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The psychometric properties of the Interpersonal Sensitivity Measure in social anxiety disorder☆

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Abstract

The Interpersonal Sensitivity Measure (IPSM) was developed to assess hypersensitivity to interpersonal rejection, a suggested trait of depression-prone personality (Aust NZ J Psychiatry 23 (1989) 341). Although studies of the IPSM and interpersonal rejection sensitivity have primarily been conducted in depressed populations, it is important to investigate interpersonal rejection sensitivity as a relevant construct in the assessment of social anxiety. This study examined the psychometric properties of the IPSM in treatment-seeking individuals with social anxiety disorder. The results of this investigation support the convergent and divergent validity and internal consistency of the IPSM in socially anxious individuals. An exploratory factor analysis of the scale was also conducted after the original factor and subscale structure was shown to be a poor fit for the present data. Three factors emerged (Interpersonal Worry and Dependency, Low Self-Esteem, and Unassertive Interpersonal Behavior), and 29 items were retained. Because they demonstrated negative factor loadings on Factor 2, it is suggested that the scoring for four items of the original IPSM be reversed. In summary, the revised IPSM assesses three aspects of interpersonal rejection sensitivity and appears to be a valid and reliable instrument for its assessment in social anxiety disorder.

Keywords: Social anxiety disorder; Interpersonal sensitivity; Validity; Reliability; Factor analysis; IPSM; Dependency; Self-esteem; Unassertive behavior

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1. Introduction

The Interpersonal Sensitivity Measure (IPSM) was developed by Boyce & Parker (1989) as a self-report measure of the construct of interpersonal sensitivity, which they defined as "undue and excessive awareness of and sensitivity to, the behavior and feelings of others" (p. 342). This construct has also been described as a general sensitivity to social feedback, vigilance with regard to others' reactions, increased concern about the behavior and statements of others, and fear of perceived or actual criticism by others (Boyce, Hickie, Parker, & Mitchell, 1993). Interpersonal sensitivity is characterized by a sense of personal inadequacy and frequent misinterpretation of others' interpersonal behavior and results in discomfort in the presence of others as well as interpersonal avoidance and non-assertive behavior (Boyce & Parker, 1989; Davidson, Zisook, Giller, & Helms, 1989). Although the authors of the IPSM refer to this construct as 'interpersonal sensitivity', we suggest the more descriptive label of 'interpersonal rejection sensitivity' to avoid confusion with the common conception of interpersonally sensitive/aware individuals and better describe the fear and discomfort associated with perceived interpersonal rejection.

The Diagnostic and Statistical Manual of Mental Disorders, (DSM-IV; American Psychiatric Association, 1994) describes a subtype of major depressive disorder, atypical depression, which was first discussed 30 years ago as resistant to antidepressant medication (Rabkin et al., 1996). The current definition of atypical depression includes the frequent symptom of interpersonal rejection sensitivity, which is conceived of as a persistent personality characteristic. This personality attribute may be exacerbated by depressive episodes, may be a reflection of the sensitivity to rejection induced by depressive episodes, or may represent a vulnerability to depressive episodes. Given these connections between depression and interpersonal rejection sensitivity, Boyce and Parker (1989) proposed that interpersonal rejection sensitivity is a characteristic of the 'depression-prone' personality and consequently developed the IPSM to assess this risk factor for the development of depressive disorders.

The initial studies of the scale yielded good evidence in support of the psychometric properties of the IPSM (Boyce & Parker, 1989). In a clinical sample of depressed patients and a non-clinical student sample, internal consistency estimates for the total score were 0.86 and 0.85, respectively. Further, the six-week retest reliability of the IPSM in the student sample was 0.70. A high correlation with a measure of neuroticism (r=0.66), a moderate correlation with a measure of self-esteem (r=0.39), and a low correlation with a measure of emotional arousability (r=0.11) provided evidence for both the convergent and divergent validity of the IPSM. The internal consistency estimates for four of the five IPSM subscales (Interpersonal Awareness, Separation Anxiety, Timidity, and Fragile Inner Self) were comparable to those reported for the total score. However, this initial investigation yielded lower six-week retest reliability for the Need for Approval subscale (r=0.55) as well as relatively low alpha coefficients of 0.67 in the patient sample and 0.55 in the student sample (Boyce & Parker, 1989).

Since its development, the IPSM has been used primarily in studies of interpersonal rejection sensitivity as a risk factor for depression. Interpersonal rejection sensitivity appears to be associated with depressive disorders, especially non-melancholic depressive episodes (Boyce et al., 1993, 1990). Although the IPSM is somewhat sensitive to mood states, interpersonal rejection sensitivity represents a more enduring personality characteristic (Boyce & Parker, 1989). Prospective studies

have demonstrated the ability of the IPSM to predict the development of initial depressive episodes, the recurrence of depression six months following childbirth, and non-remission of depressive symptoms among depressed inpatients (Boyce, Parker, Barnett, Cooney, & Smith, 1991). Further, among college students, the IPSM was associated with low social and academic self-esteem, depressive symptoms and poorer academic performance (McCabe, Blankstein, & Mills, 1999). This study also assessed the reliabilities of the IPSM subscales and obtained results comparable to the original investigation, including an alpha of 0.56 for the Need for Approval subscale, markedly lower than the other subscales (αs$>$0.75).

Interpersonal rejection sensitivity also appears to be a central feature of social anxiety disorder (Liebowitz, Gorman, Fyer, & Klein, 1985). Social anxiety disorder, also known as social phobia (Liebowitz, Heimberg, Fresco, Travers, & Stein, 2000), is characterized by persistent fears of embarrassment in social interaction or performance situations (American Psychiatric Association, 1994). Characteristics of social anxiety correspond to many aspects of the definition of interpersonal rejection sensitivity: interpersonal vigilance, fear of rejection, misinterpretations of others' behavior, thoughts of inferiority, non-assertive behavior, and avoidance of interpersonal situations (Rapee, 1995; Turk, Lerner, Heimberg, & Rapee, 2001). These parallels are especially evident in the generalized subtype of social anxiety disorder. Although individuals with social anxiety disorder may have circumscribed fears of, for example, public speaking, patients with generalized social anxiety disorder experience social anxiety and fear of embarrassment in a broad range of social situations. Therefore, interpersonal rejection sensitivity may represent an underlying personality trait of individuals with social anxiety disorder, particularly the generalized subtype. The current study investigated the psychometric properties of the IPSM among patients with social anxiety disorder.

The current investigation addressed several questions with regard to the psychometric attributes of the IPSM among patients with social anxiety disorder: (1) the internal consistency of the IPSM and its subscales; (2) the factor structure of the scale; (3) differences in IPSM scores between social anxiety disorder patients and non-anxious community participants; (4) its convergent (e.g. high interpersonal rejection sensitivity was expected to be associated with high anxiety about social interactions, more severe impairment, lack of expression of negative emotions such as anger towards others for fear of rejection, and an anxious attachment style) and divergent (e.g. the IPSM was expected to be only weakly related to anxiety sensitivity and to non-anxious insecure attachment styles and less related to observational fears than social interaction anxiety) validity; and (5) the sensitivity of the IPSM to treatment-related change among patients receiving cognitive-behavioral group therapy for social anxiety disorder. Important to the present context, research has demonstrated high rates of comorbidity between social anxiety disorder and depressive disorders (Kessler, Stang, Wittchen, Stein, & Walters, 1999; Schneier, Johnson, Hornig, Liebowitz, & Weissman, 1992). Therefore, the relationship of the IPSM to various external indicators of validity in social anxiety disorder patients above and beyond the influence of depressive symptoms was investigated.

2. Method

2.1. Participants

Two groups of participants were included in this study: a social anxiety disorder group and a community control group. The social anxiety disorder group consisted of 201 treatment-seeking individuals with a principal DSM-IV diagnosis of social anxiety disorder. Participants were recruited through newspaper advertisements and local referral for social anxiety disorder treatments at three sites: (1) the Center for Stress and Anxiety Disorders of the University at Albany, State University of New York (n=17), (2) the Adult Anxiety Clinic of Temple University, Philadelphia, PA (n=129), and (3) the Anxiety Disorders Clinic at the New York State Psychiatric Institute, New York, NY (n=55). At the Albany and Philadelphia sites, the diagnostic assessment was conducted using the Anxiety Disorders Interview Schedule for the DSM-IV, Lifetime Version (ADIS-IV-L; Di Nardo, Brown, & Barlow, 1994). The ADIS-IV-L is a widely used and reliable structured diagnostic interview with kappa coefficients of 0.73–0.77 for social anxiety disorder (Brown, Di Nardo, Lehman, & Campbell, 2001). The New York site employed the Structured Clinical Interview for DSM-IV (SCID-IV; First, Spitzer, Gibbon, & Williams, 1996). Upon receiving a principal diagnosis of social anxiety disorder, patients were offered participation in a study of cognitive-behavioral group therapy (CBGT), treatment with the monoamine oxidase inhibitor phenelzine, the combination of CBGT and phenelzine, and pill placebo. At the Albany and Philadelphia sites, patients who declined participation in the treatment study or who were excluded for medical reasons were offered open clinical treatment with CBGT and completed the same assessments as patients who participated in the outcome study. The present study investigated the reliability and validity of the IPSM using the pre-treatment assessments of all 201 treatment-seeking individuals. In addition, the sensitivity of the IPSM to CBGT treatment change was evaluated using the post-treatment data of 32 individuals who completed 12 weeks of CBGT. Exclusion criteria for individuals in the present study were a principal diagnosis other than social anxiety disorder and active suicidal intent. Further, the New York site excluded current major depressive disorder, while the remaining sites recorded 24 cases of concurrent major depression. Demographic characteristics of participants at the three sites are shown in Table 1.

The 34 community participants were recruited through newspaper advertisements and fliers posted in Philadelphia. They were recruited to match to the group of patients with regard to age, gender and ethnic background. Participants with no DSM-IV diagnoses, as assessed by the ADIS-IV-L, were included in the study.

2.2. Measures

2.2.1. Interpersonal Sensitivity Measure

The IPSM (Boyce & Parker, 1989) assesses excessive sensitivity to the interpersonal behavior of others, to social feedback and to (perceived or actual) negative evaluation by others. The 36 items of the IPSM are completed on a 4-point Likert-type scale with the following anchors: ‘1=very unlike me’, ‘2=moderately unlike me’, ‘3=moderately like me’, ‘4=very like me’. The measure includes a total score and five subscale scores: Interpersonal Awareness (seven items, e.g. ‘I worry about the effect I have on other people’), Need for Approval (eight items, e.g. ‘I

Table 1
Descriptive characteristics of the three social anxiety disorder subgroups and the community control group

	Total sample (*N*=235)		Albany, NY (*n*=17)		Philadelphia, PA (*n*=129)		New York, NY (*n*=55)		Community control group (*n*=34)	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%
Gender										
Women	98	41.7	5	29.4	54	41.9	23	41.8	16	47.1
Men	137	58.3	12	70.6	75	58.1	32	58.2	18	52.9
Marital status										
Single (never married)	167	72.0	11	64.7	89	69.0	40	76.9	27	79.4
Married or once married (widowed, divorced or separated)	65	28.0	6	35.3	40	31.0	12	23.1	7	20.6
Education										
High school or some college	110	47.4	7	41.2	57	44.5	34	64.2	12	35.3
College graduate	70	30.2	5	29.4	42	32.8	9	17.0	14	41.2
Post-graduate education	52	22.4	5	29.4	29	22.7	10	18.9	8	23.5
Race										
Caucasian	159	69.1	16	94.1	99	78.6	22	41.5	22	64.7
African–American	39	17.0	1	5.9	16	12.7	14	26.4	8	23.5
Hispanic, Asian, Pacific Islander or American Indian	32	13.9	0	0	11	8.7	17	32.1	4	11.8
Age										
Mean	33.38		30.59		33.60		34.06		32.86	
SD	10.20		9.23		10.42		9.59		10.89	
Range	19–66		20–46		19–65		20–61		19–66	
Social anxiety disorder severity										
Mean	5.27		5.24		5.17		5.40		N/A	
SD	0.70		0.56		0.69		0.74		N/A	
Range	4–7		4–6		4–7		4–7		N/A	

Note: Social anxiety disorder severity is indexed by the Clinical Global Impression Scale (CGI) completed by independent assessors; *n*s vary across descriptive indices because of missing data.

will go out of my way to please someone I am close to'), Separation Anxiety (eight items, e.g. 'I feel insecure when I say goodbye to people'), Timidity (eight items, e.g. 'I will do something I do not want to do rather than offend or upset someone'), and Fragile Inner Self (five items, e.g. 'My value as a person depends enormously on what others think of me'). The reliability and validity of the IPSM has been well studied in depressed populations (as reviewed above). To date, there are no reports of the use of the IPSM in social anxiety.

2.2.2. Social anxiety-related measures

2.2.2.1. Brief Fear of Negative Evaluation Scale (B-FNE) The B-FNE (Leary, 1983) is a trait measure of concern about the evaluation by others, distressing thoughts about disapproval and

criticism by others. This scale is an abbreviated 12-item version of the original 30-item Fear of Negative Evaluation (FNE) scale (Watson & Friend, 1969) and uses a Likert-type scale (1–5). The B-FNE is highly correlated with the full-length scale (r=0.96). The FNE has been among the most widely used scales in the assessment of social anxiety, and both versions have sound psychometric properties (e.g. Leary, 1983; Mattick & Peters, 1988).

2.2.2.2. Social Interaction Anxiety Scale (SIAS) and Social Phobia Scale (SPS) The SIAS was designed to measure anxiety experienced in social interaction situations in dyads or groups; the SPS was designed to measure distress experienced when one is being observed while undertaking some activity (Mattick & Clarke, 1998). These scales have been shown to possess high internal consistency (ranging from 0.88 to 0.94) and high retest reliability (between 0.91 and 0.93). Both scales discriminate between different anxiety disorders and subtypes of social anxiety disorder, as well as between clinical and non-clinical samples, and are more strongly related to other measures of social fear than to measures of general distress (Brown et al., 1997; Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992; Mattick & Clarke, 1998). The scales' sensitivity to change in response to treatments of social anxiety disorder has been documented (Ries et al., 1998).

2.2.2.3. Clinical Global Impression Scale (CGI) The CGI (Guy, 1976) consists of two clinician-rated items: severity of illness and improvement. This study used only the severity of illness item, which represents an assessment of the intensity and frequency of current social anxiety symptoms (and secondary dysphoria) and associated functional impairment. The rating was made by an independent assessor, uninformed about the participants' treatment condition or additional diagnoses, on a 7-point scale, with 1 representing 'Not at all ill' and 7 indicating 'Among the most severely ill patients'. The CGI was developed for use in psychopharmacology trials as part of the NIMH collaborative study of schizophrenia (Guy, 1976), and has since been used as a primary outcome measure in outcome studies of both pharmacological and psychosocial treatments for many psychological problems including social anxiety disorder (e.g. Liebowitz et al., 1999; Stein et al., 1996).

2.2.3. Depression measures

2.2.3.1. Beck Depression Inventory (BDI) The BDI-IA (Beck, Rush, Shaw, & Emery, 1979) is a 21-item self-report scale assessing current cognitive, affective and somatic symptoms of depression with a graded series of descriptive statements. Extensive research using the BDI has yielded solid evidence for its reliability, convergent, divergent and construct validity (Beck, Steer, & Garbin, 1988). Furthermore, the reliability and validity of the BDI-IA have been affirmed in patients with social anxiety disorder (Coles, Gibb, & Heimberg, in press).

2.2.3.2. Hamilton Rating Scale for Depression (HRSD) The HRSD (Hamilton, 1967) is a 21-item clinician-administered rating scale for depressive symptomatology. Validity, treatment sensitivity and inter-rater reliability have been demonstrated (e.g. Bech, Allerup, Maier, & Albus, 1992). In this study, the HRSD was administered by independent assessors to the subgroup of patients in Philadelphia or Albany.

2.2.4. Measures of life-satisfaction and impairment

2.2.4.1. Quality of Life Inventory (QOLI) The QOLI (Frisch, Cornell, Villanueva, & Retzlaff, 1992) measures self-reported life satisfaction with regard to 16 domains such as health, relationships and work. This measure requires individuals to rate the importance of these areas of life on a 3-point scale (0–2) and their satisfaction with the domain on a 6-point scale (−3 to +3, with no zero option). An overall index of life satisfaction is obtained by averaging the weighted satisfaction ratings for each domain with non-zero importance ratings. Retest reliabilities, internal consistency, and validity estimates have been shown to be high across a number of samples (Frisch et al., 1992), and the validity of the QOLI in socially anxious patients and as an outcome measure in social anxiety treatment has been demonstrated (Safren, Heimberg, Brown, & Holle, 1997).

2.2.4.2. Liebowitz Self-Rated Disability Scale (LSRDS) The LSRDS (Schneier et al., 1994) was designed for the brief assessment of functional impairment in social anxiety disorder. This 11-item self-report instrument (using a 0–3 scale) consists of a scale measuring current impairment (during the past two weeks) and a scale assessing the most severe lifetime disability attributable to social anxiety disorder. Domains of functioning addressed include work, family, alcohol use, and mood dysregulation. The subscales have been found to be internally consistent (α=0.92 for both scales), and significantly higher LSRDS scores were obtained in clinical than in non-clinical samples. Moderate correlations between the current subscale and other measures of current disability were found, and lifetime scores were significantly related to clinician-rated lifetime impairment (Schneier et al., 1994).

2.2.5. Other measures

2.2.5.1. State Trait Anger Expression Inventory (STAXI) The STAXI (Spielberger, Jacobs, Russell, & Crane, 1983), is a 44-item self-report measure of the experience, expression and control of anger, designed to assess state anger as a situational emotional response and trait anger as a pre-dispositional quality (Fuqua et al., 1991). This investigation used two of the six STAXI subscales: anger suppression (Anger-In) and anger expression (Anger-Out). Alpha coefficients for the subscales range from 0.73 to 0.93 (Spielberger, 1988), and several investigations into the psychometric properties of the scale have yielded evidence for the internal consistency, factor structure, and validity of the instrument (e.g. Forgays, Forgays, & Spielberger, 1997; Fuqua et al., 1991).

2.2.5.2. Adult Attachment Scale — Revised (RAAS) The RAAS (Collins, 1996) is a modified version of the Adult Attachment Scale developed by Collins and Read (1990). The scale was designed to measure adult attachment in close relationships, specifically the three attachment styles of secure, avoidant, and anxious-ambivalent attachment (Hazan & Shaver, 1987). This 18-item measure includes three subscales: Close (an individual's comfort level with regard to closeness and intimacy); Depend (the individual's appraisal of whether he/she is able to trust and depend on others); and Anxiety (the extent of fear of abandonment or being unloved in relationships). The internal consistency, retest reliability, and correlation of the three subscales with other measures of attachment have been demonstrated (Collins & Read, 1990).

2.2.5.3. Anxiety Sensitivity Index (ASI) The ASI (Reiss, Peterson, Gursky, & McNally, 1986) assesses self-reported levels of fear of anxiety-related sensations (predominantly physical symptoms) and the extent to which they are regarded as catastrophic in outcome. The ASI is the most frequently used measure of this construct and has been demonstrated to be sound with regard to reliability and validity (Peterson & Kirsten, 1999). The beliefs assessed by the ASI are most highly associated with panic symptomatology, and evidence for the validity of the measure has been established by demonstrating that ASI scores predict panic above and beyond trait anxiety (Peterson & Kirsten, 1999). Patients with social anxiety disorder who experience panic attacks in social situations also report high levels of anxiety sensitivity (Scott, Heimberg, & Jack, 2000).

2.3. Procedures

Individuals applying for treatment in Albany, Philadelphia or New York were scheduled for pre-treatment assessments, which consisted of gathering of demographic information, the administration of a structured diagnostic interview (the ADIS-IV-L or the SCID-IV), and the completion of a package of self-report measures. Eligible individuals were offered participation in the multisite treatment outcome study described above. In addition, individuals ineligible for, or not interested in, participating in the outcome study were offered open CBGT treatment in Albany and Philadelphia. These patients were further assessed by an independent assessor prior to starting treatment and upon completion of the 12-week treatment. The questionnaire measures were readministered at post-treatment. Community control participants in Philadelphia also completed the structured clinical interview and a package of self-report questionnaires and were paid $40 for their participation.

3. Results

3.1. Preliminary analyses

The demographic characteristics of the four subsamples (Albany, Philadelphia, New York, and Community Control) are presented in Table 1. In comparisons of the three social anxiety disorder subsamples, no differences were found in age [$F(2, 193)=0.79$, ns], marital status [$\chi^2(2, N=198)=1.45$, ns], gender [$\chi^2(2, N=201)=1.00$, ns], or level of education [$\chi^2(4, N=198)=7.20$, ns]. Neither did these groups differ in the severity of their social anxiety symptoms as determined in the independent assessor interview [$F(2, 138)=1.66$, ns]. The three sites did differ significantly with regard to the racial composition of the samples [$\chi^2(4, N=196)=31.39$, $p<0.001$]. The samples from Albany and Philadelphia included a greater percentage of Caucasian participants, while the New York sample was more ethnically diverse (see Table 1 for details). However, race was unrelated to IPSM scores [$F(2, 227)=0.62$, ns], so it was not controlled in further analyses.

The social anxiety disorder sample was also compared to the community control group with regard to demographic characteristics. There were no significant differences with respect to age [$t(231)=-0.32$, ns], gender [$\chi^2(1, N=235)=0.47$, ns], race [$\chi^2(2, N=230)=1.26$, ns], marital status [$\chi^2(1, N=232)=1.09$, ns] or level of education [$\chi^2(2, N=232)=2.86$, ns].

Table 2
Internal consistency (Cronbach's alpha coefficients) for the 36-item IPSM total score and subscales, and means and standard deviations for the original 36-item IPSM

	Social anxiety disorder patients (n=201)	Community control group (n=34)
IPSM total score	0.90	0.91
Interpersonal Awareness	0.81	0.80
Need for Approval	0.40	0.70
Separation Anxiety	0.78	0.84
Timidity	0.78	0.68
Fragile Inner Self	0.78	0.81
Mean IPSM total score (SD)	102.50 (15.75)	73.82 (13.64)

Note: IPSM=Interpersonal Sensitivity Measure.

3.2. Internal consistency

As can be seen in Table 2, the total IPSM score demonstrated excellent internal consistency, and most subscales exhibited internal consistency in the good or acceptable ranges, for both the social anxiety disorder and community control samples. However, the alpha coefficient of the Need for Approval subscale was very low (α=0.40) in the social anxiety group.

3.3. Intercorrelations among IPSM subscales

Table 3 shows the correlations between the IPSM total score and its subscales and the correlations among the subscales for the social anxiety group. Correlations between the subscales and the IPSM total score were high, with the exception of the Need for Approval scale, which yielded a comparatively lower correlation. Further, correlations were high among most IPSM subscales, with a median coefficient of 0.58. The Need for Approval scale, however, produced much lower correlations with other subscales, with a median correlation of 0.24.

Table 3
Correlations among the 36-item IPSM subscales for the social anxiety group

	IPSM total	Interpersonal awareness	Need for approval	Separation anxiety	Timidity	Fragile inner self
Interpersonal Awareness	0.86**	1.00	–	–	–	–
Need for Approval	0.46**	0.31**	1.00	–	–	–
Separation Anxiety	0.86**	0.74**	0.16*	1.00	–	–
Timidity	0.77**	0.53**	0.40**	0.52**	1.00	–
Fragile Inner Self	0.74**	0.62**	0.09	0.66**	0.38**	1.00

IPSM=Interpersonal Sensitivity Measure; *$p<0.05$, **$p<0.01$.

3.4. IPSM scale structure

3.4.1. Confirmatory factor analysis

Confirmatory factor analysis (CFA) was used to determine the fit of the factor (and subscale) structure obtained by Boyce and Parker (1989) during scale development to the data obtained in the present study. The responses of socially anxious participants were fit to the original 5-factor structure using AMOS 4 (Arbuckle, 1999). The chi-square test of covariance equivalence was significant [$\chi^2(584, N=201)=1407.41, p<0.001$], suggesting poor fit of these data to the original model. However, the chi-test is sensitive to sample size and thus, three additional indices of fit were examined: the Tucker–Lewis Index (TLI; Tucker & Lewis, 1973), the Comparative Fit Index (CFI; Bentler, 1990), and the root mean square error of approximation (RMSEA). All three indices failed to reach cutoffs for adequate fit (Hu & Bentler, 1999): TLI=0.68, CFI=0.71, and RMSEA=0.08. Although, some may argue that models with RMSEA of less than 0.10 indicate a reasonable good fit (Steiger, 1989), we opted for the more stringent criteria of Hu and Bentler (1999) to determine that the structure of the current data does not adequately match the original factor structure.

3.4.2. Exploratory factor analysis

Given the findings of the CFA and the suitability of the data (i.e. skew=−0.53; Kaiser–Meyer–Olkin Index of Sampling Adequacy=0.88), an exploratory factor analysis was conducted. Principal axis (i.e. common factor) factor analysis with varimax rotation was used to determine the underlying structure of the 36 IPSM items.[2] Floyd and Widaman (1995) recommend the use of common factor analysis (over principal components analysis) to examine the relationship of latent variables to observed manifest variables and suggest that estimates produced by common factor analysis are more robust in subsequent confirmatory replication.

Based on the scree plot of eigenvalues (Cattell, 1966), we settled on a three-factor solution (the first 10 eigenvalues were 10.15, 3.00, 1.91, 1.59, 1.37, 1.27, 1.14, 1.08, 1.06, and .98).[3] The examination of the rotated factor loadings resulted in the retention of 34 items with factor loadings with an absolute value of 0.35 or higher. Further, five items which loaded on more than one factor with a difference of less than 0.10 were also dropped. The rotated factor loadings are resented in Table 4.

The first factor was labeled *Interpersonal Worry and Dependency*, reflecting item content in the realm of worry about interpersonal issues, the importance of others' opinions and feedback, and the fear of others' responses. With an eigenvalue of 10.15, it accounted for 16.07% of the variance. This factor consisted of 11 items, five from the original Interpersonal Awareness scale and two each from the original Need for Approval, Fragile Inner Self and Separation Anxiety scales.

The second factor, labeled *Low Self-Esteem*, included items concerning low opinions of oneself, feeling disliked by others, the expectation of criticism by others, and anxiety when saying goodbye or when in close relationships. It had an eigenvalue of 3.00 and accounted for 11.01% of the

[2] Given the likely overlap of the extracted factors, the exploratory factor analysis was also conducted using oblique rotation. The results obtained were close to identical to the varimax results reported. Details on the oblique results are available from the authors.

[3] A case can be made for the 4- or 5-factor solutions, however, the fourth and fifth factors consisted of only two items each. In the spirit of stream-lining and clinical utility, the 3-factor solution was deemed the most appropriate.

Table 4
Rotated factor loadings for common factor analysis of the IPSM for Factors 1, 2 and 3, and for dropped items

IPSM Item	Factor 1	Factor 2	Factor 3
Factor 1: Interpersonal Worry and Dependency			
I worry about what others think of me (IPSM 30)	**0.73**	0.24	0.13
I care about what people feel about me (IPSM 36)	**0.69**	0.05	0.22
My value as a person depends enormously on what others think of me (IPSM 35)	**0.67**	0.26	0.15
If someone is critical of something I do, I feel bad (IPSM 23)	**0.66**	0.22	0.20
I worry about being criticized for things that I have said or done (IPSM 10)	**0.64**	0.24	0.25
I feel hurt when someone is angry with me (IPSM 34)	**0.59**	0.24	0.30
I always notice if someone doesn't respond to me (IPSM 11)	**0.54**	0.18	0.22
I can only believe that something I have done is good when someone tells me it is (IPSM 15)	**0.51**	0.23	0.14
I worry about losing someone close to me (IPSM 12)	**0.47**	0.07	0.25
If someone upsets me, I am not able to put it easily out of my mind (IPSM 28)	**0.45**	0.12	0.22
I do not feel happy unless people I know admire me (IPSM 31)	**0.44**	0.09	0.14
Factor 2: Low Self-Esteem			
If other people knew what I am really like, they would think less of me (IPSM 24)	0.37	**0.59**	0.01
If others knew the real me, they would not like me (IPSM 5)	0.33	**0.59**	0.05
I do not like people to really know me (IPSM 27)	0.26	**0.59**	0.12
I feel that people generally like me (IPSM 13)	−0.11	**−0.54**	0.15
I can make other people feel happy (IPSM 20)	−0.05	**−0.48**	0.10
I feel anxious when I say goodbye to people (IPSM17)	0.07	**0.47**	0.33
I always expect criticism (IPSM 25)	0.37	**0.47**	0.18
I feel uneasy meeting new people (IPSM 4)	0.19	**0.40**	0.16
I feel happy when someone compliments me (IPSM 18)	0.20	**−0.38**	−0.01
I feel secure when I am in a close relationship (IPSM 6)	−0.18	**−0.36**	0.06
Factor 3: Unassertive Interpersonal Behavior			
I find it hard to get angry with people (IPSM 21)	−0.01	0.11	**0.60**
I worry about hurting the feelings of other people (IPSM 33)	0.43	−0.09	**0.60**
I will do something I do not want to do rather than offend or upset someone (IPSM 14)	0.23	0.09	**0.59**
I am never rude to anyone (IPSM 32)	0.09	−0.06	**0.59**
I do not get angry with people for fear that I may hurt them (IPSM 7)	0.19	0.12	**0.54**
I worry about criticizing other people (IPSM 22)	0.28	0.05	**0.50**
After a fight with a friend, I feel uncomfortable until I have made peace (IPSM 8)	0.27	0.09	**0.41**
I am always aware of how other people feel (IPSM 9)	0.17	−0.12	**0.37**
Dropped items			
I feel insecure when I say goodbye to people (IPSM 1)	0.09	0.46	0.38
I worry about the effect I have on other people (IPSM 2)	0.40	0.38	0.25
I avoid saying what I think for fear of being rejected (IPSM 3)	0.44	0.43	0.27
I will go out of my way to please someone I am close to (IPSM 16)	0.20	0.04	0.31
I fear that my feelings will overwhelm people (IPSM 19)	0.30	0.22	0.28
I can never be really sure if someone is pleased with me (IPSM 26)	0.51	0.50	0.24
I feel others do not understand me (IPSM 29)	0.41	0.48	0.04

Note: Items were considered to load on a factor if its loading score exceeded 0.35 and the difference between the loadings on other factors was no less than 0.10; IPSM=Interpersonal Sensitivity Measure.

variance. The 10 items composing the second factor originate from the Need for Approval (four items), Fragile Inner Self (three items), Separation Anxiety (two items) and Interpersonal Awareness (one item) scales. Interestingly, this factor included four items, all from the original Need for Approval scale, which loaded highly but negatively onto the factor.

Labeled *Unassertive Interpersonal Behavior*, the third factor focused on the lack of assertive expression of opinions and feelings (particularly anger) and worry about pleasing others, and accounted for 9.64% of the variance (eigenvalue=1.91). The eight items loading on this factor were predominantly from the original Timidity subscale, with one item from the Need for Approval scale.

Factor scores for the three factors were computed by summing the scores for all the items loading on each factor. Means, standard deviations and Cronbach's alpha coefficients are presented in Table 5. Please note that, for Factor 2, internal consistency and descriptive statistics were also computed with the negatively loading items 6, 13, 18 and 20 reverse-scored. Further, a revised total score using the 29 items which loaded on the three factors as well as a 29-item total score with items 6, 13, 18 and 20 reversed were computed. The intercorrelations among those scores and the revised total score are also shown in Table 5. The following reported results of validational analyses used the 29-item IPSM total score with reversed scoring. However, analyses were also conducted using the original 36-item scale and the 29-item scale without reverse scoring, and results were close to identical (available from the authors upon request).

3.5. Relationship of IPSM scores to group membership and social anxiety disorder subtype

The ability of the IPSM to discriminate between patient and non-patient groups was evaluated by examining mean differences between individuals with generalized social anxiety disorder, indi-

Table 5
Internal consistency, means and intercorrelations of the three factor scores, the revised 29-item total score, the Factor 2 with reverse scoring and the 29-item total score with reverse scoring

	Factor 1 (Interpersonal Worry and Dependency)	Factor 2 (Low Self-Esteem)	Factor 3 (Unassertive Interpersonal Behavior)	Factor 2 with reverse scoring (Factor 2-R)	Total 29-item score	Total 29-item score with reverse scoring (Total-R)
Coefficient α	0.88	0.33	0.79	0.80	0.86	0.89
Mean (SD)	33.99 (6.40)	26.66 (3.73)	22.39 (4.69)	24.08 (5.91)	79.98 (14.09)	76.63 (15.95)
Factor 1	1.00	–	–	–	–	–
Factor 2	0.67**	1.00	–	–	–	–
Factor 3	0.58**	0.49**	1.00	–	–	–
Factor 2-R	0.64**	0.67**	0.35**	1.00	–	–
Total	0.93**	0.81**	0.80**	0.66**	1.00	–
Total-R	0.92**	0.75**	0.72**	0.83**	0.95**	1.00

**$p<0.01$.

viduals with non-generalized social anxiety disorder and community control participants. As expected, the three groups differed significantly on IPSM total scores [$F(2, 225)=94.65$, $p<0.001$]. Tukey HSD post hoc tests revealed the anticipated pattern of results: the generalized social anxiety disorder group (who fear most social situations) exhibited higher levels of interpersonal rejection sensitivity than the non-generalized social anxiety disorder group ($p<0.001$), and both social anxiety disorder groups scored higher than the normal control group (both ps<0.001).

3.6. Convergent validity of the IPSM

The convergent validity of the IPSM in the social anxiety disorder sample was investigated by examining the relationship between IPSM Total scores and scores on self-report measures of social anxiety and related constructs. Furthermore, the relationship of IPSM Total scores to clinician-administered measures was also evaluated in order to reduce the influence of method variance. Pearson product–moment correlations between the IPSM and scores on these measures are presented in Table 6. For the comparison of the magnitude of correlation coefficients, z-tests of dependent correlation differences were calculated (Meng, Rosenthal, & Rubin, 1992).

First, results demonstrated the expected relationship between the IPSM and the measures of social anxiety. High positive correlations were found between the IPSM and anxiety about social interactions (SIAS) and fears of negative evaluation (B-FNE). The IPSM was also moderately correlated with fears of being observed (SPS) and ratings by independent assessors of the severity of social anxiety.

Second, positive correlations between IPSM scores and both self-reported [r (N=183)=0.43,

Table 6
Zero-order and partial correlations (controlling for BDI scores) between the IPSM 29-item total score with reversed scoring and validational criterion measures within the social anxiety disorder group

	Zero-order correlations	Partial correlations
Brief Fear of Negative Evaluation Scale	0.71**	0.66**
Social Interaction Anxiety Scale	0.70**	0.63**
Social Phobia Scale	0.46**	0.35**
Quality of Life Inventory — Total	−0.46**	−0.31**
Quality of Life Inventory — Love	−0.32**	−0.33**
Quality of Life Inventory — Friends	−0.24**	−0.13
Liebowitz Self-Rated Disability Scale — Current	0.51**	0.31**
Liebowitz Self-Rated Disability Scale — Lifetime	0.52**	0.39**
Clinical Global Impression Scale — Severity of illness	0.46**	0.32**
State-Trait Anger Expression Inventory — Anger-Out	−0.14	−0.13
State-Trait Anger Expression Inventory — Anger-In	0.61**	0.55**
Revised Adult Attachment Scale — Anxiety	0.63**	0.55**
Revised Adult Attachment Scale — Close	−0.54**	−0.47**
Revised Adult Attachment Scale — Depend	−0.45**	−0.37**
Anxiety Sensitivity Index	0.19*	0.06

Note: IPSM=Interpersonal Sensitivity Measure; ns vary between 134 and 189 because of missing data; *$p<0.05$, ** $p<0.01$.

$p<0.01$] and clinician-rated [$r(N=130)=0.26$, $p<0.01$] depressive symptoms were obtained. These correlations were expected given the known association of interpersonal rejection sensitivity and depression. However, they were in the low to moderate range, suggesting that interpersonal rejection sensitivity is not specific to depression (also see Table 6).

Third, the data demonstrated the expected association between interpersonal rejection sensitivity and impairment. IPSM scores were significantly correlated with lower subjective quality of life, lower satisfaction in the specific domains of love and friendships, and higher self-reported functional impairment (both currently and across the person's lifetime).

Fourth, the expected relationship between high sensitivity to interpersonal rejection and attenuated expression of anger was confirmed. The measure of anger suppression, the STAXI Anger-In scale, yielded a high positive correlation with IPSM scores. As expected, this correlation was significantly higher than the correlation with the Anger-Out scale, which measures the tendency to overtly express anger ($z=6.63$, $p<0.001$). The Anger-Out scale was not significantly correlated with the IPSM. The anger expression scale of the STAXI tends to demonstrate a floor effect due to the extreme nature of several items on this subscale (e.g. 'When angry or furious I strike out at whatever infuriates me', or 'When angry or furious I lose my temper'). Thus, the variability of these scores may have been attenuated.

Finally, the IPSM demonstrated a strong positive relationship with the RAAS Anxiety subscale, the measure of the anxious style of adult attachment which is characterized by fears of being unloved.

3.7. Effects of depression levels on group differences and validational analyses

This study also investigated whether the relationships between the IPSM and criterion measures were attributable to depression. If the validity of the IPSM in social anxiety disorder is to be supported, interpersonal rejection sensitivity should be associated with criterion measures over and above the influence of depression. Partial correlation coefficients were calculated controlling for depressive symptoms (BDI scores)(see Table 6). There was a reduction in the magnitude of most correlation coefficients. However, most relationships remained significant, with the exception of the partial correlation with the QOLI Friendship index ($r=-0.13$). Furthermore, z-tests were computed to compare correlations of the IPSM and social anxiety-related measures to correlations between the IPSM and (self-report and clinician-rated) measures of depressive symptoms. These analyses yielded significantly stronger relationships between the IPSM and the B-FNE ($z=4.51$, $p<0.01$) and SIAS ($z=4.20$, $p<0.01$) than between the IPSM and the BDI, and significantly greater correlations between the IPSM and the B-FNE ($z=4.83$, $p<0.01$) and SIAS ($z=4.64$, $p<0.01$) than between the IPSM and the HRSD.

Finally, an analysis of covariance (ANCOVA) examined the effects of depressive symptomatology on the differences in IPSM scores of patients with generalized social anxiety disorder, patients with non-generalized social anxiety disorder and community controls. The ANCOVA (with BDI scores as the covariate) demonstrated the same group differences in IPSM scores reported earlier ($F(2, 209)=43.82$, $p<0.01$).

3.8. Divergent validity of the IPSM

Divergent validity analyses examined the association between the IPSM and theoretically less related constructs. First, interpersonal rejection sensitivity was expected to be relatively independent of negative beliefs about the dangerousness of anxiety symptoms. A weak correlation with the ASI was found (r=0.19, $p<0.05$). This correlation was no longer significant after BDI scores were controlled (r=0.06, ns). Secondly, the IPSM demonstrated a higher correlation (z=4.36, $p<0.001$) with interaction anxiety (SIAS) than with anxiety about being observed (SPS). Thirdly, the correlations between the IPSM and the Close and Depend attachment subscales were lower than its correlation with the Anxiety subscale (z=10.55, $p<0.001$, and z=9.20, $p<0.001$, respectively).

3.9. IPSM scores and treatment change

The sensitivity of IPSM scores to change was evaluated by comparing the pre- and post-treatment IPSM scores for the group of 32 participants who received CBGT. A dependent samples t-test indicated that post-treatment IPSM scores (Mean IPSM score=77.13, SD=11.57) were significantly lower than pre-treatment (Mean score=84.34, SD=9.80) IPSM scores ($t(31)$=4.20, $p<0.01$, ES=0.67).

4. Discussion

Although the IPSM was originally developed as a measure of a trait of depression-prone personality (Boyce & Parker, 1989), interpersonal rejection sensitivity appears to be a relevant construct in the assessment of social anxiety. The results of this study provide initial evidence for the validity and internal consistency of the IPSM in a population of treatment-seeking individuals with social anxiety disorder.

Evidence for the convergent validity of the IPSM was obtained from significant correlations with self-report measures and clinician-administered scales of constructs related to interpersonal rejection sensitivity. Greater anxiety about social interactions, greater depressive symptomatology, inhibited expression of anger, anxious attachment, and lower subjective quality of life were strongly related to hypersensitivity to interpersonal rejection. Further, IPSM scores distinguished between normal control participants, individuals with non-generalized social anxiety disorder and individuals with generalized social anxiety disorder, and the IPSM exhibited sensitivity to treatment change (after 12 weeks of cognitive-behavioral group therapy for social anxiety disorder). With regard to the divergent validity, the IPSM was only weakly related to negative beliefs about the dangerousness of anxiety symptoms. The IPSM was also more related to interpersonal aspects of social anxiety than to the fear of being observed, and it was more strongly related to anxious adult attachment than to other insecure attachment styles.

Depression is a common comorbid problem in social anxiety. Thus, it could be argued that the relationship between IPSM scores and social anxiety measures was an artifact of the common influence of depressive symptoms. However, IPSM scores remained significantly related to most indicators after self-reported depression was controlled. Thus, interpersonal rejection sensitivity

appears to be related to social anxiety, above and beyond depression. Furthermore, rejection sensitivity was significantly more closely related to measures of social anxiety symptomatology than to either self-reported or clinician-rated depressive symptoms. These findings suggest a strong relationship between hypersensitivity to interpersonal rejection and social anxiety, allowing for speculation that rejection sensitivity may be related to depression in this sample (especially atypical depression) because of its relationship to social anxiety. However, the nature of the relationships among depression, social anxiety and interpersonal rejection sensitivity may be different among individuals with depression or atypical depression.

This psychometric investigation also yielded estimates of the internal consistency of the IPSM in this socially anxious population. The total IPSM score and four of its original subscale scores (Interpersonal Awareness, Separation Anxiety, Timidity and Fragile Inner Self) demonstrated good internal consistency (ranging from 0.78 to 0.90). It has been suggested that alpha coefficients of approximately 0.80 are sufficiently reliable for clinical use (Rosenthal & Rosnow, 1991). As in previous psychometric investigations of the IPSM (Boyce & Parker, 1989; McCabe et al., 1999), the Need for Approval subscale fell short of this threshold (α=0.40). Further, the item-total correlations for this subscale were uniformly low (ranging from 0.11 to 0.29), suggesting that the poor internal consistency estimate was not produced by one or two weak items. The questionable utility of this IPSM subscale (and the overall subscale structure) was further examined via factor analytic methods.

A CFA was conducted to test the replicability of the previously reported factor structure of the IPSM. The results of the CFA did not support the application of the existing factor structure in this sample of socially anxious individuals. Consequently, an exploratory factor analysis with varimax rotation was conducted, and three factors emerged. The results of this analysis suggest that interpersonal rejection sensitivity in socially anxious individuals consists of three relatively independent factors: Interpersonal Worry and Dependency, Low Self-Esteem, and Unassertive Interpersonal Behavior. Thus, for adults with social anxiety, this measure assesses the nature of interpersonal rejection sensitivity with regard to pre-occupation with interpersonal situations, as well as negative assessments of oneself (i.e. a sense of inferiority) and submissive/unassertive overt behavior in interpersonal situations. Utilization of these new subscales may allow for a more detailed assessment of interpersonal rejection sensitivity and changes in the nature of rejection sensitivity as a result of treatment.

Five items of the original IPSM loaded on more than one factor (e.g. ‘I can never be really sure if someone is pleased with me’), and two others yielded uniformly low factor loadings (e.g. ‘I fear that my feelings will overwhelm people’). These items were dropped, resulting in a 29-item measure. Further, four items demonstrated high *negative* factor loadings on Factor 2 (Low Self-Esteem): ‘I feel that people generally like me’, ‘I can make other people feel happy’, ‘I feel happy when someone compliments me’ and ‘I feel secure when I am in a close relationship’. The negative loadings suggest that these items were endorsed by participants with relatively higher self-esteem. Empirically as well as clinically, it may be useful to reverse the scoring of these negatively-loading items. Interestingly, these four items were originally part of the Need for Approval subscale but were not reverse-scored in the original scale (suggesting that they were endorsed by persons with relatively higher need for approval in the original sample), which may have contributed to the poor performance of the Need for Approval scale in the current study and in previous psychometric analyses. Reverse scoring of these items dramatically improved the internal consistency of the Low Self-Esteem subscale for socially anxious individuals.

Several limitations of this psychometric investigation should be noted. First, the validational analyses would have benefited from the inclusion of more measures addressing the influence of method variance. The majority of measures included in this study were self-report instruments. Thus, correlations may be inflated by common method variance. Second, evidence for the validity of the IPSM in this population could be strengthened by the examination of a more diverse set of validational measures. The addition of measures addressing the ability of the IPSM to assess only aspects of interpersonal rejection sensitivity and not other anxiety-related constructs would help to delineate the boundaries of the construct measured by the IPSM. Third, a larger sample size would have increased the power of the factor-analytic investigation. The participants-to-variables ratio in the current investigation was 5.6:1, in accordance with the common guideline for factor analyses of 5–10 participants per variable (Floyd & Widaman, 1995), but a higher ratio would have further increased power. Fourth, the relationship of interpersonal rejection sensitivity to other constructs and the factor structure reported here may be limited to individuals with social anxiety disorder, and results may differ for depressed patients and other clinical samples.

Future studies of interpersonal rejection sensitivity in social anxiety disorder should aim at replicating and extending these promising psychometric data. An examination of the differences between IPSM scores in (atypically) depressed and socially anxious patients would further elucidate the relationship between these disorders and interpersonal rejection sensitivity. Further, future investigations should replicate these data for the revised Total IPSM score and should examine the validity and reliability of the three subscales derived from the current analyses. These subscales, once validated, represent a useful tool for the investigation of interpersonal rejection sensitivity in social anxiety disorder. In addition, although evidence for reversing the scoring of four items was provided, further empirical investigations should address the utility of this new approach to scoring.

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