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The Social Interaction Anxiety Scale (SIAS) and the Social Phobia Scale (SPS):  
A Comparison of Two Short-Form Versions

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### **Abstract**

The widespread use of Mattick and Clarke's (1998) Social Interaction Anxiety Scale (SIAS) and Social Phobia Scale (SPS) led two independent groups of researchers to develop short-forms of these measures (Fergus, Valentiner, McGrath, Gier-Lonsway, & Kim, 2012; Peters, Sunderland, Andrews, Rapee, & Mattick, 2012). This three-part study examined the psychometric properties of Fergus et al.'s and Peters et al.'s short-forms of the SIAS and SPS using an American nonclinical adolescent sample in Study 1 ( $N = 98$ ), American anxiety disorder patient sample in Study 2 ( $N = 117$ ), and both a South Korean college student sample ( $N = 341$ ) and an American college student sample ( $N = 550$ ) in Study 3. Scores on both sets of short-forms evidenced adequate internal consistency, inter-item correlations, and measurement invariance. Scores on Fergus et al.'s short-forms, particularly their SIAS short-form, tended to capture more unique variance in scores of criterion measures than did scores on Peters et al.'s short-forms. Implications for the use of these two sets of short-forms are discussed.

*Keywords:* psychometric properties; short-form; social anxiety; Social Interaction Anxiety Scale (SIAS); social phobia; Social Phobia Scale (SPS)

**The Social Interaction Anxiety Scale (SIAS) and the Social Phobia Scale (SPS):  
A Comparison of Two Short-Form Versions**

Researchers and clinicians commonly use Mattick and Clarke's (1998) Social Interaction Anxiety Scale (SIAS) and Social Phobia Scale (SPS) to assess two dimensions believed to characterize social anxiety. The SIAS and SPS are 20-item one-factor measures that assess *generalized social interaction anxieties* and *specific fears of scrutiny* associated with social anxiety, respectively (Mattick & Clarke, 1998). Scores on the SIAS and SPS have evidenced good (a) internal consistency (e.g., Cronbach's  $\alpha$ s ranging from .88-.94; Mattick & Clarke, 1998), (b) three-month test-retest reliability ( $r$ s of .92 and .93; Mattick & Clarke, 1998), (c) convergent validity via moderate to strong correlations with scores on other indices of social anxiety (e.g.,  $r$ s ranging from .53-.77; Hughes et al., 2006; Mattick & Clarke, 1998), and (d) discriminative validity via individuals diagnosed with social anxiety scoring significantly higher on these two measures relatively to individuals diagnosed with other anxiety disorders and nonclinical controls (Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992; Peters, 2000).

Given their widespread use, two independent groups of researchers have sought to improve the practical use of the SIAS and SPS by developing short-forms. Fergus, Valentiner, McGrath, Gier-Lonsway, and Kim (2012) and Peters, Sunderland, Andrews, Rapee, and Mattick (2012) both developed six-item short-forms of the SIAS and SPS. Fergus et al.'s and Peters et al.'s short-forms are largely distinct, as there are only two overlapping items among their short-forms of the SIAS (i.e., *I tense up if I meet an acquaintance on the street; I feel tense if I am alone with just one person*) and only two overlapping items among their short-forms of the SPS (i.e., *I get nervous that people are staring at me as I walk down the street; I would get tense if I had to sit facing other people on a bus or train*). The largely distinct item content of their short-

forms is not entirely surprising given that Fergus et al. and Peter et al. used divergent approaches when determining which SIAS and SPS items to retain for their respective short-forms.

McHugh and Behar (2009) reviewed the readability of existing self-report measures of anxiety constructs and found that few of the targeted measures, including the SIAS and SPS, approached the recommended fifth- or sixth-grade reading level for patient health materials. McHugh and Behar suggested that existing measures of anxiety constructs might be adapted to improve their readability. Following McHugh and Behar's suggestion, Fergus et al. (2012) identified six items of the SIAS and six items of the SPS that had the most favorable readability characteristics. Targeted readability characteristics included the percentage of monosyllabic words, the percentage of polysyllabic words, the ratio of syllables to words for each item, and the percentage of difficult words. Fergus et al. selected those items that, on average, had the most favorable characteristics across the targeted readability criteria to include in their short-forms of the measures. Fergus et al. then submitted the selected items to a confirmatory factor analysis (CFA) and found that a model in which their short-form SIAS items loaded on one factor and their short-form SPS items loaded on a second, correlated factor provided an adequate fit to the their data. Fergus et al. further found that this correlated two-factor model provided a significantly better fit to the data than a one-factor model in which their short-form items from the SIAS and SPS loaded on a single factor.

Peters et al. (2012) aimed to develop short-forms of the SIAS and SPS that did not substantially reduce the validity of the full-length measures. To accomplish this aim, Peters et al. used item response theory (IRT) to identify the SIAS and SPS items that best discriminated along the continuum of the latent trait of social anxiety and selected those items to include in their short-forms of the measures. Using item characteristic curves (ICCs), Peters et al. removed

full-length SIAS and SPS items from analysis that demonstrated poor discriminating properties across the latent trait of social anxiety. Peters et al. then resubmitted the remaining items for further analysis and this iterative process continued until all remaining items demonstrated favorable discriminating properties. These remaining items were selected for inclusion in their short-forms.

Both Fergus et al. (2012) and Peters et al. (2012) provided an initial psychometric evaluation of scores on their respective short-forms of the SIAS and SPS. These researchers found that scores on their respective SIAS and SPS short-forms evidenced adequate psychometric properties, including good internal consistency given the brevity of the measures ( $\alpha$ s ranging from .77-.88) and strong correlations with scores on the corresponding full-length SIAS or SPS ( $r$ s ranging from .88-.94). These researchers further found that their short-forms tended to evidence correlations that were statistically equivalent in magnitude with criterion measures relative to the corresponding full-length SIAS or SPS. Results from a recent psychometric evaluation of the two sets of short-forms by an independent group of researchers largely converged with findings from Fergus et al.'s and Peters et al.'s studies (Le Blanc et al., in press). More precisely, Le Blanc et al. found that scores on both sets of short-forms tended to evidence comparable internal consistency, discriminant and convergent validity, diagnostic sensitivity, and treatment sensitivity among patients with social anxiety disorder. Overall, Fergus et al.'s and Peters et al.'s short-forms appear to be viable alternatives to the full-length SIAS and SPS.

Fergus et al. (2012) and Peters et al. (2012) outlined similar benefits to using their respective short-forms of the SIAS and SPS. For example, both sets of researchers noted that their SIAS and SPS short-forms would provide researchers and clinicians with the opportunity to

complete a more economical assessment of social anxiety relative to using the full-length versions of the measures. Despite such benefits, researchers and clinicians are left with two short-forms of the SIAS and SPS to choose from when they desire to complete an economical assessment of social anxiety. Fergus et al.'s focus on selecting items based on readability suggests that their short-forms would be preferred when assessing social anxiety in lower literacy populations (e.g., adolescents). The potential use of Fergus et al.'s SIAS and SPS short-forms among lower literacy populations is important, as adult measures of social anxiety are often used in studies examining social anxiety among adolescents (Kashdan & Herbert, 2001). Peters et al.'s focus on selecting items that maximally discriminated along the full continuum of social anxiety might suggest that their SIAS and SPS short-forms consist of items that more fully tap the domain of social anxiety and are thus useful in assessing social anxiety in a broader array of contexts than are Fergus et al.'s short-forms.

To date, only one known published study has compared Fergus et al.'s (2012) and Peters et al.'s (2012) short-forms of the SIAS and SPS. In that study, Le Blanc et al.'s (in press) results supported the use of either set of short-forms. The purpose of the present study was to extend our knowledge as to under what conditions one set of short-forms of the SIAS and SPS might be preferred over the other set of short-forms. In addition to comparing the psychometric properties of scores on both sets of short-forms that were examined by Le Blanc et al. (internal consistency, inter-item correlations, and convergence with scores of the other short-form), we provided the first known comparison of the measurement invariance and incremental validity of both sets of short-forms. We used Haynes and Lench's (2003) definition of incremental validity as representing "the degree to which a measure explains or predicts some phenomena of interest, relative to other measures" (p. 457). Tests of incremental validity are particularly useful when

seeking to compare competing self-report measures, as this type of validity can address the performance of scores on one self-report measure in relation to scores on another self-report measure. For example, as described by Haynes and Lench, tests of incremental validity can explicate the relative proportion of variance in a criterion variable associated with variance in a self-report measure above and beyond that associated with a comparison self-report measure. The degree to which one self-report measure predicts unique criterion variance, but a comparison measure does not, its utility over the comparison measure can be highlighted. Because incremental validity findings can vary across different populations and samples (Haynes & Lench, 2003), it is important to replicate these findings. As such, we examined the incremental validity of scores on the targeted short-forms using a nonclinical American adolescent sample in Study 1, a clinical sample of American anxiety disorder patients in Study 2, and a sample of South Korean college students in Study 3. The present research represents the first known examination of the SIAS and SPS short-forms among adolescent respondents and respondents from countries other than the United States.

Based on the emphasis of readability when developing their short-forms of the SIAS and SPS, we predicted that Fergus et al.'s (2012) short-forms would concurrently predict a larger amount of unique variance in scores of criterion measures in the adolescent sample in Study 1 than would Peters et al.'s (2012) short-forms. This prediction was based on our expectation that Fergus et al.'s short-forms might be particularly useful when assessing social anxiety among lower literacy populations. Based on the notion that Peters et al. selected SIAS and SPS items that were likely more representative of the social anxiety construct than did Fergus et al., we further predicted that Peters et al.'s short-forms would concurrently predict a large amount of unique variance in scores of criterion measures among the clinical sample in Study 2 and the



college student sample in Study 3. Results consistent with these predicted findings would help explicate under what conditions researchers and clinicians might consider using Fergus et al.'s versus Peters et al.'s short-forms of the SIAS and SPS.

## **STUDY 1**

As noted, we examined the psychometric properties, with a particular focus on the incremental validity, of scores on Fergus et al.'s (2012) and Peters et al.'s (2012) short-forms of the SIAS and SPS among American adolescents in Study 1. The criterion variables of interest in this study were depression and self-worth. These two criterion variables were chosen because social anxiety is an important predictor of depression among adolescents (Stein et al., 2001) and because self-worth is an important variable for understanding when and why adolescents experience anxiety in response to social situations (Grills & Ollendick, 2002). Following the recommendations of Haynes and Lench (2003), the incremental validity of scores on the short-forms was examined using hierarchical linear regressions. In these regression analyses, one version of the SIAS short-form was entered into Step 1 of the model and the competing SIAS short-form version was entered into Step 2 of the model. The regression analyses were then re-run while switching the order of entry. An identical data analytic approach was used to compare the incremental validity of scores on the two competing SPS short-forms. This data analytic approach allowed us to examine the amount of unique variance that each short-form accounted for in the scores on the criterion measures above and beyond the variance accounted for by the corresponding alternative short-form (i.e.,  $\Delta R^2$ ).

## **Method**

### **Participants**

The sample consisted of 98 adolescents who were recruited during check-in for week-long summer camps at a large Midwestern university. The sample had an average age of 15.4 (range 11-18;  $SD = 1.80$ ) years and an average grade level of 10.0 ( $SD = 1.79$ ). The sample was 51.0% male, 80.6% White, and 19.2% Hispanic or Latino. Along with completing Fergus et al.'s (2012) and Peters et al.'s (2012) short-forms of the SIAS and SPS independent of the full-length versions of these measures, participants completed self-report measures assessing the criterion variables of depression symptoms and self-worth.

### Measures

**Depression.** The Children's Depression Inventory-2 (Kovac, 2010) is a 28-item self-report measure that assesses the severity of depression symptoms in the form of emotional problems and functional problems. Kovac found that scores on the Children's Depression Inventory-2 evidenced good internal consistency ( $\alpha = .91$ ) and moderate correlations with scores on other depression measures ( $r$ s of .37 and .58). For practical reasons, we used Kovac's 12-item short-form self-report version of the Children's Depression Inventory-2 to assess adolescent depression symptoms. Kovac found that scores on the short-form evidenced adequate internal consistency ( $\alpha = .82$ ) and a strong correlation with scores on the full-length version of the Children's Depression Inventory-2 ( $r = .95$ ). A total scale score was calculated and larger scores indicate a greater severity of depression symptoms. Scores on the short-form of the Children's Depression Inventory-2 evidenced adequate internal consistency in this study ( $\alpha = .83$ ; average inter-item correlation (AIC) = .32).

**Self-worth.** Following Grills and Ollendick (2002), we assessed self-worth using the 5-item global self-worth component scale of the Harter's (1988) Self-Perception Profile for Adolescents. When completing this component scale, respondents are presented with two

sentences (e.g., “Some teenagers like the kind of person they are” and “Other teenagers often wish they were someone else”). They are asked to indicate which statement better describes them and to what degree. Larger scores suggest greater levels of self-worth. Scores on the global self-worth scale have evidenced adequate internal consistency ( $\alpha = .77$ ) and moderate correlations with scores on criterion measures (e.g., loneliness:  $r = -.39$ ; quality of life:  $r = .46$ ) in prior studies (Wichstrøm, 1995). Moreover, Grills and Ollendick found that the global self-worth scale shared small to moderate relations ( $r$ s of  $-.17$  and  $-.29$ ) with anxiety symptom measures among adolescents. Scores on the global self-worth scale evidenced good internal consistency in this study ( $\alpha = .87$ ; AIC =  $.57$ ).

### **Procedure**

Consent for campers’ participation was obtained from parents during check-in procedures for the camp session. On the final day of each camp session, participants met as a group with study staff, while the purpose and procedures of the study were explained. Participants were provided with assent forms in order to indicate their agreement to participate in the study. Upon completion of the questionnaires, participants were provided with a debriefing statement that provided them with more information about the study and contact information of the researchers.

## **Results**

### **Descriptive Statistics and Zero-Order Correlations**

Descriptive statistics and zero-order correlations among the study variables are presented in Table 1. Scores on Fergus et al.’s (2012) SIAS short-form ( $\alpha = .74$ ) and Peters et al.’s (2012) SPS short-form ( $\alpha = .79$ ) evidenced adequate internal consistency given the brevity of the scales. Scores on Fergus et al.’s SPS short-form ( $\alpha = .64$ ) and Peters et al.’s SIAS short-form ( $\alpha = .68$ ) evidenced internal consistency estimates below conventional guidelines. However, the average

inter-item correlation among scores on the short-form scales (AIC ranged from .23-.39) all fell within Clark and Watson's (1995) recommended range (i.e., .15-.50). As shown in Table 1, Fergus et al.'s and Peters et al.'s SIAS short-forms shared a significant ( $p < .01$ ) strong ( $r = .68$ ) correlation, as did Fergus et al.'s and Peters et al.'s SPS short-forms ( $r = .78$ ). As expected, both sets of short-forms also shared significant moderate correlations with the criterion measures.<sup>1</sup> Tests of dependent correlations (Meng, Rosenthal, & Rubin, 1992) revealed that Fergus et al.'s SIAS short-form correlated significantly more strongly with depression symptoms ( $z$ -statistic = 3.80,  $p < .01$ , 95% CI ( $z_{r1} - z_{r2}$ ) = .17-.52) and self-worth ( $z$ -statistic = 2.27,  $p < .05$ , 95% CI ( $z_{r1} - z_{r2}$ ) = .02-.37) relative to Peters et al.'s SIAS short-form. Tests of dependent correlations further revealed that Fergus et al.'s SPS short-form and Peters et al.'s SPS short-form shared statistically equivalent correlations with depression symptoms ( $z$ -statistic = 1.41,  $ns$ , 95% CI ( $z_{r1} - z_{r2}$ ) = -.03-.24) and self-worth ( $z$ -statistic = 0.80,  $ns$ , 95% CI ( $z_{r1} - z_{r2}$ ) = -.08-.20).

### **Incremental Validity**

Partial correlations from the hierarchical regression analyses examining the incremental validity of scores on each short-form predicting scores on the criterion measures, while controlling for scores on the corresponding alternative short-form, are also presented in Table 1. In the regression analyses examining the SIAS short-forms, scores on Fergus et al.'s (2012) SIAS short-form evidenced incremental validity in the concurrent prediction of depression symptoms ( $\Delta R^2 = .26$ , partial  $r = .53$ ,  $p < .01$ ) and self-worth ( $\Delta R^2 = .13$ , partial  $r = -.38$ ,  $p < .01$ ) above and beyond scores on Peters et al.'s (2012) SIAS short-form. However, scores on Peters et al.'s SIAS short-form did not evidence incremental validity in the concurrent prediction of depression symptoms ( $\Delta R^2 = .01$ , partial  $r = -.13$ ,  $ns$ ) or self-worth ( $\Delta R^2 = .00$ , partial  $r = .04$ ,  $ns$ ) above and beyond scores on Fergus et al.'s SIAS short-form.

In the regression analyses examining the SPS short-forms, scores on Fergus et al.'s (2012) SPS short-form evidenced incremental validity in the concurrent prediction of depression symptoms ( $\Delta R^2 = .06$ , partial  $r = .26$ ,  $p < .05$ ) and self-worth ( $\Delta R^2 = .04$ , partial  $r = -.21$ ,  $p < .05$ ) above and beyond scores on Peters et al.'s (2012) SPS short-form. However, scores on Peters et al.'s SPS short-form did not evidence incremental validity in the concurrent prediction of depression symptoms ( $\Delta R^2 = .00$ , partial  $r = -.01$ , *ns*) or self-worth ( $\Delta R^2 = .00$ , partial  $r = -.07$ , *ns*) above and beyond scores Fergus et al.'s SPS short-form.

### Study 1 Summary

Study 1 results supported the use of Fergus et al.'s (2012) and Peters et al.'s (2012) SIAS and SPS short-forms in adolescent samples. Of note, the observed magnitude of correlations among Fergus et al.'s and Peters et al.'s short-forms does not suggest redundancy among the two sets of short-forms. Moreover, Fergus et al.'s SIAS short-form shared significantly stronger correlations with the criterion measures than did Peters et al.'s SIAS short-form. There was no significant difference in the strength of correlations between Fergus et al.'s and Peters et al.'s SPS short-forms and the criterion measures. In addition, Fergus et al.'s SIAS and SPS short-form both accounted for unique variance in scores of criterion measures above and beyond the variance accounted for by Peters et al.'s corresponding short-form. However, scores on Peters et al.'s SIAS and SPS short-form both failed to evidence incremental validity above and beyond scores on Fergus et al.'s corresponding short-form. This pattern of findings is consistent with our expectations that Fergus et al.'s short-forms might be particularly useful when assessing social anxiety among lower literacy populations. Although the use of an adolescent sample was one of the strengths of Study 1, respondents generally did not endorse high levels of symptomatology. As such, it is possible that a differential pattern of results would emerge when

examining Fergus et al.'s and Peters et al.'s short-forms in a sample of respondents who consistently endorse high scores on the measures.

## STUDY 2

We completed Study 2 to address this Study 1 limitation by comparing Fergus et al.'s (2012) and Peters et al.'s (2012) SIAS and SPS short-forms in a clinical sample of anxiety disorder patients. For the tests of incremental validity in Study 2, the criterion variables of interest were beliefs putatively important to the phenomenology of social anxiety. Specifically, the criterion measures in Study 2 assessed beliefs about social comparison, social ineptness, and social concerns of experiencing anxiety symptoms (i.e., social component of anxiety sensitivity). Individuals diagnosed with social anxiety endorse holding these targeted beliefs at especially high levels relative to individuals diagnosed with other anxiety disorders (Taylor et al., 2007; Turner, Johnson, Beidel, Heiser, & Lydiard, 2003). As with Study 1, we were particularly interested in the amount of unique variance that each short-form accounted for in the scores on the criterion measures above and beyond the variance accounted for by the corresponding alternative short-form.

## Method

### Participants

The sample consisted of 117 patients in an intensive outpatient anxiety disorder treatment program. The mean age was 28.6 (range 16-72;  $SD = 12.4$ ) years. The sample was 57.3% female, 96.5% Caucasian, and 6.5% Hispanic or Latino. The most primary anxiety disorder diagnoses were obsessive-compulsive disorder ( $n = 50$ ), generalized anxiety disorder ( $n = 22$ ), panic disorder ( $n = 21$ ), social anxiety disorder ( $n = 12$ ), anxiety disorder not otherwise specified ( $n = 8$ ), posttraumatic stress disorder ( $n = 2$ ), and specific phobia ( $n = 2$ ). The majority of

participants ( $n = 94$ ; 80.3%) were diagnosed with multiple disorders. The most common additional diagnoses were major depressive disorder ( $n = 48$ ), generalized anxiety disorder ( $n = 16$ ), and social anxiety disorder ( $n = 7$ ). Although only a modest number of participants received a primary or secondary diagnosis of social anxiety disorder, 52 participants (44.4% of the sample) had a full-length SIAS score highly indicative of social anxiety disorder (see below). Along with completing the full-length SIAS and SPS (Mattick & Clarke, 1998), participants completed criterion self-report measures assessing beliefs important to social anxiety.

### Measures

**Social comparison and social ineptness.** We used Turner et al.'s (2003) 21-item Social Thoughts and Beliefs Scale to assess beliefs about social comparison and social ineptness. Social comparison refers to beliefs that others are more socially competent and capable, whereas social ineptness refers to beliefs that one will act awkwardly in social situations or appear anxious in front of others (Turner et al., 2003). Higher scores on this measure are indicative of more strongly held beliefs. Scores on the social comparison ( $\alpha = .94$ ) and social ineptness ( $\alpha = .94$ ) scales of the Social Thoughts and Beliefs Scale have evidenced good internal consistency, as well as strong correlations with scores on other measures assessing beliefs relevant to social anxiety ( $r$ s of .63 and .69) and with scores on a social anxiety symptom measure ( $r$ s of .80 and .66) in prior studies (Fergus, Valentiner, Kim, & Stephenson, 2009). Scores on the social comparison ( $\alpha = .94$ ; AIC = .58) and social ineptness ( $\alpha = .92$ ; AIC = .52) scale of the Social Thoughts and Beliefs Scale showed good internal consistency in this study.

**Social concerns of anxiety symptoms.** We used the six-item social concerns scale of Taylor et al.'s (2007) Anxiety Sensitivity Index-3 to assess beliefs that publicly observable anxiety symptoms will engender social rejection and/or ridicule (Taylor et al., 2007). Higher

scores on the social concerns scale are indicative of more strongly held beliefs. Scores on the social concerns scale have evidenced adequate internal consistency ( $\alpha = .80$ ) and a moderate correlation ( $r = .50$ ) with scores on a social anxiety symptom measure in prior studies (Wheaton, Deacon, McGrath, Berman & Abramowitz, 2012). Scores on the social concerns scale showed good internal consistency in this study ( $\alpha = .87$ ; AIC = .54).

### **Procedure**

Participants were recruited from an intensive outpatient treatment program that took place five days per week, for at least three-and-a-half hours each day. Participants completed self-report measures at the time of their initial assessments, during which eligibility for treatment was determined. Diagnoses were based upon the Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998). The MINI was administered by master and doctoral level clinicians who had prior experience in conducting the interview. If the patient received more than one diagnosis, primary diagnoses were determined via collaboration between the clinician and the patient in discerning which disorder led to the greatest level of distress and impairment in the patient's life.

## **Results**

### **Descriptive Statistics and Zero-Order Correlations**

Descriptive statistics and zero-order correlations among the study variables are presented in Table 2. Scores on the short-forms were derived from the full-length SIAS and SPS in Study 2. Scores on Fergus et al.'s (2012) SIAS ( $\alpha = .88$ ) and SPS ( $\alpha = .87$ ) short-form evidenced good internal consistency, as did scores on Peters et al.'s (2012) SIAS ( $\alpha = .87$ ) and SPS ( $\alpha = .93$ ) short-form. The average inter-item correlation among scores on the short-form scales (AIC ranged from .53-.68) all fell above Clark and Watson's (1995) recommended range (i.e., .15-



.50). As shown in Table 2, Fergus et al.'s and Peters et al.'s SIAS short-forms shared a significant ( $p < .01$ ) strong ( $r = .90$ ) correlation, as did Fergus et al.'s and Peters et al.'s SPS short-forms ( $r = .94$ ). Both sets of short-forms shared significant strong correlations with the criterion measures. Tests of dependent correlations (Meng et al., 1992) revealed that Fergus et al.'s SIAS short-form shared significantly stronger correlations with beliefs about social comparison ( $z$ -statistic = 2.20,  $p < .05$ , 95% CI ( $z_{r1} - z_{r2}$ ) = .01-.25) and social concerns of anxiety symptoms ( $z$ -statistic = 2.74,  $p < .01$ , 95% CI ( $z_{r1} - z_{r2}$ ) = .04-.24), but not beliefs about social ineptness ( $z$ -statistic = 0.76,  $ns$ , 95% CI ( $z_{r1} - z_{r2}$ ) = -.07-.17), relative to Peters et al.'s SIAS short-form. Tests of dependent correlations (Meng et al., 1992) further revealed that Fergus et al.'s SPS short-form shared a significantly stronger correlation with beliefs about social comparison relative to Peters et al.'s SPS short-form ( $z$ -statistic = 2.38,  $p < .05$ , 95% CI ( $z_{r1} - z_{r2}$ ) = .02-.18); however, the two SPS short-forms shared statistically equivalent correlations with beliefs about social ineptness ( $z$ -statistic = 0.45,  $ns$ , 95% CI ( $z_{r1} - z_{r2}$ ) = -.07-.11) and social concerns of anxiety symptoms ( $z$ -statistic = 1.87,  $ns$ , 95% CI ( $z_{r1} - z_{r2}$ ) = -.01-.18).

### **Incremental Validity**

Partial correlations from the hierarchical regression analyses examining the incremental validity of scores on each short-form predicting scores on the criterion measures, while controlling for scores on the corresponding alternative short-form, are also presented in Table 2. In the regression analyses examining the SIAS short-forms, scores on Fergus et al.'s (2012) SIAS short-form evidenced incremental validity in the concurrent prediction of beliefs about social comparison ( $\Delta R^2 = .09$ , partial  $r = .43$ ,  $p < .01$ ), social ineptness ( $\Delta R^2 = .04$ , partial  $r = .32$ ,  $p < .01$ ), and social concerns of anxiety symptoms ( $\Delta R^2 = .11$ , partial  $r = .41$ ,  $p < .01$ ) above and beyond scores on Peters et al.'s (2012) SIAS short-form. Scores on Peters et al.'s SIAS

short-form did not evidence incremental validity in the concurrent prediction of beliefs about social comparison ( $\Delta R^2 = .00$ , partial  $r = .05$ , *ns*) or social concerns of anxiety symptoms ( $\Delta R^2 = .00$ , partial  $r = -.08$ , *ns*) above and beyond scores on Fergus et al.'s SIAS short-form, but did evidence incremental validity in the concurrent prediction of beliefs about social ineptness ( $\Delta R^2 = .02$ , partial  $r = .21$ ,  $p < .05$ ) above and beyond scores on Fergus et al.'s SIAS short-form.

In the regression analyses examining the SPS short-forms, scores on Fergus et al.'s (2012) SPS short-form evidenced incremental validity in the concurrent prediction of beliefs about social comparison ( $\Delta R^2 = .08$ , partial  $r = .35$ ,  $p < .01$ ) and beliefs about social ineptness ( $\Delta R^2 = .02$ , partial  $r = .20$ ,  $p < .05$ ), but did not in the concurrent prediction of beliefs about social concerns of anxiety symptoms ( $\Delta R^2 = .00$ , partial  $r = .03$ , *ns*), above and beyond scores on Peters et al.'s (2012) SPS short-form. Moreover, scores on Peters et al.'s SPS short-form did not evidence incremental validity in the concurrent prediction of beliefs about social comparison ( $\Delta R^2 = .00$ , partial  $r = -.08$ , *ns*) or beliefs about social ineptness ( $\Delta R^2 = .01$ , partial  $r = .16$ , *ns*), but did evidence incremental validity in the concurrent prediction or beliefs about social concerns of anxiety symptoms ( $\Delta R^2 = .06$ , partial  $r = .36$ ,  $p < .01$ ), above and beyond scores on Fergus et al.'s SPS short-form.

### Study 2 Summary

Study 2 results provided additional support for the use of Fergus et al.'s (2012) and Peters et al.'s (2012) SIAS and SPS short-forms. Of note, the average inter-item correlation among the short-forms items derived from the full-length SIAS and SPS was much higher in Study 2 than the average inter-item correlation found in Study 1. Further, Fergus et al.'s and Peters et al.'s short-forms shared correlations with the corresponding short-form developed by the other set of researchers that were much stronger in magnitude in Study 2 than what was observed in Study 1.

Based on these correlations, one possibility is that the construct assessed by the items of both sets of short-forms are narrower and cluster more strongly with the construct assessed by the items of the corresponding short-form scale among clinical respondents. However, another tenable possibility is that deriving the short-form scales from the full-length scales in Study 2 led to a higher intercorrelation between the corresponding short-form scales than what was observed when the short-forms were independently administered in Study 1.

Given the large intercorrelation between the corresponding short-forms in Study 2, a distinct pattern of correlations between the short-forms and criterion measures might be unexpected. However, and consistent with Study 1 findings, we found that Fergus et al.'s (2012) short-forms, particularly their SIAS short-form, tended to correlate significantly more strongly with the criterion measures than did Peters et al.'s short-forms. Moreover, Fergus et al.'s short-forms tended to account for unique variance in scores of the criterion measures above and beyond the variance accounted for by Peters et al.'s short-forms. Peters et al.'s short-forms evidenced incremental validity above and beyond scores on Fergus et al.'s short-forms on only one-of-the-three criterion measures.

Across the first two studies, Fergus et al.'s (2012) and Peters et al.'s (2012) short-forms generally functioned quite similarly, except in regards to incremental validity. The incremental validity results across Study 1 and Study 2 suggest that scores on Fergus et al.'s short-forms, particularly their SIAS short-form, capture a greater amount of unique variance in scores of criterion measures than do scores on Peters et al.'s short-forms. One potential limitation of the first two studies was that they were completed using American respondents. This composition of our sample is a potential limitation because Peters et al.'s developed their short-forms using Australian respondents. It should be noted, though, that Heimberg, Makris, Juster, Ost, and

Rapee (1997) found that American and Australian respondents scored similarly on the full-length SIAS and SPS. Heimberg et al.'s findings might suggest that Study 1 and Study 2 findings are unlikely due to the cultural composition of our samples. Nonetheless, more than a decade ago, Sue (1999) argued that our discipline has "not followed good scientific principles in assuming that findings from research on one population can be generalized to other populations" (p. 1073). Following Sue, it is important to examine the cross-cultural applicability of both Fergus et al.'s and Peters et al.'s short-forms of the SIAS and SPS to ensure the findings observed in Study 1 and Study 2 generalize to respondents from countries other than the United States.

### STUDY 3

Accounting for this possibility, we examined the comparability of Fergus et al.'s (2012) and Peters et al.'s (2012) SIAS and SPS short-forms in a South Korean college student sample in Study 3. Social anxiety is prevalent in East Asian countries, with some studies finding that respondents from these countries endorse significantly greater levels of social anxiety than do respondents from individualist countries, such as the United States (Schreier et al., 2010). We initially completed measurement invariance analyses to ensure the constructs assessed by the two sets of short-forms were manifested the same way among American and South Korean respondents. Then, as with Study 1 and Study 2, we focused on the incremental validity of scores on Fergus et al.'s and Peters et al.'s short-forms in Study 3. In Study 3, the criterion measure assessed the apprehension about receiving negative evaluation, a hallmark feature of social anxiety (Rapee & Heimberg, 1997). As with Study 1 and Study 2, we were particularly interested in the amount of unique variance that each short-form accounted for in the scores on the criterion measure above and beyond the variance accounted for by the corresponding alternative short-form in Study 3.

## Method

### Participants

The South Korean sample consisted of 341 college students recruited from a South Korean university. The sample had an average age of 20.9 (range 18-33;  $SD = 2.19$ ) years and was 59.8% female. Along with completing full-length Korean-language versions of the SIAS and SPS (Kim, 2000), these participants also completed a criterion self-report measure assessing for the fear of negative evaluation. The American sample consisted of 550 college students from a United States university. The sample had an average age of 18.8 (range 18-31;  $SD = 1.39$ ) years, was 52.4% female, and 72.2% White.

### Measure

**Korean-language versions of the SIAS and SPS.** The full-length Korean-language versions of the SIAS and SPS developed by Kim (2000) were completed by the South Korean respondents. The SIAS and SPS were translated into Korean by a Korean-English bilingual psychology graduate student. Two Korean-English bilingual psychologists reviewed the translation and compared it to the original English version. Items judged as nonequivalent across two language versions were then corrected or modified until being deemed equivalent by both reviewers. A back-translation process was not included, but these two bilingual psychologists specialized in social anxiety and test development. Results from Kim suggest that scores on the Korean-language versions of the SIAS and SPS have similar psychometric properties as the original English-language versions. Kim found that the Korean language versions of the SIAS and SPS share a strong intercorrelation ( $r = .75$ ) and share moderate to strong correlations with another index of social anxiety ( $r_s = .52$  and  $.71$ ).

**Fear of negative evaluation.** The Korean-language version of Leary's (1983) 12-item Brief Fear of Negative Evaluation Scale, developed by Lee and Choi (1997), was used to assess the fear of negative evaluation among the South Korean respondents. Scores on this version of the measure have shown good psychometric properties (Lee & Choi, 1997), including moderate to strong correlations ( $r_s = .56$  and  $.60$ ) with scores on Korean-language versions of the SIAS and SPS (Kim, 2000). Rodebaugh et al. (2004) and Weeks et al. (2005) recommend not scoring four reverse-keyed items of the English version of the measure and to use a straightforward-worded eight-item index. Because the Korean-language version parallels the English version, we used a straightforward-worded eight-item index of the Korean-language version in this study (i.e., the four reverse-keyed items of the measure were not included in this index). Scores on the eight-item straightforward-worded index of the measure showed good internal consistency in this study ( $\alpha = .93$ ; AIC =  $.61$ ).

### **Procedure**

The principal researcher for the South Korea site was the third author. Participants were recruited from Psychology undergraduate courses at a large university in Seoul, the capital of South Korea. Participants were recruited via a notice placed on university information boards or announcements in classes and participation occurred via class groups. Following informed consent procedures, participants were asked to complete self-report measures, including the full-length SIAS, full-length SPS, and Brief Fear of Negative Evaluation Scale. Participants received partial course credit for their participation.

The principal researcher for the United States site was the second author. Participants were recruited from Psychology undergraduate courses at a Midwestern United States university. Informed consent and questionnaire administration was completed using an online survey

program in which participants could complete the study at any computer of their choosing.

Participants were informed that their responses would be kept completely confidential and that they were free to withdraw from the study at any time. Participants received partial course credit for their participation. The American respondents completed the full-length SIAS and SPS.

## **Results**

### **Measurement Invariance**

A baseline measurement model was initially tested separately among the South Korean and the American respondents to ensure it demonstrated an adequate fit in each group. Following Fergus et al. (2012), the baseline measurement model examined the adequacy of a correlated two-factor model in which the respective SIAS short-form items loaded on one factor and the respective SPS short-form items loaded on a second factor. Given that the purpose of these analyses was to examine whether the constructs assessed by the short-forms were manifested in the same way across the two groups of respondents, we were specifically interested in construct-level metric invariance. As such, we examined the equivalence in factor structure (equal form) and factor loadings across both groups (see Kline, 2011). To examine equal form, we simultaneously examined the adequacy of the factor structure of the short-forms in both groups; when testing for the equivalence of factor loadings, we constrained parameters to equality in the lambda-x matrix. Participants completed the full-length SIAS and SPS, but only the items part of the respective short-forms were included in the measurement models.

Tests for multivariate skewness and kurtosis were significant for some of the item scores of these measures, suggesting the presence of multivariate non-normality. Multivariate non-normality can negatively impact results obtained when using maximum likelihood (ML) estimation. Robust ML estimation (Satorra & Bentler, 1994) was therefore used for all reported

analyses, as this estimation procedure provides parameter estimates with standard errors that are robust to non-normality (Brown, 2006). All models were tested by inputting covariance and asymptotic covariance matrices into LISREL 8.80 (Jöreskog & Sörbom, 2007). Four commonly-recommended (Brown, 2006; Hu & Bentler, 1999; Kline, 2011) fit statistics were used to evaluate the models: comparative fit index (CFI), non-normed fit index (NNFI), root mean square error of approximation (RMSEA), and standard root mean square residual (SRMR). Hu and Bentler's guidelines were used to evaluate fit: CFI and NNFI should be close to .95, RMSEA should be close to .06, and SRMR should be close to .08. Further, the upper limit of the 90% RMSEA confidence interval should not exceed .10 (Kline, 2011).

In addition to these fit statistics, model comparisons were evaluated as follows. First, the Satorra-Bentler scaled difference chi-square test (i.e., SDCS; following Brown, 2006). A significant SDCS test between two comparable models indicates a significant decrement in model fit. However, because the SDCS test is affected by sample size, model testing completed with large sample sizes might result in significant SDCS tests when differences in parameter estimates are trivial in magnitude (Brown, 2006; Kline, 2011). As such, and following the recommendations of Kline, we also used alternative tests for comparing models. One alternative test included examining the change in CFI ( $\Delta$ CFI). Meade, Johnson, and Braddy (2008) identified a  $\Delta$ CFI value of less than or equal to .002 as representing functionally trivial differences in parameter estimates among models. The other model comparison test was examining RMSEA 90% confidence intervals (CIs). Differences in model fit are considered non-significant if models have overlapping 90% RMSEA CIs (Wang & Russell, 2005).

The baseline correlated two-factor model of Fergus et al.'s (2012) SIAS and SPS short-forms demonstrated an adequate fit to the data among the South Korean [ $\chi^2 = 159.4$ , SB  $\chi^2 =$



124.2 ( $df = 53, p < .01$ ); CFI = .97; NNFI = .97; RMSEA = .06; RMSEA 90% CI = .05-.08; SRMR = .05] and American [ $\chi^2 = 222.2, SB \chi^2 = 170.6 (df = 53, p < .01)$ ; CFI = .98; NNFI = .97; RMSEA = .06; RMSEA 90% CI = .05-.07; SRMR = .06] respondents. All of the goodness-of-fit statistics met the specified guidelines. Equal form of Fergus et al.'s SIAS and SPS short-forms was supported across the South Korean and American [ $\chi^2 = 381.6, SB \chi^2 = 295.6 (df = 106, p < .01)$ ; CFI = .977; NNFI = .97; RMSEA = .06; RMSEA 90% CI = .05-.07; SRMR = .06] respondents. All of the goodness-of-fit statistics met the specified guidelines. Equating the factor loadings of Fergus et al.'s SIAS and SPS short-forms across South Korean and American respondents yielded a model that generally provided an adequate fit to the data [ $\chi^2 = 413.4, SB \chi^2 = 317.4 (df = 116, p < .01)$ ; CFI = .975; NNFI = .97; RMSEA = .06; RMSEA 90% CI = .05-.07; SRMR = .07]. All of the goodness-of-fit statistics met the specified guidelines. Although the SDCS test was significant between the equal form model and the model testing for equal factor loadings (SDCS:  $\chi^2_{D(10)} = 22.3, p < .05$ ), the  $\Delta CFI$  between these two models was  $\leq .002$  and RMSEA 90% CIs were overlapping. As such, based on these data and the specified guidelines, it was concluded that the constructs represented by Fergus et al.'s SIAS and SPS short-forms were manifested in the same way in each group.

The baseline correlated two-factor model of Peters et al.'s (2012) SIAS and SPS short-forms demonstrated an adequate fit to the data among the South Korean [ $\chi^2 = 150.1, SB \chi^2 = 108.7 (df = 53, p < .01)$ ; CFI = .98; NNFI = .97; RMSEA = .06; RMSEA 90% CI = .04-.07; SRMR = .06] and American [ $\chi^2 = 144.6, SB \chi^2 = 100.61 (df = 53, p < .01)$ ; CFI = .99; NNFI = .99; RMSEA = .04; RMSEA 90% CI = .03-.05; SRMR = .04] respondents. All of the goodness-of-fit statistics met the specified guidelines. Equal form of Peters et al.'s SIAS and SPS short-forms was supported across the South Korean and American [ $\chi^2 = 294.6, SB \chi^2 = 209.4 (df =$

106,  $p < .01$ ); CFI = .988; NNFI = .99; RMSEA = .05; RMSEA 90% CI = .04-.06; SRMR = .05] respondents. All of the goodness-of-fit statistics met the specified guidelines. Equating the factor loadings of Peters et al.'s SIAS and SPS short-forms across South Korean and American respondents yielded a model that provided an adequate fit to the data [ $\chi^2 = 309.1$ , SB  $\chi^2 = 220.2$  ( $df = 116$ ,  $p < .01$ ); CFI = .988; NNFI = .99; RMSEA = .05; RMSEA 90% CI = .04-.05; SRMR = .05]. All of the goodness-of-fit statistics met the specified guidelines. The SDCS test was non-significant between the equal form model and the model testing for equal factor loadings (SDCS:  $\chi^2_D(10) = 10.6$ ,  $ns$ ), the  $\Delta CFI$  between these two models was  $\leq .002$ , and RMSEA 90% CIs were overlapping. As such, based on these data and the specified guidelines, it was concluded that the constructs represented by Peters et al.'s SIAS and SPS short-forms were manifested in the same way in each group.

### **Descriptive Statistics and Zero-Order Correlations**

Descriptive statistics and zero-order correlations among the study variables are presented in Table 3. Scores on the short-forms were derived from the full-length SIAS and SPS in Study 3. Scores on Fergus et al.'s (2012) SIAS ( $\alpha = .81$ ) and SPS ( $\alpha = .73$ ) short-form evidenced adequate internal consistency given the brevity of the scales, as did scores on Peters et al.'s (2012) SIAS ( $\alpha = .77$ ) and SPS ( $\alpha = .75$ ) short-form. The average inter-item correlation among scores on the short-form scales (AIC ranged from .32-.42) all fell within Clark and Watson's (1995) recommended range (i.e., .15-.50). As shown in Table 3, Fergus et al.'s and Peters et al.'s SIAS short-forms shared a significant ( $ps < .01$ ) strong ( $r = .86$ ) correlation, as did Fergus et al.'s and Peters et al.'s SPS short-forms ( $r = .85$ ). Both sets of short-forms shared significant moderate correlations with the criterion measure. Tests of dependent correlations (Meng et al., 1992) revealed that the SIAS ( $z$ -statistic = 1.19,  $ns$ , 95% CI ( $z_{r1} - z_{r2}$ ) = -.02-.10) and SPS ( $z$ -

statistic = 1.58, *ns*, 95% CI ( $z_{r1} - z_{r2}$ ) = -.01-.12) short-forms shared statistically equivalent correlations with the fear of negative evaluation.

### **Incremental Validity**

Partial correlations from the hierarchical regression analyses examining the incremental validity of scores on each short-form predicting scores on the criterion measure, while controlling for scores on the corresponding alternative short-form, are also presented in Table 3. In the regression analyses examining the SIAS short-forms, scores on Fergus et al.'s (2012) SIAS short-form evidenced incremental validity in the concurrent prediction of the fear of negative evaluation ( $\Delta R^2 = .03$ , partial  $r = .21$ ,  $p < .01$ ) above and beyond scores on Peters et al.'s (2012) SIAS short-form. However, scores on Peters et al.'s SIAS short-form did not evidence incremental validity in the concurrent prediction of the fear of negative evaluation ( $\Delta R^2 = .01$ , partial  $r = .09$ , *ns*) above and beyond scores on Fergus et al.'s SIAS short-form.

Regression analyses examining the SPS short-forms were similar. More precisely, scores on Fergus et al.'s (2012) SPS short-form evidenced incremental validity in the concurrent prediction of the fear of negative evaluation ( $\Delta R^2 = .04$ , partial  $r = .24$ ,  $p < .01$ ) above and beyond scores on Peters et al.'s (2012) SPS short-form. However, scores on Peters et al.'s SPS short-form did not evidence incremental validity in the concurrent prediction of the fear of negative evaluation ( $\Delta R^2 = .01$ , partial  $r = .09$ , *ns*) above and beyond scores on Fergus et al.'s SPS short-form.

### **Study 3 Summary**

Analyses of measurement invariance in Study 3 supported the notion that the construct assessed by Fergus et al.'s (2012) and Peters et al.'s (2012) short-forms are expressed in the same way across South Korean and American respondents. Study 3 results paralleled the results

of Study 1 and Study 2. In Study 3, scores on Fergus et al.'s and Peters et al.'s SIAS and SPS short-forms derived from the full-length SIAS and SPS evidenced adequate internal consistency and average inter-item correlations in the sample of South Korean college students. The corresponding short-form scales also strongly intercorrelated, with there being no significant difference in the strength of correlations with the criterion measure assessing fear of negative evaluation between the corresponding measures of the two sets of short-forms. Nonetheless, Fergus et al.'s short-forms, but not Peters et al.'s short-forms, captured a significant amount of unique variance in scores of the criterion measure when accounting for the corresponding alternative short-form scale. Based on Study 3 results, it appears that Study 1 and Study 2 findings generalize to respondents outside of the United States.

### **General Discussion**

There are a number of potential benefits to using existing short-forms of Mattick and Clarke's (1998) SIAS and SPS. These benefits include likely being able to complete a more reliable and valid assessment of social anxiety among lower literacy populations, reducing respondent burden when desiring to assess social anxiety within longer questionnaire batteries or experimental studies, and the ability to more regularly screen and assess social anxiety in clinical settings (Fergus et al., 2012; Peters et al., 2012). With Fergus et al.'s and Peters et al.'s short-forms available, researchers and clinicians are left with a choice as to which set of short-forms to use when desiring to complete an economical assessment of social anxiety. Fergus et al. and Peters et al. previously presented preliminary results as to the adequacy of the psychometric properties of scores on their respective short-forms and these results were replicated in a recent psychometric evaluation of these two sets of short-forms by an independent group of researchers (Le Blanc et al., in press).

Results from this three-part study further support the psychometric properties of scores on both sets of short-forms. Specifically, scores on both sets of short-forms (a) demonstrated adequate internal consistency given the brevity of the scales, (b) evidenced average inter-item correlations that generally fell within recommended ranges, (c) clustered strongly with the corresponding short-form scale developed by the other set of researchers, and (d) correlated moderately to strongly with a number of criterion measures relevant to social anxiety. Finally, both sets of short-forms demonstrated construct-level measurement invariance across American and South Korean respondents. Whereas the short-forms were derived from the full-length SIAS and SPS in Study 2 and Study 3, the short-forms were administered independently of the full-length SIAS and SPS in Study 1.

Despite both sets of short-forms functioning similarly across most analyses, the incremental validity results shed light onto the potential usefulness of one set of the short-forms. Across all three studies, scores on Fergus et al.'s (2012) short-forms consistently evidenced incremental validity above and beyond scores on Peters et al.'s (2012) short-forms in the concurrent prediction of scores on a broad range of criterion measures. Across studies and criterion measures, the average amount of unique variance accounted for by Fergus et al.'s short-forms, above and beyond Peters et al.'s short-forms, was  $\Delta R^2 = .10$  for their SIAS short-form and  $\Delta R^2 = .03$  for their SPS short-form. Across studies and criterion measures, the average amount of unique variance accounted for by Peters et al.'s short-forms, above and beyond Fergus et al.'s short-forms, was  $\Delta R^2 = .00$  for their SIAS short-form and  $\Delta R^2 = .01$  for their SPS short-form (average  $\Delta R^2$  values calculated using Fisher's  $r$  to  $z'$  transformation). As noted earlier, the degree to which one self-report measure predicts unique criterion variance, but a comparison measure does not, its utility over the comparison measure can be highlighted. The present results

indicate that Fergus et al.'s short-forms, particularly their SIAS short-form, consistently capture unique variance in scores of criterion measures unaccounted for by scores on Peters et al.'s short-forms. Alternatively, Peters et al.'s short-forms consistently capture little to no unique variance in the scores of criterion measures beyond what is accounted for by Fergus et al.'s short-forms. Given that both sets of measures have been found to function similarly across most analyses, findings indicating that scores on Fergus et al.'s short-forms capture a greater amount of unique variance in a wide range of criterion measures than do scores on Peters et al.'s short-forms might indicate that Fergus et al.'s short-forms, particularly their SIAS short-form, represent the preferred set of short-forms for researchers and clinicians to use.

Because of their focus on selecting items that best discriminated along the full continuum of the latent trait of social anxiety using item response theory (IRT) for their short-forms, it was expected that Peters et al.'s (2012) short-forms would be more useful in assessing social anxiety in a more diverse array of samples than would Fergus et al.'s (2012) short-forms. It was thus unexpected that scores on Fergus et al.'s short-forms, which were developed with the intent to lower the reading level of the full-length SIAS and SPS, performed better in the tests of incremental validity than did scores on Peters et al.'s short-forms across all three samples. McHugh and Behar (2009), though, have asserted that readability is an especially important characteristic of self-report measures. For example, as noted by McHugh and Behar, when completing self-report measures at high reading levels, individuals, particularly those with lower levels of literacy, may be especially prone to omit responses to questions they cannot understand and/or respond to items without fully understanding the content. This response pattern can lead to data with questionable validity. Although the present results are unable to directly speak to the relative merits of using a specific approach for measurement development or refinement, the

results might be taken to indirectly support the importance of the readability of self-report measures. For measures that consist of items that do not vary substantially in their representational validity, as suggested by relatively small differences in the magnitude between their factor loadings, the variation in readability may become especially important.

Study limitations must be acknowledged. Although the SIAS and SPS short-forms were administered independently from the full-length versions of the measures in Study 1, the short-form scores were derived from the full-length versions of the measures in Study 2 and Study 3. Despite largely replicating the incremental validity findings found in Study 1 in both Study 2 and Study 3, the non-independence of the short-form scores in Study 2 and Study 3 is an important limitation of the present research. Whereas a primary focus of the present research was on incremental validity, it is possible that the scores on the short-forms might also differ along other important characteristics not examined in the present research. Although our replication of our findings across three independent samples was one of the strengths of the present research, replication of these findings in alternative adolescent, clinical, and cross-cultural samples would help support the generalizability of the present results. For example, the level of literacy in our adolescent sample was not assessed. As such, it would be informative for future studies to examine the psychometric properties of scores on the two sets of short-forms among populations that have objectively lower literacy.

The bulk of the anxiety disorder patients in Study 2 did not meet diagnostic criteria for social anxiety disorder, although a number of patients did endorse scores suggestive of elevated social anxiety symptoms. Comparing the two sets of short-forms completed independently of the full-length versions among patients diagnosed with social anxiety disorder appears to be an especially important area of investigation for future research. The intensive nature of the

program in which the clinical sample of anxiety disorder patients was drawn from might indicate the usefulness in replicating these results using less severe clinical samples as well. Moreover, replicating the present results among Australian respondents, which Peters et al. (2012) used in the development of their short-forms, seems warranted. The adequacy of the internal consistency estimates of the scores on the study measures among the South Korean respondents in Study 3 suggest that the measures likely performed as expected in that sample, the lack of a back-translated version of the SIAS and SPS represents an additional limitation of the present research. Because of the relatively homogenous racial/ethnic composition of our samples, it will be important to replicate these findings among respondents with greater racial/ethnic diversity.

Fergus et al.'s (2012) and Peters et al.'s (2012) SIAS and SPS short-forms provide researchers and clinicians with two viable alternatives to using the full-length versions of the measures. Both sets of short-forms consist of the same number of items and prior research supports the psychometric properties of scores on both sets of short-forms. An examination of descriptive statistics across studies raises the possibility that Fergus et al.'s short-forms might be most useful when assessing individuals with low to mild levels of social anxiety, whereas Peters et al.'s short-forms might be most useful when assessing individuals with mild to severe forms of social anxiety.<sup>2</sup> More specifically, mean-level scores on Fergus et al.'s short-forms tended to be higher than the mean-level scores on Peters et al.'s short-forms across all three studies in the present research. Alternatively, Peters et al. found much larger mean-level scores on their short-forms when using a sample primarily comprised of individuals diagnosed with social anxiety disorder (SIAS short-form  $M = 13.16$ , SPS short-form  $M = 10.51$ ; Peters et al., 2012) than what were found in the present research. Given this possibility, directly testing the differential utility of the short-forms based on respondents' levels of social anxiety using a large sample that has an



adequate representation of the full latent trait of social anxiety and completes the short-forms independent of the full-length version of the measures will be an important next step in the comparison of Fergus et al.'s and Peters et al.'s short-forms. Future studies comparing these sets of short-forms will be instrumental in identifying whether Fergus et al.'s or Peters et al.'s short-forms can be considered a preferred set of short-forms for use when desiring to complete an economical assessment of social anxiety.

### Footnotes

<sup>1</sup>The correlations with the Children's Depression Inventory-2-Short-Form corrected for attenuation were .75 (Fergus et al.'s SIAS short-form), .52 (Fergus et al.'s SPS short-form), .43 (Peters et al.'s SIAS short-form), and .36 (Peters et al.'s SPS short-form). The correlations with the Self-Perception Profile for Adolescents-Self-Worth corrected for attenuation were -.57 (Fergus et al.'s SIAS short-form), -.52 (Fergus et al.'s SPS short-form), -.38 (Peters et al.'s SIAS short-form), and -.41 (Peters et al.'s SPS short-form).

<sup>2</sup>We thank an anonymous reviewer for raising this point.

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Table 1

*Descriptive Statistics and Correlations among Study 1 Variables.*

Variable	Mean	SD	1	2	3	4	5	6
1. Fergus et al.'s SIAS-Short-Form	5.46	3.47	-				.53**	-.38**
2. Fergus et al.'s SPS-Short-Form	4.03	3.05	.47**	-			.26*	-.21*
3. Peters et al.'s SIAS-Short-Form	3.59	2.84	.68**	.47**	-		-.13	.04
4. Peters et al.'s SPS-Short-Form	3.58	3.28	.46**	.78**	.51**	-	-.01	-.07
5. Children's Depression Inventory-2-Short-Form	4.91	4.14	.59**	.38**	.32**	.29**	-	
6. Self-Perception Profile for Adolescents-Self-Worth	14.70	4.08	-.46**	-.39**	-.29**	-.34**	-.73**	-

*Note.*  $N = 98$ . \* $p < .05$ ; \*\* $p < .01$ (two-tailed). SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale. Values in rectangle are partial  $r$ s controlling for the corresponding alternative short-form version.

Table 2

*Descriptive Statistics and Correlations among Study 2 Variables.*

Variable	Mean	SD	1	2	3	4	5	6	7
1. Fergus et al.'s SIAS-Short-Form	9.02	6.10	-				.43**	.32**	.41**
2. Fergus et al.'s SPS-Short-Form	6.05	5.54	.75**	-			.35**	.20*	.03
3. Peters et al.'s SIAS-Short-Form	7.36	5.81	.90**	.70**	-		.05	.21*	-.08
4. Peters et al.'s SPS-Short-Form	6.32	6.50	.75**	.94**	.69**	-	-.08	.16	.36**
5. Social Thoughts and Beliefs Scale-Social Comparison	19.52	10.68	.77**	.65**	.71**	.59**	-		
6. Social Thoughts and Beliefs Scale-Social Ineptness	15.37	8.82	.77**	.72**	.75**	.71**	.79**	-	
7. Anxiety Sensitivity Index-3-Social	9.92	6.14	.65**	.72**	.56**	.76**	.58**	.68**	-

*Note.*  $N = 117$ . \* $p < .05$ ; \*\* $p < .01$ (two-tailed). SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale. Values in rectangle are partial  $r$ s controlling for the corresponding alternative short-form version.

Table 3

*Descriptive Statistics and Correlations among Study 3 Variables.*

Variable	Mean	SD	1	2	3	4	5
1. Fergus et al.'s SIAS-Short-Form	7.16	4.72	-				.21**
2. Fergus et al.'s SPS-Short-Form	5.03	3.90	.66**	-			.24**
3. Peters et al.'s SIAS-Short-Form	4.98	4.01	.86**	.64**	-		.09
4. Peters et al.'s SPS-Short-Form	4.14	3.67	.64**	.85**	.61**	-	.09
5. Brief Fear of Negative Evaluation-Straightforward Items	9.81	7.23	.48**	.53**	.45**	.49**	-

*Note.*  $N = 341$ . \*\* $p < .01$  (two-tailed). SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale. Values in rectangle are partial  $r$ s controlling for the corresponding alternative short-form version.