, \(t(428) = 1.53, p = .13\). In terms of ethnicity, 385 (89.6%) were Caucasian, 19 (4.4%) African American, 13 (3.0%) Hispanic American, 10 (2.3%) Asian American, and 3 (0.7%) other ethnic groups. Of the sample, 326 (75.8%) were freshmen, 55 (12.8%) sophomores, 32 (7.4%) juniors, and 17 (4.0%) seniors. The majority (94.7%) were single, never married. Participants were given partial course credit for their participation.

Measures and Procedure

All the participants completed the SADLI-24, a brief demographic questionnaire, and the validation self-report measures after the written informed consent procedures. The SADLI-24 and all other study measures were arranged randomly in each questionnaire packet. Senior undergraduates, who were enrolled in advanced research experience courses, carried out data collection sessions. Each packet included the following self-report instruments.

**Experiences with social phobia symptoms.** Separate items, each scored on a 10-point scale, were developed and administered by our research team to assess overall level of Life Interference in (a) social-recreational situations, (b) the ability to do school or job-related work, and (c) normal day-to-day activities due to experiences with social anxiety symptoms. Each item is scored on a 10-point scale, ranging from 0 (no interference) to 10 (extreme interference). We summed scores on the items to derive a total “Life Interference” scale score. The coefficient alpha estimate for the three items was adequate, \(\alpha = .86\) (95% CI = .84–.88, [AIC] = .67). In addition, we constructed and used a single item, scored on a 4-point scale, ranging from 0 (never) to 3 (three or more times), to assess the number of times the individual intentionally avoided social situations in the past 6 months, even when he or she recognized the fear to be irrational.

**Social Phobia Scale (SPS; Mattick & Clarke, 1998).** The SPS comprises 20 items that are designed to assess anxiety related to performance in social situations (e.g., being watched by others, being in an elevator with people), in which the symptoms of social anxiety are frequently experienced. Items are rated on a 5-point scale, ranging from 0 (not at all characteristic or true of me) to 4 (extremely characteristic or true of me), and the total scale score was used to assess general anxiety about performance in social situations. Studies have provided support for the unidimensional structure, estimates of internal consistency, and concurrent validity for scores on the SPS (e.g., Gore, Carter, & Parker, 2002; Lundh & Sperling, 2002; Osman et al., 1996). An example item is “I become self-conscious when using public toilets.” For the current sample, the coefficient alpha estimate of .94 (95% CI = .93–.95; AIC = .44) was adequate.

**Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998).** The SIAS comprises 20 items that are designed to assess social interaction anxiety. Each item is scored on a 5-point scale, ranging from 0 (not at all characteristic or true of me) to 4 (extremely characteristic or true of me). Like the companion SPS scale, scores on the SIAS are summed to obtain a total scale score. We used the total SIAS score as a validation measure for the SADLI-24 scales. Because a total SIAS score of 34 or higher has shown adequate diagnostic efficiency for social anxiety (Brown et al., 1997; Heimberg et al., 1992; Rodebaugh, Woods, Heimberg, Liebowitz, & Schneier, 2006), we used this cut score to form two groups for the subsequent validation analyses. Other investigators have also reported good estimates of internal consistency reliability and concurrent validity estimates for the total SIAS scale scores (Olivares, Garcia-Lopez, & Hidalgo, 2001; Osman et al., 1996; Peters, 2000). An example SIAS item is “When mixing socially, I feel uncomfortable.” For the current sample, the coefficient alpha estimate was .93 (95% CI = .92–.94; AIC = .37).

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Although other studies presented in the review have provided adequate psychometric properties for the 19-item version, we used the 20-item version that is used widely in research settings. Moreover, the SIAS is only one of the few self-report measures that have established cutoff scores that could be used to classify the responses of nonclinical samples.
Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983). The BFNE comprises 12 items that are modified to assess a social anxiety-related construct, fear of negative evaluation in social situations. The BFNE items are scored on a 5-point scale, ranging from 1 (not at all true of me) to 5 (extremely true of me). This instrument has strong reliability and validity estimates, and the total scale scores have been used widely in research in the area of social anxiety for clinical and nonclinical samples (Collins, Westra, Dozois, & Stewart, 2005; Duke, Krishnan, Faith, & Storch, 2006; Rodebaugh et al., 2004). Four of the 12 items were reverse-scored, as recommended by the developer of the instrument. An example item is “I am afraid that others will find fault with me.” We included the BFNE as a measure of fear of negative evaluation in validating scores on the SADLI-24 scales. For the current sample, the Cronbach alpha estimate was .89 (95% CI = .87–.95, AIC = .40).

Results

Composite Scale Reliability

The SADLI-24 scales are new; thus, we continued to use both the conventional Cronbach alpha estimate (\( \alpha \)) and the composite scale reliability (\( \rho \)) analytic procedures to examine estimates of internal consistency. Both procedures enhance generalizability of scores on the two SADLI-24 scales. The Cronbach alpha estimate for the SALI-12 (\( \alpha = .92, 95\% \text{ CI} = .91–.93, \text{AIC} = .49 \)) and the DLI-12 (\( \alpha = .91, 95\% \text{ CI} = .90–.92, \text{AIC} = .46 \)) were high. Similarly, the composite scale reliability estimate for the SALI-12 (\( \rho = .92, 95\% \text{ CI} = .91–.94 \)) and the DLI-12 (\( \rho = .91, 95\% \text{ CI} = .90–.93 \)) were high for the current study sample.

Confirmatory Factor Analysis

We conducted a confirmatory factor analysis (CFA) to further validate the fit of the two-factor oblique solution to an independent sample data. We used the maximum likelihood mean adjusted estimator (robust MLM) in Mplus 5.21 (Muthén & Muthén, 1998–2009) to evaluate the fit of the following models. We examined fit estimates for a one-factor model, in which all 24 items were hypothesized to load on a general factor, and the oblique two-factor model from the EFA that included a social anxiety interference factor and a depressive symptom interference factor. Following the recommendation of Brown (2006), we did not evaluate the fit of a second-order model, because most two- to three-factor models yield essentially the same fit estimates as the related second-order models. For each model, the variance of the factor was set at 1.0 and the error terms were not allowed to correlate.

We used multiple fit estimates to evaluate the adequacy of each model to the sample data: (a) a scaling MLM (robust) \( \leq 2.0 \); (b) a robust comparative fit index (R-CFI) of .90–.95; (c) a robust Tucker-Lewis Index (R-TLI) of .80–.95; and (d) a standardized root mean square residual (SRMR) and a root mean square error of approximation (RMSEA) value of .06 or less (Bentler & Bonett, 1980; Browne & Cudeck, 1993; Marsh, Hau, & Wen, 2004; Tucker & Lewis, 1973). The one-factor model did not provide an adequate fit to the sample data, scaling MLM = 1.71, CFI = .75, TLI = .72, SRMR = .09, and RMSEA = .11. However, as expected, the oblique two-factor model provided adequate to good fit to the sample data: scaling MLM = 1.16, CFI = .91, TLI = .90, SRMR = .05, RMSEA = .06. The correlation between the factors was moderate, .66, \( p < .001 \). The standardized factor loadings are listed in Table 1 (see columns 5 and 6). Each item loaded significantly on its designated factor: SALI-12 (range = .45 to .81) and DLI-12 (range = .48 to .79).

Receiver Operating Characteristic (ROC) Curve

We conducted receiver operating characteristic (ROC) curve analysis to determine the ability of scores on the SADLI-24 scales to differentiate the responses of individuals with

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5We used the commonly used version of this instrument to allow for comparisons with previous investigations.
self-reported social anxiety and a control group (Swets, 1988; Zweig & Campbell, 1993). Using the cut score of 34 on the total SIAS, we retained 132 (30.7%) individuals in the Social Anxiety subgroup and those with a total SIAS score of 33 or less in the control subgroup ($n = 298$; 69.3%). As noted earlier, the total SIAS cut score has established criterion-related validity in the extant literature (Antony, Orsillo, & Roemer, 2001; Brown et al., 1997). Although we expected scores on both scales to differentiate the responses of the subgroups (i.e., using area under the curve estimate [AUC] = .70–.90, as medium accuracy), we hypothesized that as a measure of social anxiety interference, the content-specific SALI-12 scale score would have a substantially higher AUC estimate than would the DLI-12.

The result of the ROC analysis showed that the SALI-12 had an AUC of .86 (standard error [SE] = .02; 95% CI = .83–.90) and the DLI-12 had an AUC of .78 (SE = .03; 95% CI = .74–.82), $z = 3.29, p < .001$, providing support for the proposed hypothesis. Using scores on the SALI-12 alone, we found that a raw cut score of 24 or higher had a sensitivity of 84.9% (95% CI = 77.6–90.5) and a specificity of 70.5% (95% CI = 64.9–75.6). Likewise, a cut score of 24 or higher on the DLI-12 was identified as most useful for differentiating between the groups (sensitivity = 76.5%, 95% CI = 68.4–83.5; specificity = 68.1%, 95% CI = 62.5–73.4). Following guidelines in the extant literature (Lonigan, Anthony, & Shannon, 1998; Matthey & Petrovski, 2002), scores on both the SALI-12 and DLI-12 scales were useful in differentiating the responses of the subgroups.

**Regression Analyses**

To examine additional evidence for concurrent validity, we conducted regression analyses. We used scores on the Life Interference and the Avoidance of Social Situations measures as dependent measures in the separate analyses. Scores of the SADLI-24 scales, the SIAS, the SPS, and the BFNE were included simultaneously as predictor variables. The analyses were exploratory; thus, we used the forward (stepwise) regression method. As shown in Table 2 (upper portion), when we included the Life Interference variable as a dependent variable, and scores on the SALI-12, DLI-12, SIAS, SPS, and BFNE as predictors, only three (i.e., the SALI-12, SIAS, and DLI-12) of the five predictor variables were statistically significant in the model, $F(3, 426) = 155.87, p < .001$. The model accounted for 52.3% of the variance in overall life interference. In the second analyses that included Avoidance of Social Situations as the dependent variable, and the same set of predictors, SALI-12, DLI-12, and SIAS were again identified as significant predictors, $F(3, 426) = 117.35, p < .001$. The model accounted for 45.2% of the variance in the social situation avoidance variable.

Pairwise differences between the standardized coefficients showed that the SALI-12 was a better predictor of Life Interference than both the SIAS, $t(426) = 177.14, p < .001$ and the DLI-12, $t(426) = 3.62, p < .001$. Similarly, the SALI-12 was a better predictor of Avoidance of Social Situations than both the SIAS, $t(426) = 52.80, p < .001$, and the DLI-12, $t(426) = 39.80, p < .001$.

**Study 4**

The purpose of Study 4 was to further evaluate the psychometric properties of the SADLI-24 in an independent adolescent sample. Given the fact that (a) the SADLI-24 comprises social anxiety and major depressive disorder items and (b) concurrent diagnostic comorbidity is extensive in long-term psychiatric inpatient settings, we wanted to evaluate the ability of scores on the scales to differentiate the responses of two global groups: Internalizing Disorders versus...
Externalizing Disorders. To identify potential correlates of the SADLI-24 scale scores, a subset of the inpatient adolescents completed a measure of adolescent psychopathology.

Participants and Procedure

We collected data from two adolescent units of a state psychiatric inpatient hospital. The mean age of the participants \((n = 112)\) was 15.62 years \((SD = 1.05)\), range = 14–17. Boys \((n = 41; \ M \ age = 15.44, SD = 1.05 \text{ years})\) and girls \((n = 71; \ M \ age = 15.72, SD = 1.04 \text{ years})\) did not differ significantly in age, \(t(110) = 1.36, p = .18\). Most of the participants identified themselves as Caucasian, 94 (83.9%), 10 (8.9%) African American, 5 (4.5%) Hispanic/Latino American, and 3 (2.7%) Asian American. Of the sample, 26 (23.2%) had primary diagnoses of major depressive disorder, 14 (12.5%) post-traumatic stress disorder, 8 (7.1%) generalized anxiety disorder, 6 (5.4%) bipolar disorder, 2 (1.8%) dysthymic disorder, 20 (17.9%) conduct disorder, 14 (12.5%) substance use disorder, 12 (10.7%) oppositional defiant disorder, and 10 (8.9%) attention deficit-hyperactivity disorder. Multidisciplinary teams assigned all diagnoses (primary and secondary) during regular clinical case conferences (see Hoagwood, Jensen, Petti, & Burns, 1996). The team members, which comprised staff psychiatrists, psychologists, social workers, senior nursing staff, school administrative staff, and direct care staff, used multiple resources to assign the diagnoses.

To further examine evidence of known-groups validity, youths with diagnoses of major depression, post-traumatic stress disorder, generalized anxiety disorder, bipolar disorder, and dysthymic disorder were assigned to an Internalizing subgroup \((n = 56)\). Those with diagnoses of conduct disorder, substance use disorder, oppositional defiant disorder, and attention deficit-hyperactivity disorder were assigned to the Externalizing subgroup \((n = 56)\). Within these subsamples, we randomly asked 84 (75.0%) participants to complete a self-report measure of psychological disorders (see below) for validating scores on the SADLI-24. To reduce potential effect of long-term hospitalization on the study measures, each participant completed the questionnaire packets within 3–4 days of admission to the unit. A trained high school teacher administered all questionnaire packets.

We also collected data from an independent sample of 67 nonclinical high school youths for inclusion in the known-groups validity analyses as a control group. This sample included 26 boys \((M \ age = 15.27, SD = 1.19 \text{ years})\) and 41 girls \((M \ age = 15.56, SD = 1.14 \text{ years})\) with no significant difference in age, \(t(65) = 1.01, p = .32\). Of the sample, 50 (74.6%) were Caucasian, 9 (13.4%) African American, 6 (9.0%) Hispanic/Latino American, 1 (1.5%) Asian American, and 1 (1.5%) other ethnic group. Responses on a background information questionnaire indicated that none of the participants had received mental health services before participation in the study. Following the informed consent procedures, the research project team collected data from the high school participants; all questionnaires were completed anonymously.

\[\text{Table 2} \]

\textbf{Multiple Regression of Measures of Social Anxiety and Depression}

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>(R)</th>
<th>(B)</th>
<th>(SE)</th>
<th>(\beta)</th>
<th>(R^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicting Life Interference</td>
<td>.52</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SALI-12</td>
<td>.691</td>
<td>.285</td>
<td>.037</td>
<td>.419*</td>
<td></td>
</tr>
<tr>
<td>SIAS</td>
<td>.630</td>
<td>.096</td>
<td>.021</td>
<td>.235*</td>
<td></td>
</tr>
<tr>
<td>DLI-12</td>
<td>.544</td>
<td>.109</td>
<td>.030</td>
<td>.157*</td>
<td></td>
</tr>
<tr>
<td>Predicting Avoidance –Social Situations</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SALI-12</td>
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<td>.051</td>
<td>.007</td>
<td>.422*</td>
<td></td>
</tr>
<tr>
<td>DLI-12</td>
<td>.526</td>
<td>.022</td>
<td>.006</td>
<td>.183*</td>
<td></td>
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<tr>
<td>SIAS</td>
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<td>.011</td>
<td>.004</td>
<td>.150*</td>
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</tbody>
</table>

Note. SALI = Social Anxiety and Life Interference; DLI = Depression Life Interference; SIAS = Social Interaction and Anxiety Scale.

*p < .01.
Measures

Besides the brief demographic questionnaire, each participant individually completed the final version of the SADLI-24. As noted earlier, a subset of the adolescent psychiatric inpatients \((n = 84)\) completed a multidimensional self-report measure of adolescent psychopathology, the Adolescent Psychopathology Scale (APS; Reynolds, 1998). The APS is designed to assess a range of childhood and adolescent Internalizing (e.g., major depressive disorder, panic disorder, and social phobia), Externalizing (conduct disorder, oppositional defiant disorder), and psychosocial (e.g., anger and suicide) conditions. It comprises 346 items, and the items are rated using several scales (e.g., true-false; 4-point Likert-type format) that are consistent with the specificity of the psychological disorder being assessed. An example major depressive disorder item is “I felt miserable.” The five externalizing and seven internalizing disorder clinical scales included in the current study (see Table 3) have excellent estimates of internal consistency reliability and validity (Conners et al., 1997; Mazza, 2000; Salekin, Neumann, Leistico, DiCicco, & Duros, 2004). We used the standardized scale scores to conduct the analyses.

Results

Internal Consistency Reliability

For the adolescent inpatient samples \((n = 112)\), the composite reliability estimates for the SALI-12 \((\rho = .94, 95\% \ CI = .92–.96)\) and the DLI-12 \((\rho = .93, 95\% \ CI = .90–.96)\) were high. Similarly, for the high school sample \((n = 67)\), the observed composite reliability estimates for the SALI-12 \((\rho = .87, 95\% \ CI = .82–.92)\) and the DLI-12 \((\rho = .79, 95\% \ CI = .72–.87)\) were adequate.

Known-Groups Validity

We conducted a one-way analysis of variance (ANOVA) to determine the extent to which the known groups differed in their responses on the SADLI-24 scales. Significant ANOVAs were followed by pairwise comparison tests. For the SALI-12, the Internalizing group mean score \((M = 31.16, \ SD = 10.32)\) was significantly higher than the Externalizing group \((M = 22.89, \ SD = 8.95), t(110) = 4.53, p < .001, Cohen’s d = .86\). In addition, the Internalizing group had a

<table>
<thead>
<tr>
<th>Variable</th>
<th>SALI-12</th>
<th>DLI-12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Externalizing Disorders</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Attention-Deficit Hyperactivity</td>
<td>.42**</td>
<td>.45**</td>
</tr>
<tr>
<td>2. Conduct</td>
<td>.35**</td>
<td>.31**</td>
</tr>
<tr>
<td>3. Oppositional Defiant</td>
<td>.47**</td>
<td>.48**</td>
</tr>
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<td>4. Adjustment</td>
<td>.44**</td>
<td>.42**</td>
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<td>5. Substance Abuse</td>
<td>.14**</td>
<td>.31**</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>6. Sleep</td>
<td>.46**</td>
<td>.53**</td>
</tr>
<tr>
<td>7. Panic</td>
<td>.35**</td>
<td>.39**</td>
</tr>
<tr>
<td>8. Generalized Anxiety</td>
<td>.46**</td>
<td>.47**</td>
</tr>
<tr>
<td>9. Social Phobia</td>
<td>.58**</td>
<td>.44**</td>
</tr>
<tr>
<td>10. Posttraumatic</td>
<td>.52**</td>
<td>.52**</td>
</tr>
<tr>
<td>11. Depression</td>
<td>.50**</td>
<td>.61**</td>
</tr>
<tr>
<td>12. Dysthymic</td>
<td>.48**</td>
<td>.52**</td>
</tr>
</tbody>
</table>

Note. SADLI = Social Anxiety and Depression Life Interference; SALI = Social Anxiety Life Interference; DLI = Depression Life Interference. **p < .01.
higher mean social anxiety interference score than the high school youths \( (M = 19.78, SD = 4.10), t(121) = 8.28, p < .001, \) Cohen’s \( d = 1.50. \) Likewise, the Externalizing group had a higher mean SALI-12 score than the high school youths, \( t(121) = 2.54, p < .01, \) Cohen’s \( d = .46. \)

Next, in the analyses involving the DLI-12, the Internalizing group \( (M = 33.45, SD = 9.62) \) had a higher mean scale score than the Externalizing group \( (M = 25.46, SD = 8.53), t(110) = 4.65, p < .001, \) Cohen’s \( d = .88. \) Moreover, the Internalizing group had a higher mean DLI-12 scale score than the high school youths, \( (M = 19.69, SD = 3.41), t(121) = 10.92, p < .001, \) Cohen’s \( d = 1.97. \) Likewise, the Externalizing group had a higher mean depression interference score than the high school youths, \( t(121) = 5.08, p < .001, \) Cohen’s \( d = .92. \)

**Correlates of the SADLI-24 Scale Scores**

We selected the APS attention-deficit hyperactivity disorder, conduct disorder, oppositional defiant disorder, adjustment disorder, and substance abuse disorder scale scores to serve as potential Externalizing correlates. The APS sleep disorder, panic disorder, generalized anxiety disorder, social phobia, post-traumatic stress distress disorder, major depression, and dysthymic disorder scale scores served as the potential Internalizing correlates (see Table 3).

Previous investigations suggest that social anxiety and depression have similar correlates (Brown et al., 1998; Cho & Telch, 2005; Higa-McMillan et al., 2008). As in previous investigations (Naragon-Gainey et al., 2009; Silverman & Ollendick, 2005), we expected that potential correlates for the SADLI-24 scale scores would be in the moderate range (i.e., \( r_s \approx .40 \) to \(.65).\)

As shown in Table 3, three (i.e., attention-deficit hyperactivity, oppositional defiant, and adjustment disorders) of the five Externalizing correlates for both the SALI-12 and the DLI-12 scales were in the expected moderate and significant range. The highest Externalizing correlate of both the SALI-12 and the DLI-12 was oppositional defiant disorder. Only one of the preidentified Internalizing correlates (i.e., Panic disorder) for the SALI-12 and the DLI-12 was at the low level; 85% of the other correlates were in the expected direction. For the SALI-12, the highest Internalizing correlate was with the Social Phobia scale \( (r = .58). \) For the DLI-12, the highest Internalizing correlate was with the Depression scale \( (r = .61). \)

**Study 5**

The goal of Study 5 was to examine estimates of test-retest reliability of the SADLI-24 scale scores. We expected moderate changes in the scores given the fact that participants were receiving various inpatient treatments over the specified test-retest time interval.

**Method**

*Participants and Procedures*

Participants were recruited from one of the two units described in Study 4.\(^7\) This independent test-retest sample included 22 boys \( (M \) age = 15.36, \( SD = 1.05 \) years) and 41 girls \( (M \) age = 15.80, \( SD = 1.08 \) years) with no significant difference in age, \( t(61) = 1.56, p = .12. \) In terms of ethnicity, 51 (80.9%) specified Caucasian, 7 (11.1%) African American, 3 (4.8%) Hispanic American, and 2 (3.2%) Asian American. Pretest data were collected within 2–3 days of admission, and the average length of stay for the sample was 50.95 days \( (SD = 13.51, range = 37–87). \) The multidisciplinary team assigned primary diagnoses that included 19 (30.2%) major depressive disorder, 10 (15.9%) post-traumatic stress disorder, 8 (12.7%) conduct disorder, 6 (9.5%) substance related disorder, 5 (4.9%) bipolar disorder, 4 (6.3%) major anxiety disorder, and 1 (1.6%) attention-deficit hyperactivity disorder.

\(^7\) Data were collected approximately 6 months after Study 4. Patients readmitted \( (n = 3) \) during the test-retest study were not asked to participate in the current study. Additionally, data were not included for five youths with only the pretest data.
oppositional defiant disorder, 3 (4.8%) dysthmic disorder, and 8 (12.7%) other internalizing disorders.

Measures
Participants completed a brief background information questionnaire and the SADLI-24. We modified the original instructions slightly (“during the past few months”) to approximate the test-retest data collection interval of 5–6 weeks.

Results and Discussion
Descriptive Statistics and Test-Retest Reliability
At Time 1 (pretest), the mean score for the SALI-12 scale ($M = 28.49$, $SD = 10.84$) was significantly higher than the scale mean score at Time 2 ($M = 25.02$, $SD = 10.15$), $t(62) = 4.36$, $p < .001$, Cohen’s $d = .55$. The test-retest reliability was observed at $.82$, $p < .001$. Similarly, the mean score for the DLI-12 scale at Time 1 ($M = 29.95$, $SD = 9.82$) was significantly higher than the scale mean score at Time 2 ($M = 25.78$, $SD = 9.24$), $t(62) = 5.01$, $p < .001$, Cohen’s $d = .63$. The test-retest reliability was $.76$, $p < .001$. Together, scores on the SADLI-24 scales showed adequate estimates of stability over the test-retest interval.

Discussion
We conducted five studies to develop and examine initial psychometric properties of a self-report measure of social anxiety, the SADLI-24 inventory. Studies 1–3 established the item pool, content specificity, factor structure, and construct validity for this new measure (Haynes et al., 1995). The Flesch-Kincaid index was 9.0 and the mean clarity ratings of the items by adolescents was high. In addition, the fact that adolescents, ages 14 to 17 years of age, completed the SADLI-24 and the concurrent self-report instruments without assistance provides some degree of confidence that the SADLI-24 is suitable for use with individuals ages 14 and older.

In addition, as in prior investigations (see Osman et al., 1996; Rodebaugh, 2009), scores on the SADLI-24 scales were useful in differentiating the responses of nonclinical respondents with self-reported social anxiety from an appropriate control in a college-age sample. Moreover, the SADLI-24 scale scores were better predictors of experiences with symptoms of life interference and avoidance when compared with commonly used self-report measures of social anxiety. Preliminary cutoff score for use of the scales in nonclinical samples was attained at a raw score of 24 or higher for each scale.

The findings of Study 4 with adolescent inpatients were equally encouraging. We obtained moderate to high associations between the SADLI-24 scale scores and measures of related constructs. Of interest is the observation that, as in prior studies of this type (see Higa-McMillan et al., 2008; Naragon-Gainey et al., 2009; Osman et al., 1996), several correlates for the SALI-12 and DLI-12 were similar for the inpatient samples. Concerning known-groups validity, the findings were consistent with those in Study 3, in that scores on the SADLI-24 scales were useful in discriminating the responses of known-groups of youths with internalizing and externalizing disorders. In Study 5, test-retest correlation coefficients in samples of adolescent inpatients showed that responses on the SADLI-24 scales are stable over time. Across the studies, estimates of internal consistency for the scale scores were acceptable for use in clinical and research settings.

Despite these positive findings, there are specific limitations that need to be highlighted. First, the studies are cross-sectional and data collection involved only self-report measures. In particular, as a self-report instrument, the SADLI-24 does not assess other important response modalities (e.g., behavioral avoidance and physiological responses) of the social anxiety disorder or major depressive disorder constructs. Future studies could include other methods of assessment such as ratings by others to complement scores on the SADLI-24. Second, the subclinical groups in Study 3 were not clinically diagnosed. Moreover, the substantive
demographic and psychosocial differences between the inpatient youth and other youth samples such as high school or community outpatient adolescents might limit the generalization of the study findings. As an example, general community outpatients are less likely to present with highly comorbid conditions, psychosocial stressors, and traumatic stressors that might have an impact on the range of responses to the SADLI-24 items. Likewise, the inpatient test-retest samples were receiving several types of intervention (e.g., pharmacotherapy), which might have had some impact on the SADLI-24 item scores. Thus, additional data from diverse racial and ethnic samples over time will provide stronger evidence for scores (e.g., stability) on the SADLI-24.

Third, although the SADLI-24 scale scores were useful in differentiating the responses of youth with internalizing and externalizing disorders, it would have been desirable to know how scores on this instrument perform with youth with specific social anxiety and those with mixed social anxiety and major depressive disorder. Given the fact that comorbidity tends to be high in long-term care inpatient programs, such as the settings from which the clinical sample data were collected, future studies are needed to evaluate the psychometric properties of the SADLI-24 in clinical settings with low rates of comorbidity disorders. The clinical utility of the SADLI-24 scale scores might also be enhanced by examining psychometric properties such as incremental validity, predictive validity, and sensitivity to change in several treatment settings.

Despite these limitations, the SADLI-24 has promise to improve the assessment of social anxiety disorder by specifically examining the extent to which the symptoms interfere with overall functioning. However, as recommended by the DSM-IV-TR (APA, 2000), screening individuals that are not exposed routinely to social situations for social anxiety disorder with instruments such as the SALDI-24 will result in the underreporting of scores on the instrument. Taken together, this brief, easy to administer and score self-report measure should have utility in a range of settings (e.g., schools, outpatient clinics) where resources may not exist to conduct extensive screening of adolescents and adults who present with social anxiety concerns. Additionally, studies are needed to further our understanding of various demographic and psychosocial factors on the SADLI-24 scale scores.

References


