Personality and Individual Differences 98 (2016) 16–24

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

The Social Anxiety and Depression Life Interference—24 Inventory: Classical and modern psychometric evaluations

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ARTICLE INFO

Article history:
Received 10 November 2015
Received in revised form 14 March 2016
Accepted 18 March 2016
Available online xxxx

Keywords:
Confirmatory factor analysis
Bifactor
Social anxiety disorder
Depression

ABSTRACT

Two instrument validation studies broadened the research literature exploring the factor structure, internal consistency reliability, and concurrent validity of scores on the Social Anxiety and Depression Life Interference—24 Inventory (SADLI-24; Osman, Bagge, Freedenthal, Guiterrez, & Emmerich, 2011). Study 1 (N = 1065) was undertaken to concurrently appraise three competing factor models for the instrument: a unidimensional model, a two-factor oblique model and a bifactor model. The bifactor model provided the best fit to the study sample data. Study 2 (N = 220) extended the results from Study 1 with an investigation of the convergent and discriminant validity for the bifactor model of the SADLI-24 with multiple regression analyses and scale-level exploratory structural equation modeling. This project yields data that augments the initial instrument development investigations for the target measure.

1. Introduction

Social anxiety disorder (SAD) is generally indicated by persistent and extreme fear or anxiety of one or more evaluative social situations, which provokes at least six consecutive months of related anxiety and avoidant behavior (*Diagnostic and Statistical Manual of Mental Disorders* [DSM-5], American Psychiatric Association [APA], 2013). The *DSM-5* (APA, 2013) also requires that persons seeking treatment for SAD demonstrate considerable life interference across several events prior to being assigned a formal diagnosis. Clinical research shows that individuals present with SAD as early as mid-adolescence (Sumter, Bokhorst, & Westenberg, 2009; Klein, 2009; Van Oort, Greaves-Lord, Verhulst, Ormel, & Huizink, 2009; Weeks, Coplan, & Kingsbury, 2009) and many continue to endure the negative consequences of the disorder into adulthood (Kessler, Berglund, Demler, Jin, & Walters, 2005; Magee, Eaton, Wittchen, McGonagle, & Kessler, 1996). In many cases, individuals who present with SAD also report low life satisfaction (Hambrick, Turk, Heimberg, Schneier, & Liebowitz, 2003) and severe depressive symptomology (Beesdo et al., 2007). Moreover, the lifetime prevalence rate for SAD may be as high as 14.3% in the general population (Essau, Conradt, & Petermann, 1999; Kessler et al., 2005; Wittchen & Fehm, 2001).

An important aspect in assigning formal diagnosis of social anxiety disorder is confirmation that the essential symptoms of the disorder interfere significantly with the functioning of the individual. To date, however, existing self-report measures of the social anxiety disorder construct tend to focus entirely on the essential symptoms of the disorder. Unfortunately, self-report measures targeting daily interference from SAD are not readily available for use by clinicians or researchers. In fact, in a recent review of the psychometric properties of over 70 widely used trait measures of social anxiety, Modini, Abbott, and Hunt (2015) concluded that not a single existing instrument met basic psychometric standards. In particular, limitations were noted with respect to inadequate content validity, internal consistency, criterion validity, construct validity, reliability (defined as the ability to consistently distinguish between patients with high vs. low levels of social anxiety), reproducibility of scores, responsiveness (defined as the ability to detect clinically important changes in social anxiety over time), mitigation of floor and ceiling effects, and ease of interpretability (Modini et al., 2015). Measures of life interference will enhance our understanding of the impact of the social anxiety disorder symptoms on the individual (APA, 2013).

Upon identifying the former need, Osman et al. (2011) developed the Social Anxiety and Depression Life Interference—24 (SADLI-24) Inventory to remove two critical barriers preventing the widespread use of psychometric tools for detecting SAD interference. First, the SADLI-24 includes two subscales that separate depressive symptomology from symptoms specific to SAD. Moreover, SAD often co-occurs with depression (Brown, Chorpita, & Barlow, 1998; Cho & Telch, 2005; Kessler, Stang, Wittchen, Stein, & Walters, 1999; Ranta, Kaltiala, Pelkonen, & Marttunen, 2009; Watson, Gamez, & Simms, 2005) and consequently, the SADLI-24 aids clinical diagnostic accuracy with items differentiating the two internalizing disorders. Second, unlike traditional self-report measures, the SADLI-24 includes items assessing the level of life *interference* caused by SAD, instead of measuring the *severity* or *intensity* of the

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http://dx.doi.org/10.1016/j.paid.2016.03.048
0191-8869/

disorder. Accordingly, the SADLI-24 is a valuable assessment tool that compliments existing self-report severity measures. For the current project, we conducted two studies to extend findings of the original instrument development investigations reported by Osman et al. (2011), which are briefly reviewed below.

1.1. Instrument development studies for the SADLI-24

In the initial instrument development study, Osman et al. (2011) generated an initial pool of 58 potential items that captured *internalizing* behaviors relevant to the constructs of social anxiety and depression. This initial pool was reduced to 30 items after the authors inspected the item contents for specificity, clarity, relevancy, and construct representativeness. For the second study, the authors recruited 438 high school and undergraduate students to examine the factor structure and internal consistency of the scale scores. Six additional items were removed after repeated exploratory factor analyses, resulting in a two-factor inventory with 24 items. All items are scaled from 1 (*strongly disagree*) to 5 (*strongly agree*). Each factor (Social Anxiety Life Interference [SALI-12] and Depression Life Interference [DLI-12]) is composed of 12 items (inter-factor correlation, $r = .61$; range of primary factor loadings: .51 to .94). A sample item from the SALI-12 subscale reads, "In general, how much of the time has fear or concerns about what other people think of you in social situations interfered with your normal daily life?" A sample item from the DLI-12 subscale reads, "In general, how much of the time have feelings of being depressed, down, or sad interfered with your normal daily life?" In addition, the related subscale scores demonstrated adequate internal consistency reliability.

For the third instrument development study, Osman et al. (2011) recruited a confirmatory sample of 430 undergraduates and replicated the two-factor structure of the SADLI-24 using confirmatory factor analysis. The authors also used receiver operating curve analysis to derive an empirically supported diagnostic cut point for the SALI-12 and DLI-12 subscale scales. Results showed that raw scores of the 24 items were able to differentiate between clinical-level social anxiety (SALI-12) and depressive symptomology (DLI-12) for the majority of the study participants. Study Three also incorporated several relevant concurrent measures and showed evidence for the discriminant and convergent validity of the SADLI-24 subscale scores using the validation self-report measures.

For the fourth instrument development study, Osman and colleagues administered the SADLI-24 items to two samples of adolescents ($M_{age} = 15.62$ years), who were inpatients at a state psychiatric hospital. One group of participants exhibited internalizing symptoms ($n = 56$) whereas the other group exhibited externalizing symptoms ($n = 56$). The authors used participants' scores on the SADLI-24 to examine evidence for known-groups validity and reliability for the specific subscale scores. The final instrument development study demonstrated adequate test–retest validity with an independent clinical inpatient sample of adolescents.

1.2. Total study objectives

The current project extends the initial instrument development studies in several critical ways. Given the strong correlation between the SALI-12 and DLI-12 subscale scores ($r = .61$; Osman et al., 2011), in Study 1 we utilized a confirmatory bifactor model strategy to investigate the extent to which the subscale scores represent a single latent construct. Study 1 also included empirical evaluations of the convergent validity, discriminant validity, and internal consistency reliability of the SADLI-24 subscale scores. The analyses in Study 2 broadened findings from Study 1, with central aims of delineating the nomological network of the instrument and of assessing the concurrent and discriminant validity estimates of the SADLI-24 subscale scores.

2. Objectives for Study 1

Study 1 addresses three specific objectives. The first objective was to strengthen evidence of validity for the SADLI-24. We performed multiple regression analyses with scores on the SADLI-24 subscales serving as predictors of scores on two criterion measures: The Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) and The Social Phobia and Anxiety Inventory—23 (SPAI-23; Roberson-Nay, Strong, Nay, Beidel, & Turner, 2007). Each concurrent measure assesses constructs that are theoretically related to SAD (i.e., scores on the SALI-12) and depression (i.e., scores on the DLI-12). More specific predictions regarding the relationships between the indicators and criterion measures are outlined in the subsequent sections.

The second objective of Study 1 was to compute coefficient-ω (McDonald, 1999; Zinbarg, Revelle, Yovel, & Li, 2005) for the SADLI-24 subscale scores and the concurrent measures. The instrument development studies reported coefficient-α (Cronbach, 1951; Raykov & Marcoulides, 2015) and composite reliability (Raykov, 1997) to show evidence of internal consistency reliability with a different estimation method. For comparative purposes, we also provided estimates of coefficient-α.

The third and final objective of Study 1 was to explore the instrument's latent factor structure using confirmatory factor analysis (CFA). More specifically, we used CFA to compare the fit of three possible factor structures for the SADLI-24: a one-factor model, a two-correlated factors model (as specified in the original studies), and a bifactor model. Due to the strong association between the SALI-12 and DLI-12 recorded in the previous studies, we reasoned that the variance captured by the SADLI-24 may actually reflect a shared latent construct tapped by both subscale scores, and not necessarily two separate latent constructs. That is to say, perhaps the items measuring life interference reflect a respondents' perception of impairment from general psychological distress, instead of intrusions resultant from either social anxiety *or* depression.

We tested this prediction within a bifactor framework, which allowed us to specify a model with a central, latent "general distress" dimension. Each bifactor-inventory item contributes variance to two factors where the first factor represents a specific factor (or subscale) and the second more general factor comprises variance from all of the inventory items. Any specific factors that remain stable after controlling for the contributions of its items to the general factor are considered discrete dimensions of a multidimensional instrument, whereas specific factors that are completely represented by the general factor are no longer considered distinct dimensions (Reise, Moore, & Haviland, 2010). Notably, the bifactor model also necessitates that the specific and general factors be orthogonal to each other.

3. Method for Study 1

3.1. Participants and procedure

We combined data from research settings in the Southeast and Midwest to maximize parameter estimates and to increase the generalizability of the study results. Specifically, using secure online survey format, participants ages 18 to 29 years who self-identified as college-age students ($n = 855$) were included in the initial pool. As noted above, we recruited an additional 210 participants to increase the heterogeneity and size of the study sample; the second sample included participants ages 30 and older who self-identified as non-students.

The full sample with complete item-level data included 328 women and 737 men, ranging in age from 18 to 49 years ($M_{age} = 22.85$, $SD = 7.50$). Three hundred and sixty-eight (368; 34.6%) participants self-identified as being Caucasian/White (368; 34.6%), 402 (37.7%) as being Hispanic/Latino American, 104 (9.8%) as being African American, 98 (9.2%) as being Asian American, 66 (6.2%) as being biracial, and 25 (2.3%) as being Middle Eastern. Additionally, of the sample,