Article

Assessment
2018, Vol. 25(5) 564–577

DOI: 10.1177/1073191116656438
journals.sagepub.com/home/asm
SAGE

Comparing Social Anxiety Between Asian Americans and European Americans: An Examination of Measurement Invariance

Alexander Krieg[1], Yiyuan Xu[1], and David C. Cicero[1]

Abstract

There have been over 30 studies and two meta-analyses comparing social anxiety between Asian Americans and European Americans. However, few have investigated the invariance of social anxiety measures that would make these comparisons appropriate. In the current study, we systematically examined psychometric properties and configural, metric, and scalar invariance of five social anxiety measures and four short forms that have been used more than once to compare Asian Americans (n = 232) and European Americans (n = 193). We found that four (i.e., SPS-6, SIAS-6, SPS, and SPAI-18) of the nine scales were scalar invariant, three scales (i.e., SIAS, SPAI, and B-FNES) only achieved configural invariance, and two scales (i.e., FNES and SADS) failed to achieve configural invariance. Latent mean comparisons based on the scalar invariant measures revealed higher social anxiety scores for Asian Americans than European Americans. The findings are discussed with regard to the issues and challenges when comparing social anxiety among different cultural and ethnic groups.

Keywords

social anxiety, measurement invariance, cross-culture comparison, Asian Americans

Social anxiety is one of the most prevalent psychological conditions with 25% to 33% of adults reporting intense anxiety and/or avoidance of certain social situations at some point in their lives (Kessler, Stein, & Berglund, 1998; Ruscio et al., 2008). It is characterized by fearful anticipation of embarrassment or humiliation in social settings where others may evaluate one's behavior (American Psychiatric Association, 2013). While relatively common, social anxiety is frequently accompanied by intense physiological arousal (e.g., shortness of breath and sweating), self-defeating cognitions, and invariable avoidance of feared situations (American Psychiatric Association, 2013; Heimberg, Brozovich, & Rapee, 2010). Unsurprisingly, social anxiety is associated with both occupational and social impairment (Aderka, Nickerson, Bøe, & Hofmann, 2012; Wittchen & Beloch, 1996), and is estimated to have cost the United States $100 billion dollars in mental health treatment, work absence, and opportunity costs (Kessler & Greenberg, 2002).

Experiences of social anxiety often involve evaluation of the self in relation to others (Clark & Wells, 1995; Rapee & Heimberg, 1997), which seems to vary in accordance with different values and norms in Western and Asian cultures (Markus & Kitayama, 1991). A meta-analysis conducted by Oyserman, Coon, and Kemmelmeier (2002) have shown that Asian cultural groups tend to place stronger emphasis on interdependence, that is, construing oneself so as to fit in and maintain social harmony among individuals, than Europeans and European Americans. Cross-cultural studies have shown that a strong emphasis on interdependence may inadvertently lead to heightened attention to social relationships (Okazaki, 1997), increased sensitivity toward others' feelings, opinions, and evaluations (Lau, Fung, Wang, & Kang, 2009), a tendency to regulate and suppress negative emotions (Park et al., 2011), and an inclination to be easily threatened by social blunders and subsequent judgments from others (Paulhus, Duncan, & Yik, 2002); all of which are often found among individuals with symptoms of social anxiety (Heimberg et al., 2010; Moscovitch, Rodebaugh, & Hesch, 2012; Pineles & Mineka, 2005; Spokas, Luterek, & Heimberg, 2009). Thus, it is of particular interest to both clinical and cross-cultural psychologists to discern whether the prevalence, symptoms, and impairment of social anxiety differ between individuals of Asian heritage and European heritage (Hong & Woody, 2007; Hsu & Alden, 2007; Hsu et al., 2012; Lau et al., 2009; Lee, Okazaki, & Yoo, 2006; Mak, Law, & Teng, 2011; Okazaki, Liu, Longworth, & Minn, 2002; Okazaki, 1997; Sue, Sue, & Ino, 1983).

[1]University of Hawai'i at Manoa, Honolulu, HI, USA

Corresponding Author:
Yiyuan Xu, Department of Psychology, University of Hawai'i at Manoa, Sakamaki Hall, C408, 2530 Dole St., Honolulu, HI 96822, USA.
Email: yiyuan@hawaii.edu

The results of two recent meta-analyses (Krieg & Xu, 2015; Woody, Miao, & Kellman-McFarlane, 2015) showed that compared with European Americans, Asian Americans tended to report higher levels of social anxiety on standardized questionnaires. However, meta-analytic techniques assume equivalent measurement properties among groups (i.e., *measurement invariance*; Little, 1997) to calculate unbiased estimates, an assumption that had been rarely tested in prior studies that compared social anxiety between Asian Americans and European Americans.

It is important to examine whether measures of social anxiety are equivalent between Asian Americans and European Americans for at least two reasons. First, the results of a measurement invariance analysis would provide evidence on whether the group comparisons made in prior studies revealed “actual” (i.e., latent) mean differences on the underlying construct of social anxiety (Hambrick et al., 2010) or reflect unequal psychometric properties of the scales being compared across groups (Knight & Hill, 1998). Second, although there is some mixed evidence for invariance for some social anxiety measures between Asian Americans and European Americans (Fergus, Valentiner, Kim, & McGrath, 2014; Hambrick et al., 2010; Hardin & Leong, 2005; Norton & Weeks, 2009), there is not yet a systematic examination of all social anxiety measures used to compare members of these two groups. Such effort would add to the much needed discussion about the best practices in using self-report measures for cross-cultural/ethnic investigations (e.g., Doucette-Gates, Brooks-Gunn, & Chase-Lansdale, 1998; Greenfield, 1997; Knight & Hill, 1998; Little, 1997; Marsella & Yamada, 2007; Okazaki & Sue, 1995), by empirically examining the impact of measurement bias on one of the most commonly cited group differences in cross-cultural psychopathology.

The aims of the current study were twofold: (a) to comprehensively examine the measurement properties of five full-length social anxiety measures and four short forms between Asian Americans and European Americans, as well as (b) to investigate whether there were latent mean group difference in social anxiety between Asian Americans and European Americans, after the establishment of invariant measurement properties between these two groups.

Tests of Measurement Invariance

To garner statistical evidence for measurement equivalence, a series of tests for measurement invariance have been developed (for a review, see Vandenberg & Lance, 2000). The basic underlying question that measurement invariance tests attempt to answer is whether respondents from different groups respond to a given measure in a conceptually similar manner (Vandenberg & Lance, 2000). Tests of measurement invariance are designed to place increasing constraints on a given multigroup measurement model in order to see if the model still fit the data when certain parameters are constrained to be equal. Tests within this series are hierarchical in nature, meaning that invariance at one level must be found for invariance at the next level to be meaningfully interpreted. The first level is *configural invariance*, which if achieved, demonstrates that the number of factors is equal across groups. On confirming configural invariance, *metric invariance* can be tested by constraining not only the number of factors but also items’ factor loadings (Little, 1997). Confirmed metric invariance would provide support for an equivalent underlying factor structure across groups, and forms the basis for testing *scalar invariance*. Generally with scalar invariance, item intercepts can be further constrained to be equal across groups in addition to previously constrained factor loadings (Meredith, 1993). However, certain parameter estimators (e.g., weighted least squares with means and variances adjustment [WLSMV]) constrain thresholds rather than intercepts (Sass, 2011). By constraining item thresholds, we are able to see if responses to items are on the same or different scales between groups. Confirmed scalar invariance allows us to also determine mean-level group differences in the latent construct of interest (Little, 1997; Meredith, 1993; Vandenberg, 2002).

Mixed Evidence for Invariance for Social Anxiety Measures

In examining group mean differences in social anxiety between Asian Americans and European Americans, certain measures have been used more frequently than others (refer to Table S1 for a summary of the social anxiety measures that have been used to compare scores among Asian Americans and European Americans in previous studies available online at http://asm.sagepub.com/content/by/supplemental-data). According to Krieg and Xu’s (2015) meta-analysis, among the 32 studies comparing social anxiety between Asian Americans and European Americans, five measures (or their short forms) were used more than once, including the Social Avoidance and Distress Scale (SADS; Watson & Friend, 1969), the Fear of Negative Evaluation Scale (FNES; Watson & Friend, 1969) and its short form (BFNE; Leary, 1983), the Social Phobia and Anxiety Inventory (SPAI; Turner, Beidel, Dancu, & Stanley, 1989), the Social Phobia Scale (SPS; Mattick & Clarke, 1998), and the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998). To our knowledge, three existing short forms: SPAI-18 (de Vente, Majdandžić, Voncken, Beidel, & Bögels, 2014), SPS-6 (Peters, Sunderland, Andrews, Rapee, & Mattick, 2011), and SIAS-6 (Peters et al., 2011) have not yet been used with Asian Americans.[1] All these measures have been found to have excellent psychometric properties (e.g., Beidel, Turner, Stanley, & Dancu, 1989; Le Blanc et al., 2014; Osman, Barrios, Aukes, & Osman, 1995; Osman, Gutierrez, Barrios, Kopper, & Chiros, 1998) in

Table 1. Demographic Characteristics of Participants.

	Asian Americans (*n* = 232)			European Americans (*n* = 193)		
Characteristic	Count		Percentage	Count		Percentage
Sex (female/male)	171/61		74/26	137/56		71/29
First generation[a] (frequency)	29		12.5	6		3.1
Second generation (frequency)	76		32.7	4		2.1
Third generation and above (frequency)	109		47.0	183		90.6
	M	*SD*	Range	*M*	*SD*	Range
Age (years)	19.93	2.65	18-44	21.23	5.27	18-48
Mother's education (years)	14.84	2.49	5-18	12.51	5.01	3-18
Father's education (years)	15.03	2.65	5-18	12.90	4.66	5-18

[a]Eighteen Asian American students did not specify their generation status.

studies of European Americans. However, evidence for reliability and validity has been rarely reported for Asian Americans, even among studies that directly compared social anxiety between Asian Americans and European Americans. As shown in Table S1, among 23 independent studies that had compared social anxiety between Asian Americans and European Americans, nearly half of them (11 studies) either did not report evidence of reliability for Asian Americans or only reported reliability estimates for their entire samples that combined Asian Americans with European Americans. About 70% (16 studies) either did not report any evidence of validity for Asian Americans or only reported evidence for validity for their entire samples rather than respective ethnic groups. Thus, there is a clear need to comprehensively evaluate psychometric properties of these social anxiety measures for Asian Americans.

Likewise, emerging evidence demonstrates that only a few of these measures may be invariant when being used to compare social anxiety between Asian Americans and European Americans (Hambrick et al., 2010; Hardin & Leong, 2005; Norton & Weeks, 2009). In a study that compared social anxiety across groups of self-identified African ($n = 141$), Asian ($n = 251$), European ($n = 247$), and Hispanic ($n = 160$) American undergraduate students in the United States, Norton and Weeks (2010) found evidence of configural, metric, and scalar invariance for the BFNE (Leary, 1983) across all four ethnic groups. In contrast, an exploratory factor analysis of the SPS and SIAS (Mattick & Clarke, 1998) failed to replicate the previously identified one-factor structure among European Americans, in an Asian American student and community sample (Condit, Carter, Tang, & Rothstein, 2015). Although this indicates a lack of configural invariance for both measures, it is important to note the small sample size ($N = 85$) used in this study. Likewise, Hardin and Leong (2005) found that constraining some parceled item loadings on the SADS to be equal between Asian American ($n = 140$) and European American ($n = 189$) undergraduates led to worse model fit, whereas removing the constraint improved model fit, suggesting that only configural, but not metric invariance was found for the SADS. Given the scant and mixed evidence, there is a clear need for a systematic evaluation of invariance for these social anxiety measures, before any valid conclusions can be drawn in comparisons of social anxiety between Asian Americans and European Americans.

The Current Study

The current study systematically investigated invariance of five social anxiety measures (i.e., SADS, FNES, SPAI, SPS, and SIAS) and their short forms when available (i.e., BFNE, SPAI-18, SPS-6, and SIAS-6) in comparisons of Asian Americans and European Americans. First, we examined the goodness of fit for each measure's proposed factor structures for each group. Second, on finding satisfactory fit for proposed factor models, we examined configural, metric, scalar invariance for each measure between the two groups. Third, measures with evidence of scalar invariance were used to compute latent mean differences in social anxiety between Asian Americans and European Americans. Finally, due to the lack of evidence of psychometric properties of these measures' scores for Asian Americans, we examined evidence for reliability (i.e., Cronbach's alphas) and validity (estimated by concurrent correlations among these social anxiety measures) in both groups. The results of our four-part analysis were discussed in the context of best practices in using self-report measures for cross-cultural investigations.

Method

Participants

Two hundred and thirty-five Asian American undergraduate students (74% female) and 198 European American undergraduate students (71% female) were recruited via a department subject pool from a large, public university in Hawaii, and completed five social anxiety measures (SPS, SIAS, SPAI, FNES, and SADS) and their short forms (SPS-6, SIAS-6, SPAI-18, and BFNE) in an online survey in exchange for course credit. Other studies and alternative assignments were also available to receive course credit. All questions from each measure were pooled and then presented in a randomized order. These questions were completed as a part of a larger assessment battery. Participants were given a set of checkboxes with the 20 most common ethnicities and asked to endorse all that applied to them. A follow-up open-ended question asked them to state their ethnic identity. To be included in the European American group, participants needed to both endorse and describe themselves as “White,” “European American,” or a specific European ethnic group (e.g., “German American”). To be included in the Asian American group, a participant needed to endorse one or more East Asian (i.e., Chinese, Japanese, and Korean) ethnicity and describe themselves as “Asian,” “Asian American,” “Japanese,” “Chinese American,” and so forth. We limited our Asian American sample to Chinese, Japanese, and Korean participants because prior studies of social anxiety predominantly focused on these three groups which share a similar cultural heritage and Confucian value system with a focus on interdependence. Among the Asian American participants, 29.6% endorsed Japanese ancestry, 22.4% endorsed Chinese ancestry, 21.7% endorsed Korean ancestry, and 26.3% endorsed more than one of the above Asian categories (i.e., multiethnic Asian Americans). See Table 1 for more participant demographic characteristics.

Measures

Based on the results of a recent meta-analysis (Krieg & Xu, 2015), our measurement invariance analyses focused on five social anxiety measures that have been used more than once in comparisons of European Americans to Asian Americans (SPS, SIAS, SPAI, FNES, and SADS), as well as their respective short forms when available (SPS-6, SIAS-6, SPAI-18, and BFNE).[2] All measures were designed to be completed by adult participants and the number of items included in each ranged from 6 to 45. Table S1 summarizes factor structure and evidence of reliability and validity of measure scores as reported in prior studies of Asian Americans and European Americans.

Analytic Strategy

Measurement Invariance. To test measurement invariance between Asian Americans and European Americans, for each social anxiety measure we fit a series of three nested models to the data using R module “lavaan” (Rosseel, 2012). We used a variety of fit estimators suggested by Hu and Bentler (1998), who proposed that comparative fit index (CFI), McDonald’s noncentrality fit index (MFI), and Tucker–Lewis index (TLI) values of above .95, and root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) values below .06 indicate good model fit.

The measurement invariance analyses involved three steps. First, we fit a *configural invariance model* (Model 1) in which the number of factors and the items that load on said factors were the same, but factor loadings and intercepts were allowed to vary between groups. Metric and scalar invariance model were not examined if the configural invariance model fit the data unsatisfactorily.

Second, given the establishment of configural invariance, we fit a *metric invariance model* (Model 2) in which the factor loadings were constrained to be equal between groups. We compared the fit of a metric invariance model with its corresponding configural invariance model by examining the change in CFI as well as the change in MFI. According to a series of statistical simulations conducted by Cheung and Rensvold (2002), both the change in CFI and change in MFI are relatively robust against potential violations of model assumptions (e.g., multivariate normality; Cheung & Rensvold, 2002; Hu & Bentler, 1998) and are good model fit indicators to use in tests of measurement invariance. Following their recommendations, a change in CFI of less than .01 and a change in MFI of less than .02 indicates nonsignificant model change[3] (Cheung & Rensvold, 2002).

(1) When the changes in CFI and MFI failed to meet the criteria mentioned above, metric invariance was considered not achieved and scalar invariance was not examined. This would suggest that this particular social anxiety measure may not assess an equivalent construct between Asian Americans and European Americans.
(2) When there was a lack of metric invariance, modification indices for item loadings were examined to reveal whether any item loading accounted for increasing the χ^2 value by more than 10 (Byrne, Shavelson, & Muthén, 1989). The particular item loadings would then be allowed to vary freely between groups (Heene, Hilbert, Freudenthaler, & Bühner, 2012), and this modified model would be retested (*partial metric invariance*; Model 2b). These problematic items would be of particular interest to future ethnic/cultural comparisons due to their significant contribution to poor fit of the metric invariance model. If modification indices did not reveal any problematic item loadings, a partial metric invariance model would not be fitted.

Third, given the establishment of metric invariance, we fit a *scalar invariance model* (Model 3) in which factor loadings and intercepts are constrained to be equal between groups. The change in CFI and the change in MFI were examined when comparing the scalar (Model 3) and metric invariance models (Model 2 or Model 2b) in the following way:

(3) Scalar invariance was considered achieved when the change in CFI was less than .01 and the change in MFI was less than .02.
(4) When these criterion were not met, scalar invariance was considered not achieved, suggesting that scores may represent different levels of latent constructs between groups, and mean comparisons would not be appropriate.
(5) When there was a lack of scalar invariance, modification indices were generated and any item intercept that accounted for a χ^2 value greater than 10, would be allowed to vary freely between groups (Heene et al., 2012), and this modified model would be retested. If the fit change indices demonstrated similar fit when comparing modified Model 3 (Model 3b) with Model 2 (or Model 2b), the measure was considered *partially scalar invariant* for Asian Americans and European Americans (Byrne et al., 1989).

While some methodologists may rightly caution against modifying a given model based on modification indices (e.g., Hurley et al., 1997), partial invariance models may help identify problematic items in measurement invariance studies (Byrne et al., 1989; Marsh & Hocevar, 1985). Partial invariance analyses that involved identifying problematic items may be of particular interest for ethnic and cultural comparisons, since these items may be indicative of important ethnic or cultural variations. Cultural variation in item intercepts is especially relevant to our goal of examining the appropriateness of group mean comparisons.

Latent Mean Differences. Given that there has been strong arguments made for using latent mean differences as oppose to mean differences based on raw scores from manifest variables (e.g., Little, 1997), we estimated latent mean differences in social anxiety between Asian Americans and European Americans on the measures that were shown to be invariant. Specifically, we estimated a latent "social anxiety" factor, using scales that were invariant, and constrained both item loadings and intercepts. We fixed the latent intercept for the reference group (i.e., European Americans) to "0" and allowed the latent intercept for the Asian American group to vary. This model provided a standardized estimate of mean differences on the latent "social anxiety" construct (Sass, 2011), and the standardized difference was then compared with the overall effect size found in Krieg and Xu's (2015) meta-analysis.

Results

Data Cleaning

Twelve participants stopped answering questions during the middle of the online survey and were thus removed from the data set. Following Enders and Bandalos's (2001) recommendations, the remaining 425 participants (232 Asian Americans; 193 European Americans) had missing scores imputed through a multiple imputation algorithm performed on R module "mice" (van Buuren & Groothuis-Oudshoom, 2011). This Monte Carlo technique used information from the participants' scores along with information from the remaining set of items to generate five plausible data sets with missing scores selected from a distribution that likely represented that particular missing score, given the set of scores from all other items and all other participants. These data sets were then analyzed and pooled via a predictive mean matching algorithm that minimized the standard error. This entire process was went through five iterations, and returned a resulting data set that contained both nonmissing and pooled missing values (van Buuren, Brand, Groothuis-Oudshoorn, & Rubin, 2006; van Buuren & Groothuis-Oudshoom, 2011). After it was confirmed that no values were missing in the entire data set, the data were subject to further analysis.

Factor Structures

Before examining measurement invariance, a confirmatory factor analysis was performed for each measure on each group to ensure that previously identified factor structures (listed in Table S1) fit the data. We used confirmatory factor analysis with WLSMV method of estimation (Jöreskog, 1990). WLSMV is a robust estimator that does not assume normal distribution. This approach is appropriate for categorical data (Brown, 2006), including the dichotomous data presented in the FNES, BFNE, and SADS.

For Asian Americans, each of the five measures and the four short forms showed satisfactory fit (CFI: .96-.99; TLI: .96-1.00; RMSEA: .00-.05; SRMR: .02-.08). Likewise, reasonable model fit was identified for European Americans (CFI: .97-1.00; TLI: .97-1.00; RMSEA: .00-.06; SRMR: .03-.08). Given that each measure satisfactorily fit its respective model for each group, these factor structures were retained when testing measurement invariance.

Measurement Invariance

Social Phobia Scale (SPS) and Its Short Form (SPS-6). As shown in Table 2, Model 1 fit the data well, providing evidence for configural invariance. Compared with Model 1, Model 2's CFI and MFI changed little, and metric invariance was achieved. Model 3 also did not significantly differ from Model 2 as indicated by minimal change in CFI and MFI, suggesting that scalar invariance was achieved (see Table 2).

Table 2. Model Fit and Model Comparisons Among Asian Americans and European Americans for Five Social Anxiety Measures and Their Respective Short Forms.

			Model comparison		Model fit					Standardized loadings	
Measure	Invariant?	Model	ΔCFI	ΔMFI	CFI	MFI	TLI	RMSEA	SRMR	Asian Americans	European Americans
SPS	☑	Model 1: Configural	—	—	1.00	1.00	1.00	.000	.057	.447-.700	.436-.770
	☑	Model 2: Metric	.001	.013	.999	.987	.997	.012	.068	—	—
	☑	Model 3: Scalar	.001	.006	.998	.981	.997	.014	.070	—	—
SPS-6	☑	Model 1: Configural	—	—	1.00	1.00	1.00	.000	.031	.554-.750	.593-.782
	☑	Model 2: Metric	.000	.000	1.00	1.00	1.00	.000	.041	—	—
	☑	Model 3: Scalar	.000	.000	1.00	1.00	1.00	.000	.043	—	—
SIAS	☑	Model 1: Configural	—	—	1.00	1.00	1.00	.000	.056	.133-.766	.315-.820
	☐	Model 2: Metric	.062	.527	.938	.473	.937	.091	.108	—	—
	☐	Model 3: Scalar	.001	.004	.937	.469	.939	.089	.109	—	—
SIAS-6	☑	Model 1: Configural	—	—	1.00	1.00	1.00	.000	.025	.563-.739	.354-.804
	☑	Model 2: Metric	.000	.000	1.00	1.00	1.00	.000	.049	—	—
	☑	Model 3: Scalar	.000	.001	1.00	.999	1.00	.010	.054	—	—
SPAI	☑	Model 1: Configural	—	—	1.00	1.00	1.00	.000	.069	.267-.857	.377-.822
	☐	Model 2: Metric	.025	.807	.975	.193	.975	.058	.093	—	—
	☐	Model 3: Scalar	.000	.007	.975	.186	.975	.058	.094	—	—
SPAI-18	☑	Model 1: Configural	—	—	1.00	1.00	1.00	.000	.051	.486-.866	.571-.898
	☑	Model 2: Metric	.001	.017	.999	.983	1.00	.016	.068	—	—
	☑	Model 3: Scalar	.000	.001	.999	.982	1.00	.016	.070	—	—
FNES	☐	Model 1: Configural	—	—	.969	.585	.967	.000	.069	.336-.629	.302-.718
	☐	Model 2: Metric	.019	.066	.950	.419	.948	.058	.093	—	—
	☐	Model 3: Scalar	.001	.100	.949	.414	.949	.058	.094	—	—
BFNE	☑	Model 1: Configural	—	—	.987	.946	.984	.045	.063	.420-.693	.345-.742
	☐	Model 2: Metric	.025	.095	.962	.851	.959	.073	.080	—	—
	☐	Model 2b: Partial Metric	.006	.024	.981	.922	.979	.053	.068	—	—
	☐	Model 3: Scalar	.020	.077	.961	.845	.961	.072	.083	—	—
SADS	☐	Model 1: Configural	—	—	.990	.856	.989	.030	.066	.124-.624	.279-.697
	☐	Model 2: Metric	.030	.319	.960	.538	.959	.058	.080	—	—
	☐	Model 3: Scalar	.002	.280	.959	.526	.959	.058	.082	—	—

Note. SPS = Social Phobia Scale; SPS-6 = Social Phobia Scale–Six-item scale; SIAS = Social Interaction Anxiety Scale; SIAS-6 = Social Interaction Anxiety Scale–Six-item scale; SPAI = Social Phobia and Anxiety Inventory; SPAI-18 = Social Phobia and Anxiety Inventory–18-item version; FNES = Fear of Negative Evaluation; BFNE = Brief Fear of Negative Evaluation; SADS = Social Avoidance and Distress Scale; CFI = comparative fit index; MFI = McDonald's noncentrality fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; SRMR = square root mean residuals. Change (Δ) statistics are in comparison with the row above (i.e., metric compared with configural, modified metric compared with configural, and scalar compared with metric or modified metric).

For its short form SPS-6, all three invariance models resulted in adequate fit indices. Likewise, Model 2 did not differ from Model 1 and Model 3 did not differ from Model 2 as measured by the changes in CFI and MFI (all <.001). This provided evidence for configural, metric, and scalar invariance (see Table 2).

Social Interaction and Anxiety Scale (SIAS) and Its Short Form (SIAS-6). When examining the SIAS, Model 1 fit the data relatively well, providing evidence for configural invariance. As can be seen in Table 2, compared with Model 1, Model 2 had a change in CFI greater than .01 and a change in MFI greater than .02. This suggests a lack of metric invariance, and subsequent scalar invariance models were not tested. To explore SIAS items that may have significantly contributed to between-group nonequivalence, we investigated item-level modification indices. However, the results showed that the poor model fit between Model 2 and Model 1 was due to group differences in item covariances, rather than changes in individual item loadings (i.e., no item loading accounted for increasing the χ^2 value by more than 10).

The short form (SIAS-6), on the other hand, demonstrated good fit for all three models. In addition, Model 2 did not differ from Model 1 and Model 3 did not differ from Model 2 as measured by the change in CFI (all <.001), providing evidence for configural, metric, and scalar invariance (see Table 2).

Social Phobia and Anxiety Inventory (SPAI) and Its Short Form (SPAI-18). Table 2 shows that Model 1 fit the data relatively well, providing evidence for configural invariance. Compared with Model 1, Model 2 resulted in a change in CFI greater than .01 and a change in MFI greater than .02, demonstrating lack of evidence for metric invariance (see Table 2). Because of this, subsequent scalar invariance models were not tested. Investigating modification indices for item loadings revealed that nearly every item loading on the SPAI's two-factor structure (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 22, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 37, 39, 40, 43, 45) accounted for a χ^2 change value greater than 10. This may suggest that an inherent difficulty in separating symptoms of social phobia from symptoms of agoraphobia may have contributed to the between-group nonequivalence of the SPAI.

In contrast to the full version of this scale, the short form (SPAI-18), which only uses items from the social phobia subscale, demonstrated evidence for all three levels of invariance. Model 1 fit the data relatively well, providing evidence for configural invariance. Compared with Model 1, Model 2 had a change in CFI less that .01 and a change in MFI less than .02, demonstrating evidence for metric invariance. Likewise, when Model 3 was tested against Model 2, the change in CFI and MFI was minimal (all <.001), providing evidence for scalar invariance (see Table 2).

Fear of Negative Evaluation Scale (FNES) and Its Short Form (BFNE). Table 2 shows that Model 1 did not fit the data well. Of particular concern was Model 1's low MFI (.585). This result demonstrated a lack of evidence for configural invariance, and subsequent metric and scalar invariance models were not tested.

In contrast, configural invariance was identified in the short form (BFNE): Model 1 fit the data relatively well, though with a slightly lower MFI (.946). Compared with Model 1, Model 2 had a change in CFI greater than .01 as well as a change in MFI greater than .02. These results demonstrate lack of evidence for metric invariance, and subsequent scalar invariance models were not tested. Investigating modification indices for item loadings revealed that Item 8 ("When I am talking to someone, I worry about what they may be thinking about me"; intercepts: Asian American [AA] = 1.25, European American [EA] = 1.13), Item 9 ("I am usually worried about what kind of impression I make"; intercepts: AA = 1.66, EA = 1.49), and Item 11 ("I often worry that I will say or do the wrong things"; intercepts: AA = 1.30, EA = 1.20) accounted for a χ^2 change value greater than 10. We allowed these item loadings to freely vary between groups and retested the model. Compared with Model 1, Model 2b resulted in a change in CFI less than .01, and a change in MFI greater than .02. Because these results did not meet the change in MFI cutoff, partial metric invariance was also not achieved (see Table 2).

Social Avoidance and Distress (SAD). Table 2 shows that Model 1 did not fit the data well. Due to a low MFI score of .856, evidence for configural invariance was not achieved. Because of this, subsequent metric and scalar invariance models were not tested.

Latent Mean Difference in Social Anxiety

Based on the results of the measurement invariance analyses, we selected the total scores of scalar invariant measures to be indicators for the latent construct of social anxiety, and estimated latent mean differences between Asian Americans and European Americans. Specifically, we used the SPS (latent mean difference: .58; $p < .01$), SPS-6 (latent mean difference: .66; $p < .01$), SIAS-6 (latent mean difference: .86; $p < .01$), and SPAI-18 (latent mean difference: .50; $p < .01$) regressed on a single latent "social anxiety" factor. Holding factor structure, loadings, and intercepts constant, as well as fixing the European American group's mean to 0, we found that Asian Americans' latent mean in social anxiety was .62 ($p < .01$). This finding represents higher latent mean social anxiety scores for Asian Americans with a "moderate to large" (Cohen, 1988) overall effect.

Reliability and Validity Estimates

Table 3 summarizes the psychometric properties of all measures and their short forms in the current study. Given that three out of the four short forms, SPS-6, SIAS-6, and SPAI-18, had not been previously used with Asian Americans, we would like to highlight the psychometric properties of these short forms, including estimates of internal consistency and evidence for concurrent correlations with other social anxiety measures. As shown in Table 3, internal consistencies of these short forms' scores, estimated by Cronbach's alpha, ranged from .71 to .93 when being used with Asian Americans. The four short forms also demonstrated showed moderate to high correlations with other social anxiety measures: *r*s ranged from .39 to .82, *p*s < .01). The evidence for reliability and validity for the scores generated by these four short forms were also comparable for their corresponding original measures, and for European Americans in the current study (see Table 3). Taken together, these results demonstrate satisfactory psychometric properties of all the social anxiety measures and their short forms for Asian Americans and European Americans.

Discussion

Ethnic differences in social anxiety between Asian Americans and European Americans have been of considerable interest to both cross-cultural and clinical researchers in the past 30 years. However, most measures of social anxiety were developed and validated with only European Americans. To a large extent, previous studies have overlooked whether these measures may yield similar psychometric properties and factor structures for other ethnic groups such as Asian Americans, and whether they were configural, metric, and scalar invariant when being used in ethnic group comparisons. These limitations challenged the validity of previously found ethnic group mean differences in social anxiety between European and Asian Americans. The current study sought to fill this gap by investigating invariance of these social anxiety measures and their short forms across Asian Americans and European Americans.

A few prior studies had suggested at least some measures of social anxiety, such as SIAS (Condit et al., 2015) and SADS (Hardin & Leong, 2005) did not seem to achieve scalar invariance between Asian Americans and European Americans. In line with these previous findings, we found that among the five social anxiety measures and the four short forms, only four of them (SPS, SPS-6, SIAS-6, and SPAI-18) achieved scalar invariance. Three of the other five measures (SIAS, SPAI, and BFNE) failed to achieve anything beyond configural invariance. The last two measures, the FNES and SADS, failed to achieve configural invariance, suggesting a different number of underlying factors among Asian Americans when these two measures were used. These results have at least two implications for cross-cultural research on social anxiety. First, the majority of social anxiety measures achieved configural invariance, suggesting that key facets of social anxiety may be similar for Asian Americans and European Americans. Second, the mean differences revealed in previous studies that had used noninvariant measures, may be based on comparisons of "apples" with "oranges," and to some degree or less, reflected measurement nonequivalence between Asian Americans and European Americans. While it is possible that there are "true" differences on these noninvariant measures, lacking scalar invariance limits the ability to establish these differences between groups. Our results also showed that at least some items of these measures seemed to be understood differently by Asian Americans and European Americans, thus leading to the lack of metric invariance; or assessed the construct of social anxiety on different scales, as being shown in the lack of scalar invariance.

We explored and documented these problematic items based on their contributions to the lack of model fit via modification indices. Our effort represents an important first step for cross-cultural researchers to understand ethnic and cultural differences in social anxiety in general and more specifically, to investigate what items were responsible for the noninvariance of these measures when being used with Asian Americans and European Americans. We found that some of the noninvariant items seemed to be strongly related to one's cultural orientation toward interpersonal relationships that may vary between Asian Americans and European Americans. For instance, Items 8 and 9 on the BFNE assess fear of evaluation during a social encounter; it may be understood as a culturally appropriate sense of social cohesion among Asian Americans due to their primary cultural emphasis on interdependent self-construal that views one's identity as interconnected with the identities of those around them (Markus & Kitayama, 1991). In contrast, European Americans often view themselves as separate and independent from others (Markus & Kitayama, 1991). As a consequence, Items 8 and 9 on the BFNE may have assessed an emphasis on impression management that is viewed as culturally less necessary—even pathological—among European Americans. Clearly, additional studies of these noninvariant items, particularly using focus groups, is critical to further understand how certain facets of the construct of social anxiety may be manifested differently, or tap other related constructs among Asian Americans and European Americans.

Likewise, the SPAI contained problematic factor loadings in that the majority of its items loaded on both its agoraphobia and social phobia subscales. It is difficult to differentiate agoraphobia from social anxiety in clinical settings (Turner & Biedel, 1989), and likely more difficult in subclinical or community settings, like in the current research. The degree of overlap between these two subscales may have been further

Table 3. Summary of Psychometric Properties of Social Anxiety Scales for the Current Study.

Name of the measure	Abbr.	No. of items	Response options	Evidence for reliability: EA	Evidence for reliability: AA	Evidence for validity: EA	Evidence for validity: AA
Social Phobia Scale (Mattick & Clarke, 1998)	SPS	20	5-Point Likert-type (range: 0 [*not at all*]-4 [*extremely*])	Cronbach's α = .92; composite reliability: ω = .92	Cronbach's α = .92; composite reliability: ω = .92	Correlations with other social anxiety measures: r = .47-.79	Correlations with other social anxiety measures: r = .41-.80
Social Phobia Scale–Six-item version (Peters et al., 2011)	SPS-6	6	5-Point Likert-type (range: 0 [*not at all*]-4 [*extremely*])	Cronbach's α = .83; composite reliability: ω = .83	Cronbach's α = .82; composite reliability: ω = .82	Correlations with other social anxiety measures: r = .42-.76	Correlations with other social anxiety measures: r = .39-.73
Social Interaction Anxiety Scale (Mattick & Clarke, 1998)	SIAS	20	5-Point Likert-type (range: 0 [*not at all*]-4 [*extremely*])	Cronbach's α = .79; composite reliability: ω = .79	Cronbach's α = .76; composite reliability: ω = .77	Correlations with other social anxiety measures: r = .59-.86	Correlations with other social anxiety measures: r = .49-.82
Social Interaction Anxiety Scale–Six-item version (Peters et al., 2011)	SIAS-6	6	5-Point Likert-type (range: 0 [*not at all*]-4 [*extremely*])	Cronbach's α = .94; composite reliability: ω = .94	Cronbach's α = .90; composite reliability: ω = .90	Correlations with other social anxiety measures: r = .42-.77	Correlations with other social anxiety measures: r = .31-.79
Social Phobia and Anxiety Inventory (Turner, Beidel, & Dancu, 1996)	SPAI	45	7-Point Likert-type (range: 1 [*never*]-7 [*always*])	Cronbach's α = .87-.97; composite reliability: ω = .97	Cronbach's α = .86-.96; composite reliability: ω = .96	Correlations with other social anxiety measures: r = .59-.82	Correlations with other social anxiety measures: r = .53-.76
Social Phobia and Anxiety Inventory–18-item version (de Vente et al., 2014)	SPAI-18	18	7-Point Likert-type (range: 1 [*never*]-7 [*always*])	Cronbach's α = .74-.95; composite reliability: ω = .80	Cronbach's α = .71-.93; composite reliability: ω = .79	Correlations with other social anxiety measures: r = .60-.86	Correlations with other social anxiety measures: r = .54-.82
Fear of Negative Evaluation Scale (Watson & Friend, 1969)	FNES	30	Dichotomous (range: 0 [*false*]-1 [*true*])	Cronbach's α = .92; composite reliability: ω = .91	Cronbach's α = .91; composite reliability: ω = .91	Correlations with other social anxiety measures: r = .49-.66	Correlations with other social anxiety measures: r = .40-.59
Brief Fear of Negative Evaluation Scale (Leary, 1983)	BFNE	12	Dichotomous (range: 0 [*false*]-1 [*true*])	Cronbach's α = .87; composite reliability: ω = .87	Cronbach's α = .84; composite reliability: ω = .84	Correlations with other social anxiety measures: r = .42-.60	Correlations with other social anxiety measures: r = .31-.54
Social Avoidance and Distress Scale (Watson & Friend, 1969)	SADS	28	Dichotomous (range: 0 [*false*]-1 [*true*])	Cronbach's α = .92; composite reliability: ω = .92	Cronbach's α = .88; composite reliability: ω = .89	Correlations with other social anxiety measures: r = .50-.82	Correlations with other social anxiety measures: r = .44-.77

Note. EA = European American; AA = Asian American.

amplified by subtle differences in which symptoms of fear and withdrawal are conceptualized cross-culturally. For instance, in certain East Asian cultures, "social withdrawal"—an element characterizing both social anxiety and agoraphobia—is often used as an "idiom of distress," irrespective of the motivating factor behind it (Tajan, 2015, p. 324). Clearly, studies focusing on item-level analysis of noninvariant measures, particularly using focus groups, is a critical next step to further understand how certain facets of social anxiety may be manifested differently, or tap into other related constructs among Asian Americans and European Americans.

Due to the lack of scalar invariance for most measures, one would wonder whether the previously found group means differences in social anxiety raw scores truly reflected higher social anxiety among Asian than European Americans. To address this concern, we compared the means of the latent construct of social anxiety, defined by four scalar invariant social anxiety measures (SPS, SPS-6, SIAS-6, and SPAI-18). We found that the latent mean difference between Asian Americans and European Americans (.62) was consistent with previous findings in its predicted direction (i.e., higher social anxiety among Asian Americans) and was nearly twice that of the effect size estimate derived from Krieg and Xu's (2015) meta-analysis of raw scores (.36). Thus, it seems that the lack of equivalence in measurement may have underestimated the group-level differences in social anxiety.

The current research was also the first study to systematically examine the estimates of internal consistencies (Cronbach's alphas) and convergent validity (measured by concurrent correlations with other social anxiety measures), as well as factor structures of each social anxiety measure, for Asian Americans and European Americans, respectively. Overall our results, as shown in Table 3, indicated satisfactory psychometric properties for Asian Americans, and comparable factor structure for Asian Americans and European Americans. The scores of all measures, both those shown to be scalar invariant and those that only obtained evidence for configural invariance, demonstrated good reliability and validity estimates. However, these psychometric properties should be interpreted with caution when a given measure failed to attain evidence for metric invariance, which indicates a fundamental difference in the respective groups' understanding of the construct.

Limitations and Future Directions

While the current study provided preliminary support for internal consistency and validity of scores from the five social anxiety measures and the four short forms, estimates of the psychometric properties of these measures' scores are still lacking for ethnic groups other than European Americans (Melka, Lancaster, Adams, Howarth, & Rodriguez, 2010). Likewise, among Asian Americans, there was still very little evidence for test–retest reliability and discriminant validity, and researchers who studied social anxiety among ethnic minority groups often erroneously cited evidence for criterion-based validity based solely on studies of European Americans. Future studies need to establish other evidence for reliability and validity among social anxiety scores generated by Asian Americans and other ethnic minority members. Such efforts could focus on test–retest correlations, discriminant validity, or task-based criterion validity.

There is also a clear need to replicate our results of measurement invariance in other samples of Asian Americans. Asian American represents a diverse group that varies significantly in their languages, immigration history, and cultural traditions (Chin & Kameoka, 2006). Our sample was limited to individuals of East Asian heritage (e.g., Japanese, Chinese, Korean) and had only a few first generation immigrants (n = 29). Although the prior meta-analysis (Krieg & Xu, 2015) found that generational status and acculturation was not related to the mean ethnic group difference in social anxiety, it remains to be seen whether other characteristics of Asian Americans may contribute to higher social anxiety among this ethnic group. Likewise, our sample consisted of mostly female, undergraduate students who may not be as representative of community or clinical samples. Of particular note, prior findings have also demonstrated that female participants tend to self-report higher social anxiety compared with their male counterparts (e.g., Xu et al., 2012). Future research could examine the measurement invariance of these scales between men and women in European American and Asian American samples. At the same time, prior research suggests that despite these limitations to external validity, the use of undergraduates to model psychopathology has both empirical and clinical value (Gotlib, 1984). More recently, epidemiological studies have shown similar rates of social anxiety in undergraduate students in comparison with their non-college-attending peers (Blanco et al., 2008), suggesting that both college and community samples may show a similar distribution in the continuum of social anxiety symptoms.

Another potential limitation related to our sample characteristics includes the limited sample size. Our sample consisted of 232 Asian Americans and 193 European Americans. While simulation studies demonstrate consistent and acceptable results with the WLSMV estimator with sample sizes of 400 cases (Muthén, du Toit, & Spisic, 1997), this figure may be less relevant to the current study due to our sample being divided by ethnic group in order to test for measurement invariance. Cheung and Rensvold (2002) recommend sample sizes of at least 200 participants per group, and one of our group's sample size falls just short of that benchmark.

It should be pointed out that evidence of measurement invariance is not equivalent to that of cultural validity.

Cultural validity refers to whether members of different cultural group understand and interpret the content of questions and the measurement procedure in the same way (Greenfield, 1997). While results of measure invariance are important in helping cross-cultural and clinical researchers choose appropriate measures in comparing social anxiety between Asian Americans and European Americans, examination of cultural validity provides additional evidence on *why* certain items of social anxiety achieve or fail to achieve invariance across different cultural or ethnic groups. As pointed out by Greenfield (1997), studies that use mixed methods, including not only standardized questionnaires but also qualitative methods such as focus groups and ethnographic interviews, are needed to further establish evidence of cultural validity of these social anxiety measures in various cultural and ethnic groups.

Finally, the reliance on self-report questionnaires to measure constructs such as social anxiety has been criticized by methodologists due to the arbitrary metric of Likert-type scales that may be particularly problematic in cross-cultural comparisons (Blanton & Jaccard, 2006). While a claim can be made in a relative sense, such that Asian Americans may report higher social anxiety than European Americans, there is no ground to argue that Asian Americans tend to be socially anxious or are at risk for developing social anxiety disorder, because high scores on Likert-type scales (e.g., scoring a "7" on a 7-point scale) says little about "true" level of the underlying social anxiety construct, unless the meaning of such metric can be established in relation to observation of socially anxious behavior or diagnosis of social anxiety disorder. Additional work is needed to establish a nomological network through which the construct of social anxiety can be cross-validated with other types of measures than self-reports, in various cultural and ethnic groups.

Despite these limitations, the current study was the first to comprehensively examine psychometric properties and three types of invariance in all the social anxiety measures that had been used more than once in comparisons of Asian Americans and European Americans. Our findings provided systematic evidence for cross-cultural and clinical researchers who are interested in understanding and explaining both cultural similarities and differences in social anxiety.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Notes

1. While the recently developed SPS-6, SIAS-6, and SPAI-18 have not yet been used in comparing social anxiety between Asian Americans and European Americans, we investigated the psychometric properties and measurement invariance for these short forms due to both the popularity of the corresponding long forms (SPS, SIAS, and SPAI) and the preference for short forms among clinical practitioners.
2. We also found evidence of configural, metric, and scalar invariance for another measure: the Liebowitz Social Anxiety Scale (Liebowitz, 1987). However, this result was not included because Liebowitz Social Anxiety Scale had not been used to compare social anxiety between Asian Americans and European Americans in prior studies.
3. Some researchers recommend using more stringent, empirically based cutoffs that vary based on the specific test of measurement invariance. However, Cheung and Rensvold (2002) conclude that between-model variation is quite small and that general criteria can be used. For simplicity's sake, we used the general recommended cutoffs for the CFI and MFI.

References

Aderka, I. M., Nickerson, A., Bøe, H. J., & Hofmann, S. G. (2012). Sudden gains during psychological treatments of anxiety and depression: A meta-analysis. *Journal of Consulting and Clinical Psychology*, *80*, 93-101. doi:10.1037/a0026455

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: Author.

Beidel, D. C., Turner, S. M., Stanley, M. A., & Dancu, C. V. (1989). The Social Phobia and Anxiety Inventory: Concurrent and external validity. *Behavior Therapy*, *20*, 417-427. doi:10.1016/S0005-7894(89)80060-7

Blanco, C., Okuda, M., Wright, C., Hasin, D. S., Grant, B. F., Liu, S.-M., & Olfson, M. (2008). Mental health of college students and their non-college-attending peers. *Archives of General Psychiatry*, *65*, 1429-1437. doi:10.1001/archpsyc.65.12.1429

Blanton, H., & Jaccard, J. (2006). Arbitrary metrics in psychology. *The American Psychologist*, *61*, 27–41. doi:10.1037/0003-066X.61.1.62

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: The Guilford Press.

Byrne, B. M., Shavelson, R. J., & Muthén, B. (1989). Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. *Psychological Bulletin*, *105*, 456-466. doi:10.1037/0033-2909.105.3.456

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, *9*, 233-255. doi:10.1207/S15328007SEM0902_5

Chin, D., & Kameoka, V. A. (2006). Sociocultural influences. In F. Andrasik (Ed.), *Comprehensive handbook of personality and psychopathology: Vol. 2: Adult Psychopathology* (pp. 67-84). Hoboken, NJ: John Wiley.

Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. In R. G. Heimberg, M. R. Liebowitz, D. A. Hope, &

F. R. Schneier (Eds.), *Social phobia: Diagnosis, assessment, and treatment* (pp. 69-93). New York, NY: Guilford Press.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

Condit, C. S., Carter, M. M., Tang, D., & Rothstein, L. A. (2015). Cultural validity and the measurement of social anxiety: Asian American groups are not psychometrically equivalent. *Journal of Depression and Anxiety*, *4*, 174-182. doi:10.4172/2167-1044.1000174

de Vente, W., Majdandžić, M., Voncken, M. J., Beidel, D. C., & Bögels, S. M. (2014). The SPAI-18, a brief version of the Social Phobia and Anxiety Inventory: Reliability and validity in clinically referred and non-referred samples. *Journal of Anxiety Disorders*, *28*, 140-147. doi:10.1016/j.janxdis.2013.05.003

Doucette-Gates, A., Brooks-Gunn, J., & Chase-Lansdale, P. L. (1998). The role of bias and equivalence in the study of race, class, and ethnicity. In V. C. McLoyd & L. Steinberg (Eds.), *Studying minority adolescents: Conceptual, methodological, and theoretical issues* (pp. 211-236). Mahwah, NJ: Lawrence Erlbaum.

Enders, C. K., & Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling*, *8*, 430-457. doi:10.1207/S15328007SEM0803_5

Fergus, T. A., Valentiner, D. P., Kim, H.-S., & McGrath, P. B. (2014). The Social Interaction Anxiety Scale (SIAS) and the Social Phobia Scale (SPS): A comparison of two short-form versions. *Psychological Assessment*, *26*, 1281-1291. doi:10.1037/a0037313

Gotlib, I. H. (1984). Depression and general psychopathology in university students. *Journal of Abnormal Psychology*, *93*, 19-30. doi:10.1037/0021-843X.93.1.19

Greenfield, P. M. (1997). You can't take it with you: Why ability assessments don't cross cultures. *American Psychologist*, *52*, 1115-1124. doi:10.1037/0003-066X.52.10.1115

Hambrick, J. P., Rodebaugh, T. L., Balsis, S., Woods, C. M., Mendez, J. L., & Heimberg, R. G. (2010). Cross-ethnic measurement equivalence of measures of depression, social anxiety, and worry. *Assessment*, *17*, 155-171. doi:10.1177/1073191109350158

Hardin, E. E., & Leong, F. T. (2005). Optimism and pessimism as mediators of the relations between self-discrepancies and distress among Asian and European Americans. *Journal of Counseling Psychology*, *52*, 25-35. doi:10.1037/0022-0167.52.1.25

Heene, M., Hilbert, S., Freudenthaler, H. H., & Bühner, M. (2012). Sensitivity of SEM fit indexes with respect to violations of uncorrelated errors. *Structural Equation Modeling*, *19*, 36-50. doi:10.1080/10705511.2012.634710

Heimberg, R. G., Brozovich, F. A., & Rapee, R. M. (2010). A cognitive behavioral model of social anxiety disorder: Update and extension. In S. G. DiBartolo & P. M. Hofmann (Eds.), *Social anxiety: Clinical, developmental, and social perspectives* (2nd ed., pp. 395-422). San Diego, CA: Elsevier Academic Press. doi:10.1016/b978-0-12-375096-9.00015-8

Hong, J. J., & Woody, S. R. (2007). Cultural mediators of self-reported social anxiety. *Behaviour Research and Therapy*, *45*, 1779-1789. doi:10.1016/j.brat.2007.01.011

Hsu, L., & Alden, L. E. (2007). Social anxiety in Chinese- and European-heritage students: The effect of assessment format and judgments of impairment. *Behavior Therapy*, *38*, 120-131. doi:10.1016/j.beth.2006.06.006

Hsu, L., Woody, S. R., Lee, H.-J., Peng, Y., Zhou, X., & Ryder, A. G. (2012). Social anxiety among East Asians in North America: East Asian socialization or the challenge of acculturation? *Cultural Diversity & Ethnic Minority Psychology*, *18*, 181-191. doi:10.1037/a0027690

Hu, L., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods*, *3*, 424-453. doi:10.1037/1082-989X.3.4.424

Hurley, A. E., Scandura, T. A., Schriesheim, C. A., Brannick, M. T., Seers, A., Vandenberg, R. J., & Williams, L. J. (1997). Exploratory and confirmatory factor analysis: Guidelines, issues, and alternatives. *Journal of Organizational Behavior*, *18*, 667-683. doi:10.1002/(SICI)1099-1379(199711)18:6<667::AID-JOB874>3.0.CO;2-T

Jöreskog, K. G. (1990). New developments in LISREL: Analysis of ordinal variables using polychoric correlations and weighted least squares. *Quality & Quantity, 24*, 387-404. doi:10.1007/bf00152012

Kessler, R. C., & Greenberg, P. E. (2002). The economic burden of anxiety and stress disorders. *Neuropsychopharmacology*, *67*, 982-992.

Kessler, R. C., Stein, M. B., & Berglund, P. (1998). Social phobia subtypes in the National Comorbidity Survey. *American Journal of Psychiatry*, *155*, 613-619. doi:10.1176/ajp.155.5.613

Knight, G. P., & Hill, N. E. (1998). Measurement equivalence in research involving minority adolescents. In V. McLoyd & L. Steinberg (Eds.), *Studying minority adolescents: Conceptual, methodological and theoretical issues* (pp. 183-210). Hillsdale, NJ: Lawrence Erlbaum.

Krieg, A., & Xu, Y. (2015). Ethnic differences in social anxiety between individuals of Asian heritage and European heritage: A meta-analytic review. *Asian American Journal of Psychology*, *6*, 66-80. doi:10.1037/a0036993

Lau, A. S., Fung, J., Wang, S., & Kang, S.-M. (2009). Explaining elevated social anxiety among Asian Americans: Emotional attunement and a cultural double bind. *Cultural Diversity & Ethnic Minority Psychology*, *15*, 77-85. doi:10.1037/a0012819

Le Blanc, A. L., Bruce, L. C., Heimberg, R. G., Hope, D. A., Blanco, C., Schneier, F. R., & Liebowitz, M. R. (2014). Evaluation of the psychometric properties of two short forms of the Social Interaction Anxiety Scale and the Social Phobia Scale. *Assessment*, *21*, 312-323. doi:10.1177/1073191114521279

Leary, M. R. (1983). A brief version of the Fear of Negative Evaluation Scale. *Personality and Social Psychology Bulletin*, *9*, 371-375. doi:10.1177/0146167283093007

Lee, M. R., Okazaki, S., & Yoo, H. C. (2006). Frequency and intensity of social anxiety in Asian Americans and European Americans. *Cultural Diversity & Ethnic Minority Psychology*, *12*, 291-305. doi:10.1037/1099-9809.12.2.291

Liebowitz, M. R. (1987). Social phobia. *Modern Problems of Pharmacopsychiatry*, *22*, 141-173. doi:10.1159/000414022

Little, T. D. (1997). Mean and covariance structures (MACS) analyses of cross-cultural data: Practical and theoretical issues. *Multivariate Behavioral Research*, *32*, 53-76. doi:10.1207/s15327906mbr3201_3

Mak, W. W. S., Law, R. W., & Teng, Y. (2011). Cultural model of vulnerability to distress: The role of self-construal and sociotropy on anxiety and depression among Asian Americans and European Americans. *Journal of Cross-Cultural Psychology*, *42*, 75-88. doi:10.1177/0022022110361713

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*, 224-253. doi:10.1037/0033-295x.98.2.224

Marsella, A. J., & Yamada, A. M. (2007). Culture and psychopathology: Foundations, issues, and directions. In S. K. D. Cohen (Ed.), *Handbook of cultural psychology* (pp. 797-818). New York, NY: Guilford Press.

Marsh, H. W., & Hocevar, D. (1985). Application of confirmatory factor analysis to the study of self-concept: First- and higher order factor models and their invariance across groups. *Psychological Bulletin*, *97*, 562-582. doi:10.1037/0033-2909.97.3.562

Mattick, R. P., & Clarke, J. C. (1998). Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behaviour Research and Therapy*, *36*, 455-470. doi:10.1016/s0005-7967(97)10031-6

Melka, S. E., Lancaster, S. L., Adams, L. J., Howarth, E. A., & Rodriguez, B. F. (2010). Social anxiety across ethnicity: A confirmatory factor analysis of the FNE and SAD. *Journal of Anxiety Disorders*, *24*, 680-685. doi:10.1016/j.janxdis.2010.04.011

Meredith, W. (1993). Measurement invariance, factor analysis and factorial invariance. *Psychometrika*, *58*, 525-543. doi:10.1007/BF02294825

Moscovitch, D. A., Rodebaugh, T. L., & Hesch, B. D. (2012). How awkward! Social anxiety and the perceived consequences of social blunders. *Behaviour Research and Therapy*, *50*, 142-149. doi:10.1016/j.brat.2011.11.002

Muthén, B. O., du Toit, S. H., & Spisic, D. (1997). Robust inference using weighted least squares and quadratic estimating equations in latent variable modeling with categorical and continuous outcomes. *Psychometrika*, *75*, 49. doi:10.2139/ssrn.201668

Norton, P. J., & Weeks, J. W. (2009). A multi-ethnic examination of socioevaluative fears. *Journal of Anxiety Disorders*, *23*, 904-908. doi:10.1016/j.janxdis.2009.05.008

Okazaki, S. (1997). Sources of ethnic differences between Asian American and White American college students on measures of depression and social anxiety. *Journal of Abnormal Psychology*, *106*, 52-60. doi:10.1037/0021-843x.106.1.52

Okazaki, S., Liu, J. F., Longworth, S. L., & Minn, J. Y. (2002). Asian American-White American differences in expressions of social anxiety: A replication and extension. *Cultural Diversity & Ethnic Minority Psychology*, *8*, 234-247. doi:10.1037/1099-9809.8.3.234

Okazaki, S., & Sue, S. (1995). Methodological issues in assessment research with ethnic minorities. *Psychological Assessment*, *7*, 367-375. doi:10.1037/1040-3590.7.3.367

Osman, A., Barrios, F. X., Aukes, D., & Osman, J. R. (1995). Psychometric evaluation of the social phobia and anxiety inventory in college students. *Journal of Clinical Psychology*, *51*, 235-243. doi:10.1002/1097-4679(199503)51:2<235::AID-JCLP2270510213>3.0.CO;2-R

Osman, A., Gutierrez, P. M., Barrios, F. X., Kopper, B. A., & Chiros, C. E. (1998). The Social Phobia and Social Interaction Anxiety Scales: Evaluation of psychometric properties. *Journal of Psychopathology and Behavioral Assessment*, *20*, 249-264. doi:10.1023/A:1023067302227

Oyserman, D., Coon, H. M., & Kemmelmeier, M. (2002). Rethinking individualism and collectivism: Evaluation of theoretical assumptions and meta-analyses. *Psychological Bulletin*, *128*, 3-72. doi:10.1037/0033-2909.128.1.3

Park, I. J. K., Sulaiman, C., Schwartz, S. J., Kim, S. Y., Ham, L. S., & Zamboanga, B. L. (2011). Self-construals and social anxiety among Asian American college students: Testing emotion suppression as a mediator. *Asian American Journal of Psychology*, *2*, 39-50. doi:10.1037/a0023183

Paulhus, D. L., Duncan, J. H., & Yik, M. S. M. (2002). Patterns of shyness in East-Asian and European-heritage students. *Journal of Research in Personality*, *36*, 442-462. doi:10.1016/S0092-6566(02)00005-3

Peters, L., Sunderland, M., Andrews, G., Rapee, R. M., & Mattick, R. P. (2011). Development of a short form Social Interaction Anxiety (SIAS) and Social Phobia Scale (SPS) using nonparametric item response theory: The SIAS-6 and the SPS-6. *Psychological Assessment*, *24*, 66-76. doi:10.1037/a0024544

Pineles, S. L., & Mineka, S. (2005). Attentional biases to internal and external sources of potential threat in social anxiety. *Journal of Abnormal Psychology*, *114*, 314-318. doi:10.1037/0021-843X.114.2.314

Rapee, R. M., & Heimberg, R. G. (1997). A cognitive-behavioral model of anxiety in social phobia. *Behaviour Research and Therapy*, *35*, 741-756. doi:10.1016/s0005-7967(97)00022-3

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*, 1-36.

Ruscio, A. M., Brown, T. A., Chiu, W. T., Sareen, J., Stein, M. B., & Kessler, R. C. (2008). Social fears and social phobia in the USA: Results from the National Comorbidity Survey Replication. *Psychological Medicine*, *38*, 15-28. doi:10.1017/s0033291707001699

Sass, D. A. (2011). Testing measurement invariance and comparing latent factor means within a confirmatory factor analysis framework. *Journal of Psychoeducational Assessment*, *29*, 347-363. doi:10.1177/0734282911406661

Spokas, M., Luterek, J. A., & Heimberg, R. G. (2009). Social anxiety and emotional suppression: The mediating role of beliefs. *Journal of Behavior Therapy and Experimental Psychiatry*, *40*, 283-291. doi:10.1016/j.jbtep.2008.12.004

Sue, D. M., Sue, D. M., & Ino, S. (1983). Nonassertiveness of Asian Americans: An inaccurate assumption? *Journal of Counseling Psychology*, *30*, 581-588. doi:10.1037/0022-0167.30.4.581

Tajan, N. (2015). Social withdrawal and psychiatry: A comprehensive review of Hikikomori. *Neuropsychiatrie de l’Enfance et de l’Adolescence*, *63*, 324-331. doi:10.1016/j.neurenf.2015.03.008

Turner, S. M., & Beidel, D. C. (1989). Social phobia: Clinical syndrome, diagnosis, and comorbidity. *Clinical Psychology Review, 9*, 3-18. doi:10.1016/0272-7358(89)90043-3.

Turner, S. M., Beidel, D. C., & Dancu, C. V. (1996). *Social Phobia and Anxiety Inventory: Manual*. Toronto, Ontario, Canada: Multi-Health Systems.

Turner, S. M., Beidel, D. C., Dancu, C. V., & Stanley, M. A. (1989). An empirically derived inventory to measure social fears and anxiety: The Social Phobia and Anxiety Inventory. *Psychological Assessment*, *1*, 35-40. doi:10.1037//1040-3590.1.1.35

van Buuren, S., Brand, J. P. L., Groothuis-Oudshoorn, C. G. M., & Rubin, D. B. (2006). Fully conditional specification in multivariate imputation. *Journal of Statistical Computation and Simulation*, *76*, 1049-1064. doi:10.1080/10629360600810434

van Buuren, S., & Groothuis-Oudshoom, K. (2011). mice: Multivariate Imputation by Chained Equations in R. *Journal of Statistical Software*, *45*, 1-67.

Vandenberg, R. J. (2002). Toward a further understanding of an improvement in measurement invariance methods and procedures. *Organizational Research Methods*, *5*, 139-158. doi:10.1177/1094428102005002001

Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods*, *3*, 4-70. doi:10.1177/109442810031002

Watson, D., & Friend, R. (1969). Measurement of social-evaluative anxiety. *Journal of Consulting and Clinical Psychology*, *33*, 448-457. doi:10.1037/h0027806

Wittchen, H-U. U., & Beloch, E. (1996). The impact of social phobia on quality of life. *International Clinical Psychopharmacology*, *11*, 15-23. doi:10.1097/00004850-199606003-00004

Woody, S. R., Miao, S., & Kellman-McFarlane, K. (2015). Cultural differences in social anxiety: A meta-analysis of Asian and European heritage samples. *Asian American Journal of Psychology, 6*, 47-55. doi:10.1037/a0036548

Xu, Y., Schneier, F., Heimberg, R. G., Princisvalle, K., Liebowitz, M. R., Wang, S., & Blanco, C. (2012). Gender differences in social anxiety disorder: Results from the national epidemiologic sample on alcohol and related conditions. *Journal of Anxiety Disorders*, *26*, 12-19. doi:10.1016/j.janxdis.2011.08.006