Article

Measurement and Evaluation in Counseling and Development
Volume 42 Number 3
October 2009 179-196
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10.1177/0748175609344093
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Factorial Invariance of the Asian American Family Conflicts Scale Across Ethnicity, Generational Status, Sex, and Nationality

Matthew J. Miller
University of Maryland–College Park
Richard M. Lee
University of Minnesota–Twin Cities

The factorial invariance of the Asian American Family Conflicts Scale–Likelihood (FCS-L) was examined in a sample of 1,012 participants. Results support the use of the FCS-L in future research with diverse Asian subgroups. Limitations and future directions for research are discussed.

Keywords: *Asian American; family conflict; factorial invariance; measurement invariance*

Scholars have noted the cultural richness and diversity within the Asian American population (cf. Chun, Morera, Andal, & Skewes, 2007; Min, 2006; Nagayama Hall & Okazaki, 2002; Sandhu, 1997; Sue & Sue, 2008). There are as many as 40 different Asian ethnic groups, each with their own unique language(s), values, customs, practices, and sociopolitical histories (Min, 2006; Nagayama Hall & Barongan, 2002; Sandhu, 1997). In light of the rich diversity among Asian ethnic groups, factorial invariance, which is defined as the degree to which tests or inventories measure a construct in an equivalent fashion across different groups (Byrne, Shavelson, & Muthén, 1989), is a critical methodological issue to consider in Asian American psychological research. It is important to note that factorial invariance is not solely a property of a given measure; instead, it is dependent on the properties of a measure and the characteristics of the cultural group of interest (cf. van de Vijver & Leung, 1997). Therefore, providing evidence of factorial invariance for each cultural group of interest is an important component of the measure validation process (Messick, 1995). If, in fact, each Asian ethnicity represents a distinct cultural group, it would seem that providing evidence of factorial invariance across the Asian ethnic groups would be an important component of Asian American psychological research (cf. Ang, Lau, Tan, & Lim, 2007). For example, a common strategy in Asian American psychological research is to recruit participants from a number of culturally and ethnically heterogeneous Asian ethnic groups (e.g., Korean, Vietnamese, Pakistani, etc.) and treat them as a homogeneous racial group (e.g., Asian Americans). This strategy operates under the assumption that data from an ethnically diverse Asian sample can be meaningfully interpreted and generalized to a broader Asian American population. In addition, it assumes that the selected assessment tools are appropriate and operate in an equivalent fashion for each of the distinct

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ethnic groups represented. Researchers might assume that measures that demonstrate the ability to provide reliable and valid scores must also operate (e.g., demonstrate equal factor loadings and item intercept values) in an equivalent manner across ethnic groups even in the absence of empirical support. In addition, if factorial invariance is not established, interpretations of mean score scale differences across different Asian ethnic groups (i.e., that differences in mean scores reflect true difference in the construct of interest) are at best tenuous and at worst erroneous without such empirical evidence (Horn & McArdle, 1992; Steenkamp & Baumgartner, 1998). Yet there are surprisingly few empirical investigations that assess the factorial invariance of commonly used measures with Asian ethnic subpopulations. Given the recent calls for attending to the diversity of Asian ethnic groups in research (cf. Chun et al., 2007; Okazaki, 2002), it would seem that providing evidence of factorial invariance for commonly used culture-specific measures would facilitate research that would shed light on the diversity of experiences among Asian ethnic groups.

Factorial Invariance

Factorial invariance requires two types of empirical evidence: measurement invariance and structural invariance (Byrne et al., 1989; Vandenberg & Lance, 2000). Measurement invariance assesses whether the factor configuration, loadings, item intercepts, and unique error variances are significantly different across groups or not. Measurement invariance is typically demonstrated through a number of sequential invariance tests including configural, metric, scalar, and uniqueness invariance. These different tests of measurement invariance focus primarily on the fit of the hypothesized measurement model across groups. Specifically, configural invariance assesses the degree to which the pattern of factor loadings is the same across independent samples and does not require that any model parameters be constrained to be equivalent across samples. Metric invariance assesses the degree to which observed items relate to their respective factor in an equivalent fashion and, therefore, allows the researcher to examine the degree to which items are being interpreted in the same way across different groups (Byrne et al., 1989; Horn & McArdle, 1992; Widaman & Reise, 1997). Scalar invariance assesses the equivalence of item intercepts and provides an indication of the value of the item when the common factor is zero (Bontempo & Hofer, 2007). Finally, uniqueness invariance is the degree to which error variance in each measured item is equivalent across groups. It might be important to note that some researchers have suggested that tests of uniqueness invariance are overly restrictive (cf. Bentler, 2004; Dimitrov, 2006).

Once measurement invariance is established, structural invariance can be examined (Widaman & Reise, 1997). Structural invariance assesses whether factor variances, covariances, and latent means are equivalent across groups (Bontempo & Hofer, 2007; Byrne et al., 1989; Vandenberg & Lance, 2000). Testing for the equivalence of factor variance(s) assesses the way in which the breadth of the latent factor is being operationalized equivalently (Cheung & Rensvold, 2002). The equivalence of factor variances is necessary when attempting to determine the reliability of measured indicators across groups. The test of equivalence of factor covariances assesses the degree to which factor intercorrelations are the same across groups. Whereas tests of equivalence of latent means are somewhat rare in the literature, the examination of latent means as opposed

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to observed means is advantageous because error (random measurement error and unique error) has been parceled out (Bontempo & Hofer, 2007; Cheung & Rensvold, 2002; Vandenberg & Lance, 2000).

Asian American Family Conflicts Scale–Likelihood

The Asian American Family Conflicts Scale–Likelihood (FCS-L, Lee, Choe, Kim, & Ngo, 2000) assesses family conflicts because of intergenerational and acculturation differences within immigrant families. The FCS-L has been used with a number of Asian ethnic groups (e.g., Hmong, Korean, Chinese, Vietnamese, Asian Indian; Berkel & Constantine, 2005; Fu, 2002; Huang, 2006; Kang, 2006; Lee et al., 2000; Lee & Liu, 2001; Lee, Su, & Yoshida, 2005; Leong, 2005; Liang, 2005; Lin, Grome, & Miller, 2007; Nguyen, 2003; Su, Lee, & Vang, 2005) as well as with European American, African American, and Latino/Latina populations (Berkel & Constantine, 2005; Constantine & Flores, 2006; Lee & Liu, 2001). It has been correlated with a variety of outcomes measures including career aspirations (Constantine & Flores, 2006), acculturation (Fu, 2002; Huang, 2006; Leong, 2005), acculturative stress (Lin et al., 2007), psychological adjustment (Lee et al., 2005; Su et al., 2005), and life satisfaction (Berkel & Constantine, 2005). Although previous studies have examined the factorial stability of the measure and established evidence for construct validity (e.g., Lee et al., 2000; Lee et al., 2001; Lee & Liu, 2001), it remains unclear whether the FCS-L operates in an equivalent fashion across Asian ethnic groups. Likewise, there is scant evidence to suggest that the FCS-L operates similarly across other Asian subpopulations including generation status, gender, and nationality.

It is possible that Asian ethnic, generational, sex, and nationality groups might experience culture-specific family conflict differently and thus may respond differently to FCS-L items. For example, more recent immigrant families are more likely to experience culture-specific conflict because the acculturation gap is arguably widest soon after immigration when children acculturate to the new culture at a faster rate than their parents do (Lee et al., 2000). By contrast, second-generation children (born in the United States) are less likely to experience culture-specific family conflict because their parents have had several years to acculturate to the new culture. Regarding ethnic groups, Southeast Asian groups (e.g., Hmong) might be more likely to experience culture-specific family conflict compared to East Asian groups (e.g., Korean) because of refugee status and their more recent history of immigration (Lee, Jung, Su, Tran, & Bahrassa, 2009; Tatman, 2004). Finally, culture-specific family conflict in China, for example, would likely differ from family conflict for Chinese American families given the different nature of cultural interaction across nations. Demonstrating factorial invariance across these Asian subgroups would provide further evidence regarding the construct validity of the FCS-L.

For this study, we conducted factorial invariance tests to provide further evidence for the construct validity of FCS-L scores with Asian Americans (Messick, 1995). Specifically, we were interested in (a) assessing the degree to which the hypothesized one factor measurement model of the FCS-L was supported by the data and (b) examining the generalizability of FCS-L scores across a number of Asian subgroups by testing its factorial invariance across ethnicity, generational status, sex, and nationality.

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Method

Participants

The overall sample (N = 1,012) used in this study represents eight independent data sets comprised of Asian American and Chinese National college-aged participants (for more information on each independent data set see Cao & Miller, 2008; Lee et al., 2000; Lee et al., 2009; Lee & Liu, 2001; Lee et al., 2005; Lin et al., 2007; Su et al., 2005). Individuals from each data set (except the Chinese Nationals) were identified and grouped via their self-identified Asian ethnic group. This process resulted in three separate ethnic (Korean American, Chinese American, and Hmong American) samples. For conceptual reasons, the Chinese National sample was not incorporated into the Asian American ethnic group samples. Instead, the Chinese National sample along with the Chinese American sample was used to examine FCS-L equivalence across nationality. To examine equivalence across gender and generation status, the overall U.S. sample was resorted based on self-reported generation (first and second generation) status and gender (female and male).

Samples

Korean Americans. The Korean American sample consisted of 201 participants (107 women and 94 men). The mean age for the sample was 21.92 (SD = 4.34). Mean years in the United States was 18.01 (SD = 6.08). Of the individuals, 85 self-identified as first generation, whereas 110 identified as second generation. Other generations represented were 1.5 (n = 3) and fourth (n = 1), with 2 individuals indicating "other."

Chinese Americans. The Chinese American sample consisted of 269 participants (146 women, 122 men, and 1 did not provide information). The mean age for the sample was 19.98 (SD = 2.06). Mean years in the United States was 17.54 (SD = 5.05). Of the individuals, 102 self-identified as first generation and 143 and 12 identified as second and third generation, respectively. Other generations represented were fourth (n = 11) and fifth (n = 3), with 5 individuals indicating "other."

Hmong Americans. The Hmong American sample consisted of 225 participants (133 women, 91 men, and 1 did not provide information). The mean age for the sample was 19.92 (SD = 1.25). Of the individuals, 64 self-identified as first generation and 135 identified as second generation. Other generations represented were fourth (n = 2) and fifth (n = 1), with 4 individuals indicating "other." In addition, 19 of the participants endorsed a refugee status.

Chinese Nationals. The Chinese National sample consisted of 317 undergraduate participants (191 women, 126 men, and 7 did not provide information). The mean age for the sample was 20.47 (SD = 1.76). A majority of participants (n = 287) had never traveled outside of China, and approximately half (n = 168) were from rural regions in China.

Measures

Asian American Family Conflicts Scale (FCS). The FCS (Lee et al., 2000) is a 10-item measure of intergenerational family conflict because of cultural differences in values and expectations (see the appendix). The FCS provides 10 family conflict situations that participants are required to rate on a 5-point scale according to likelihood of occurrence (1 = *almost never* to 5 = *almost always*) and seriousness of the conflict

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(1 = *not at all* to 5 = *extremely*). In addition, a family conflict intensity score can be estimated by obtaining the average of the mean items scores for the Likelihood and Seriousness subscales. For this study, only data from the Likelihood subscale (FCS-L) was analyzed because of inconsistencies in use of the Seriousness subscale across independent samples. In this study, FCS-L scores provided internal consistency reliability estimates (Cronbach's alphas) of .87, .90, .86, and .78 for Chinese Americans, Korean Americans, Hmong Americans, and Chinese Nationals, respectively. In addition, the FCS-L scores produced alphas of .90 and .86 for women and men, respectively, and .88 and .88 for first-generation and second-generation Asian Americans, respectively. For the Chinese National data, the FCS-L was translated into Chinese using translation and back translation (Brislin, 1993) by graduate students fluent in both Chinese and English. To achieve semantic equivalence, the English FCS-L was translated into Chinese. Next, another graduate student back translated the instrument, remaining blind to the original measures. Finally, another graduate student examined the back-translated version against the original FCS-L.

Results

Analytic Strategy

The factorial invariance of the FCS-L was assessed using a similar multistep method as outlined by Byrne (1998), Dimitrov (2006), Jöreskog and Sörbom (1996), and Vandenberg and Lance (2000). Specifically, the measurement and structural invariance of the FCS-L was assessed in a series of increasingly stringent model comparisons. Covariance and asymptotic covariance matrices were analyzed via LISREL 8.54 (Jöreskog & Sörbom, 1996). The Satorra-Bentler scaled chi-square (Satorra & Bentler, 1994) was selected to adjust for the presence of nonnormal data. In addition, the standardized root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), and the comparative fit index (CFI) were used to assess model fit. Using a single index strategy (cf. Hu & Bentler, 1999), SRMR value less than or equal to .09, RMSEA values less than .10, and CFI values greater than or equal to .90 are individually indicative of adequate model fit (Bentler, 1990; Browne & Cudeck, 1992; Hu & Bentler, 1998; Hu & Bentler, 1999). As an alternative to the single index strategy, Hu and Bentler (1999) suggested a robust two-index combination rule for assessing model fit. Hu and Bentler suggested a CFI cutoff value close to .95 in combination with a SRMR cutoff value close to .09 for evaluating model fit. Because there is some debate regarding rules of thumb for cutoff values for determining adequate model fit (cf. Hu & Bentler, 1999), both the single-index and two-index approaches were used to evaluate model fit.

Likelihood ratio tests using Satorra and Bentler's (2001) chi-square difference test (T_d) were used to compare competing models. Likelihood ratio tests assessed the degree to which the observed change in model fit (i.e., reduction or increase of scaled chi-square values) for two competing models was significantly different from zero. These analyses tested whether constraining specified model parameters (e.g., factor loadings) across groups resulted in a significant improvement or worsening of model fit. To reduce the probability of experiment-wise error, a p value of .01 as an indication of statistical significance was selected a priori.

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Table 1
Fit Statistics for Independent Tests of the FCS-L Measurement Model Across Asian Subgroups

FCS Model	SB χ^2	*p*	*df*	SRMR	RMSEA	CFI
Korean American	84.419	<.000	35	.0597	.084 (.061; .107)	.950
Chinese American	92.599	<.000	35	.0532	.078 (.059; .098)	.970
Hmong American	91.082	<.000	35	.0485	.084 (.063; .106)	.975
First generation	94.674	<.000	35	.0496	.082 (.062; .103)	.967
Second generation	130.668	<.00	35	.0488	.084 (.068; .099)	.968
Female	122.766	<.00	35	.0459	.087 (.070; .104)	.973
Male	99.080	<.000	35	.0518	.077 (.059; .095)	.965
Chinese National	122.562	<.00	35	.0648	.088 (.071; .105)	.914

Note: FCS-L = Asian American Family Conflicts Scale–Likelihood; SB χ^2 = Satorra-Bentler scaled chi square; *df* = degrees of freedom; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; CFI = comparative fit index. RMSEA values in parentheses represent 90% confidence intervals.

Step One: Configural Invariance

Ethnic groups. Based on the two-index approach to model fit, the FCS-L measurement model exhibited good model fit for the Korean, Chinese, and Hmong samples (see Table 1). However, it is important to note that given the high RMSEA value the model demonstrated an adequate fit based on the single-index approach. All but 1 of the 30 estimated model parameters were significant for the Korean (intercept for item 10) and Chinese (intercept for item 3) samples, whereas 4 (intercepts for items 2, 3, 8, and 10) were nonsignificant for the Hmong sample (a table of parameters estimates and standard errors for all samples is available from the first author). The model accounted for 40, 42, and 49% of the variance in FCS-L items for Korean, Chinese, and Hmong Americans, respectively. This evidence combined with the overall pattern of fit statistics suggested that the model appeared to adequately fit the data for each ethnic group.

Sex. Based on the two-index approach to model fit, the measurement model demonstrated a good fit to the data for both female and male samples (see Table 1). Similar to the prior analyses, the high RMSEA value indicated adequate model fit according to the single-index approach to model fit. All but 1 (intercept values for item 3) of the 30 estimated model parameters were significant for the female sample, whereas all but 2 (intercept values for items 3 and 10) were significant for the male sample. The one factor model accounted for 49 and 39% of the variance in items for female and male samples. Combined, this pattern of evidence suggested adequate model fit for both female and male samples.

Generational status. Based on the two-index approach to model fit, the FCS-L measurement model exhibited a good fit to the data for first- and second-generational status groups (see Table 1). Similar to the ethnic group analyses, the high RMSEA value indicated adequate model fit according to the single-index approach to model fit. All but 4 (intercept values for items 2, 3, 5, and 10) of the 30 estimated model parameters were significant for the first-generation sample, whereas all but 2 (intercept values

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for items 3 and 10) were significant for the second-generation sample. In addition, the model accounted for 45 and 44% of the variance in items for first and second generations, respectively. Thus, overall the measurement model demonstrated an adequate fit to the data for both generational status groups.

Nationality. Based on the single- and two-index approaches, the FCS-L measurement model demonstrated mixed findings regarding model fit for the U.S. Asian and Chinese National data (see Table 1). Whereas the SRMR and CFI values suggested good model fit according to the single-index approach, the high RMSEA value suggested adequate model fit. Also, the low CFI value suggested adequate model fit according to the two-index strategy. All but 3 of the 30 estimated model parameters were significant for the Chinese National sample (intercepts for items 3, 4, and 10). The model accounted for 29% of the variance in FCS-L items compared to the 42% accounted for in the Chinese American sample. This evidence combined with the overall pattern of fit statistics suggested that the model appeared to adequately fit the data for each group.

Step Two: Metric Invariance

Ethnic groups. A baseline model, which was used for metric invariance tests, was simultaneously estimated for all Asian ethnic groups (see Table 2). An omnibus test of the invariance of factor loadings across the three ethnic groups resulted in a significant worsening of model fit $T_d(18, N = 695) = 46.618$, $p < .000$. To identify nonequivalent factor loadings across ethnic groups, equality constraints (which constrained single-model parameters to be equal across groups) were used. These analyses identified the factor loading associated with FCS-L Items seven (see Table 3), $T_d(2, N = 695) = 9.976$, $p < .006$, and eight, $T_d(2, N = 695) = 83.376$, $p < .000$, to be variant across ethnic groups. Focused equality constraint analyses (which compared all possible pairings of ethnic groups) found that the relationship between Item seven and the latent factor was significantly higher for Chinese Americans when compared to Korean Americans, $T_d(1, N = 695) = 13.073$, $p < .000$, but not Hmong Americans, $T_d(1, N = 695) = 5.317$, $p < .021$. There was a nonsignificant difference in the magnitude of this factor loading for Korean and Hmong Americans, $T_d(1, N = 695) = 1.102$, $p > .293$. The factor loading for Item eight was greater in magnitude for Chinese Americans compared to Korean Americans, $T_d(1, N = 695) = 70.568$, $p < .000$, and Hmong Americans, $T_d(1, N = 695) = 28.346$, $p < .000$. No difference emerged across Korean and Hmong Americans, $T_d(1, N = 695) = .649$, $p > .900$, for Item eight.

Sex. An omnibus test of the invariance of factor loadings (see Table 4) across females and males resulted in a nonsignificant change in model fit, $T_d(9, N = 693) = 9.702$, $p > .254$, which suggested that Asian American women and men interpreted FCS-L items in an equivalent fashion.

Generational status. An omnibus test of the invariance of factor loadings across generational statuses resulted in a nonsignificant change in model fit, $T_d(9, N = 647) = 9.702$, $p > .375$, suggesting that first- and second-generation Asian Americans interpreted FCS-L items in an equivalent fashion (see Table 5).

Nationality. An omnibus test of the invariance of factor loadings (see Table 6) across the Chinese Americans and Chinese Nationals

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Table 2
Results of Omnibus Likelihood Ratio Tests of FCS-L Invariance Across Asian Ethnic Groups

			Nested Model Contrasted With					
			Model Immediately Above It			Initial Baseline Model		
Model	SB χ^2	*df*	$\Delta\chi^2$	Δdf	*p*	$\Delta\chi^2$	Δdf	*p*
Model 0	280.183	105	—	—	—	—	—	—
Model 1	327.077	123	46.618	18	<.000[a]	46.618	18	<.000
Model 2	463.080	141	177.247	18	<.000[b]	217.976	36	<.000[c]
Model 3	517.404	161	51.345	20	<.000[d]	266.131	56	<.000[e]
Model 4	526.835	163	14.953	2	<.000[f]	278.187	58	<.000[g]
Model 5	546.020	165	21.725	2	<.000[h]	301.251	60	<.000[i]

Note: FCS-L = Asian American Family Conflicts Scale–Likelihood; SB χ^2 = Satorra-Bentler scaled chi square; *df* = degrees of freedom. Model 0 = baseline model with no invariance constraints; Model 1 = Model 0 with factor loading constrained to be equal; Model 2 = Model 1 with item intercepts constrained to be equal; Model 3 = Model 2 with uniqueness terms constrained to be equal; Model 4 = Model 3 with factor variances constrained to be equal; Model 5 = Model 4 with latent factor means constrained to be equal.
a. Omnibus test of differences in factor loadings across samples.
b. Omnibus test of differences in item intercepts across samples.
c. Omnibus test of differences in factor loadings and item intercepts across samples.
d. Omnibus test of differences in unique error variances across samples.
e. Omnibus test of differences in factor loadings, item intercepts, and unique error variances across samples.
f. Omnibus test of differences in factor variances across samples.
g. Omnibus test of differences in factor loadings, item intercepts, unique error variances, and factor variances across samples.
h. Omnibus test of differences in latent factor means across samples.
i. Omnibus test of differences in factor loadings, item intercepts, unique error variances, factor variances, and latent factor means across samples.

resulted in a significant worsening of model fit, $T_d(9, N = 593) = 38.566$, $p < .000$. Equality constraints identified three factor loadings associated with FCS-L Items four (see Table 7), $T_d(1, N = 593) = 7.940$, $p < .005$, seven, $T_d(1, N = 593) = 8.061$, $p < .004$, and eight, $T_d(1, N = 593) = 9.217$, $p < .002$, to be variant across groups. In each case, the factor loadings were greater in magnitude for the Chinese American sample.

Although some researchers suggest that if metric measurement invariance is not established then further tests are not plausible, there is support for partial measurement invariance as a prerequisite to further invariance testing (Byrne et al., 1989; Reise, Widaman, & Pugh, 1993). *Partial measurement invariance* refers to the condition in which one or more model parameters, identified via metric, scalar, and uniqueness invariance tests, are found to be variant across identified groups. Whereas there is a lack of consensus as to what is acceptable in terms of the number and type of variant parameters, it has been suggested that a minimum of two invariant factor loadings per latent factor in metric invariance tests are required to establish partial measurement invariance (Byrne et al., 1989). Because the majority of factor loadings were invariant, further invariance tests were conducted.

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Table 3
Factor Loadings, Item Intercepts, Uniqueness Terms, Factor Variances, and Latent Factor Means for Asian Ethnic Groups

Parameter Estimate	Korean Americans (n = 201)	Chinese Americans (n = 269)	Hmong Americans (n = 225)
Factor loadings			
FCS1[a]	1.0	1.0	1.0
FCS2	1.139 (.133)	1.483 (.203)	1.057 (.098)
FCS3	0.999 (.120)	1.304 (.167)	1.098 (.110)
FCS4	1.098 (.112)	1.498 (.199)	1.146 (.107)
FCS5	1.220 (.116)	1.566 (.207)	1.526 (.111)
FCS6	1.063 (.133)	1.666 (.238)	1.294 (.121)
FCS7[c]	1.185 (.107)	1.849 (.236)	1.366 (.115)
FCS8[c]	0.982 (.110)	1.892 (.236)	1.098 (.119)
FCS9	1.104 (.099)	1.576 (.218)	1.348 (.130)
FCS10	0.764 (.122)	1.112 (.203)	0.960 (.125)
Item intercepts			
FCS1[b]	—	—	—
FCS2	–0.926 (.419)	–1.639 (.630)	–0.524 (.337)$_{ns}$
FCS3	–0.133 (.379)	–0.918 (.520)$_{ns}$	–0.673 (.376)$_{ns}$
FCS4	–0.925 (.355)	–2.096 (.620)	–1.090 (.365)
FCS5[c]	–0.924 (.370)	–1.608 (.642)	–2.046 (.384)
FCS6	–0.859 (.422)	–2.379 (.739)	–1.340 (.417)
FCS7[c]	–1.147 (.340)	–3.064 (.734)	–1.069 (.395)
FCS8[c]	–0.732 (.347)	–3.174 (.735)	–0.522 (.410)$_{ns}$
FCS9	–0.787 (.384)	–2.155 (.676)	–1.596 (.447)
FCS10	–0.072 (.387)$_{ns}$	–1.015 (.629)	–0.654 (.428)$_{ns}$
Uniqueness terms			
FCS1[c]	1.036 (.110)	0.982 (.086)	0.695 (.078)
FCS2	1.199 (.149)	1.177 (.105)	1.056 (.112)
FCS3	1.206 (.119)	1.264 (.107)	1.270 (.125)
FCS4	0.871 (.107)	0.862 (.087)	0.850 (.094)
FCS5	1.048 (.116)	0.917 (.097)	0.669 (.083)
FCS6	1.219 (.161)	1.226 (.121)	1.075 (.112)
FCS7	0.853 (.094)	0.669 (.074)	0.746 (.084)
FCS8[c]	0.888 (.103)	0.546 (.063)	1.099 (.133)
FCS9	1.028 (.107)	1.004 (.097)	0.958 (.128)
FCS10	1.220 (.134)	1.431 (.130)	1.361 (.123)
Factor covariance[c]	0.617 (.111)	0.316 (.076)	0.653 (.106)
Latent means[c]	3.045 (.091)	3.063 (.070)	3.333 (.078)

Note: FCS = Asian American Family Conflicts Scale; *ns* = non-significant parameter estimate. Standard errors are presented in parentheses.
a. Factor loading was fixed to 1.0 for purposes of latent factor identification.
b. Item intercept was fixed to 1.0 for purposes of latent factor identification.
c. Demonstrated variance across groups ($p < .005$).

Step Three: Scalar Invariance

Ethnic groups. A partially metric-invariant baseline model, which constrained all but two (FCS-L Items 7 and 8) factor loadings to be equivalent across ethnic groups, was used to test for the equivalence of item intercepts (see Table 2). An omnibus test of

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Table 4
Results of Omnibus Likelihood Ratio Tests of FCS-L Invariance Across Sex

			Nested Model Contrasted With					
			Model Immediately Above It			Initial Baseline Model		
Model	SB χ^2	*df*	$\Delta\chi^2$	Δdf	*p*	$\Delta\chi^2$	Δdf	*p*
Model 0	248.760	70	—	—	—	—	—	—
Model 1	264.074	79	11.295	9	>.254[a]	11.295	9	>.254
Model 2	304.050	88	41.146	9	<.000[b]	53.631	18	<.000[c]
Model 3	332.891	98	25.024	10	<.002[d]	81.496	28	<.000[e]
Model 4	340.510	99	13.405	1	<.000[f]	89.345	29	<.000[g]
Model 5	340.549	100	0.105	1	>.999[h]	88.931	30	<.000[i]

Note: FCS-L = Asian American Family Conflicts Scale–Likelihood. Model 0 = baseline model with no invariance constraints; Model 1 = Model 0 with factor loading constrained to be equal; Model 2 = Model 1 with item intercepts constrained to be equal; Model 3 = Model 2 with uniqueness terms constrained to be equal; Model 4 = Model 3 with factor variances constrained to be equal; Model 5 = Model 4 with latent factor means constrained to be equal.
a. Omnibus test of differences in factor loadings across samples.
b. Omnibus test of differences in item intercepts across samples.
c. Omnibus test of differences in factor loadings and item intercepts across samples.
d. Omnibus test of differences in unique error variances across samples.
e. Omnibus test of differences in factor loadings, item intercepts, and unique error variances across samples.
f. Omnibus test of differences in factor variances across samples.
g. Omnibus test of differences in factor loadings, item intercepts, unique error variances, and factor variances across samples.
h. Omnibus test of differences in latent factor means across samples.
i. Omnibus test of differences in factor loadings, item intercepts, unique error variances, factor variances, and latent factor means across samples.

the invariance of item intercepts (see Table 2) across the four ethnic groups resulted in a significant worsening of model fit, $T_d(18, N = 836) = 177.247$, $p < .000$. Equality constraint analyses identified three item intercepts (for FCS-L Items 5, 7, and 8) that were variant across Asian ethnic groups (see Table 3). This indicates that when the common factor is zero the intercept terms associated with Items 5, 7, and 8 demonstrated statistically significant variance in magnitude across ethnic groups.

Sex. An omnibus test of the invariance of item intercepts (see Table 4) across females and males resulted in a significant decrease in model fit, $T_d(9, N = 693) = 41.146$, $p < .000$, which suggested a difference in item values when the common factor is zero for Asian American women and men (see Table 7). Focused equality constraint analyses identified two variant item intercept values (Items 3 and 10).

Generational status. An omnibus test of the invariance of item intercepts across generational statuses resulted in a nonsignificant change in model fit, $T_d(9, N = 647) = 9.289$, $p > .410$, which suggested that when the common factor is zero FCS-L item values are equivalent across first- and second-generation Asian Americans (see Table 5).

Nationality. An omnibus test of the invariance of item intercepts (see Table 6) across the four ethnic groups resulted in a

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Table 5
Results of Omnibus Likelihood Ratio Tests of FCS-L Invariance Across Generational Status

			Nested Model Contrasted With					
			Model Immediately Above It			Initial Baseline Model		
Model	χ^2	*df*	$\Delta\chi^2$	Δdf	*p*	$\Delta\chi^2$	Δdf	*p*
Model 0	230.422	70	—	—	—	—	—	—
Model 1	246.322	79	9.702	9	>.375[a]	9.702	9	>.375
Model 2	257.802	88	9.289	9	>.410[b]	18.944	18	>.330[c]
Model 3	267.543	98	5.585	10	>.780[d]	25.000	28	>.627[e]
Model 4	268.640	99	.014	1	>.999[f]	25.212	29	>.667[g]
Model 5	272.538	100	4.024	1	<.045[h]	29.589	30	>.468[i]

Note: FCS-L = Asian American Family Conflicts Scale–Likelihood. Model 0 = baseline model with no invariance constraints; Model 1 = Model 0 with factor loading constrained to be equal; Model 2 = Model 1 with item intercepts constrained to be equal; Model 3 = Model 2 with uniqueness terms constrained to be equal; Model 4 = Model 3 with factor variances constrained to be equal; Model 5 = Model 4 with latent factor means constrained to be equal.
a. Omnibus test of differences in factor loadings across samples.
b. Omnibus test of differences in item intercepts across samples.
c. Omnibus test of differences in factor loadings and item intercepts across samples.
d. Omnibus test of differences in unique error variances across samples.
e. Omnibus test of differences in factor loadings, item intercepts, and unique error variances across samples.
f. Omnibus test of differences in factor variances across samples.
g. Omnibus test of differences in factor loadings, item intercepts, unique error variances, and factor variances across samples.
h. Omnibus test of differences in latent factor means across samples.
i. Omnibus test of differences in factor loadings, item intercepts, unique error variances, factor variances, and latent factor means across samples.

significant worsening of model fit, $T_d(9, N = 593) = 164.680$, $p < .000$. Equality constraint analyses identified three variant item intercepts (for Items 8, 9, and 10) across samples (see Table 7). The item intercepts values were larger for the Chinese American sample in all three cases.

Step Four: Uniqueness Invariance

Ethnic groups. A partially invariant baseline model, which, based on the preceding invariance tests, constrained all but three item intercepts (FCS-L Items 5, 7, and 8) to be equivalent, was used to assess the equivalence of uniqueness terms across ethnic groups (see Table 2). The omnibus test of uniqueness invariance across ethnic groups resulted in a significant worsening in model fit, $T_d(20, N = 836) = 51.345$, $p < .000$. Equality constraints analyses found that two uniqueness terms (FCS-L Items 1 and 8) demonstrated variance across ethnic groups, which suggests that the degree to which these items shared common variance differed across ethnic groups (see Table 3). Chinese, $T_d(1, N = 695) = 16.731$, $p < .000$, and Korean, $T_d(1, N = 695) = 9.886$, $p < .001$, ethnic groups demonstrated significantly higher uniqueness (i.e., measurement and noncommon variance) than Hmong Americans for the uniqueness term associated

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Table 6
Results of Omnibus Likelihood Ratio Tests of FCS-L Invariance Across Nationality

			Nested Model Contrasted With					
			Model Immediately Above It			Initial Baseline Model		
Model	χ^2	*df*	T_d	Δdf	*p*	T_d	Δdf	*p*
Model 0	185.009	70	—	—	—	—	—	—
Model 1	217.267	79	38.3808	9	<.000[a]	38.3808	9	<.000
Model 2	319.097	88	166.3294	9	<.000[b]	197.3629	18	<.000[c]
Model 3	382.517	98	105.6936	10	<.000[d]	304.1312	28	<.000[e]
Model 4	403.125	99	43.2142	1	<.000[f]	352.3608	29	<.000[g]
Model 5	418.777	100	24.0263	1	<.000[h]	377.8241	30	<.000[i]

Note: FCS-L = Asian American Family Conflicts Scale–Likelihood. Model 0 = baseline model with no invariance constraints; Model 1 = Model 0 with factor loading constrained to be equal; Model 2 = Model 1 with item intercepts constrained to be equal; Model 3 = Model 2 with uniqueness terms constrained to be equal; Model 4 = Model 3 with factor variances constrained to be equal; Model 5 = Model 4 with latent factor means constrained to be equal.
a. Omnibus test of differences in factor loadings across samples.
b. Omnibus test of differences in item intercepts across samples.
c. Omnibus test of differences in factor loadings and item intercepts across samples.
d. Omnibus test of differences in unique error variances across samples.
e. Omnibus test of differences in factor loadings, item intercepts, and unique error variances across samples.
f. Omnibus test of differences in factor variances across samples.
g. Omnibus test of differences in factor loadings, item intercepts, unique error variances, and factor variances across samples.
h. Omnibus test of differences in latent factor means across samples.
i. Omnibus test of differences in factor loadings, item intercepts, unique error variances, factor variances, and latent factor means across samples.

with Item 1. Hmong Americans, however, had a higher uniqueness value on Item 8 than did Korean, $T_d(1, N = 695) = 7.339$, $p < .006$, and Chinese, $T_d(1, N = 695) = 28.880$, $p < .000$, Americans. The Korean ethnic group had a higher uniqueness term than the Chinese ethnic group did, $T_d(1, N = 695) = 25.323$, p .000.

Sex. An omnibus test of the invariance of item uniqueness terms across females and males resulted in a significant worsening of model fit, $T_d(10, N = 693) = 25.024$, $p < .002$, which suggests a difference in the level of common variance shared by FCS-L items across female and male samples (see Table 4). Focused equality constraint analyses identified three nonequivalent item uniqueness terms (1, 4, and 9). In each case, the uniqueness terms were larger (i.e., greater degree of measurement error and uniqueness variance in observed indicators) for men (see Table 7).

Generational status. An omnibus test of the invariance of item uniqueness terms across generational statuses resulted in a nonsignificant change in model fit, $T_d(10, N = 647) = 5.585$, $p > .780$, which indicates that the degree to which the variance accounted for in FCS-L items by the latent factor was equivalent across first- and second-generation Asian Americans (see Table 5).

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Table 7
Factor Loadings, Item Intercepts, Uniqueness Terms, Factor Variances, and Latent Factor Means for Sex and Nationality Subgroups

Parameter Estimates	Females (n = 330)	Males (n = 308)	Chinese Americans (n = 269)	Chinese Nationals (n = 324)
Factor loadings				
FCS1[a]	1.0	1.0	1.0	1.0
FCS2	1.100 (.089)	1.283 (.144)	1.483 (.203)	1.329 (.190)
FCS3	0.999 (.088)	1.200 (.129)	1.304 (.167)	0.988 (.176)
FCS4	1.230 (.086)	1.191 (.134)	1.498 (.199)	0.914 (.160)
FCS5	1.353 (.088)	1.355 (.143)	1.566 (.207)	1.615 (.222)
FCS6	1.219 (.103)	1.448 (.161)	1.666 (.238)	1.568 (.213)
FCS7	1.418 (.095)	1.499 (.150)	1.849 (.236)	1.265 (.155)
FCS8	1.249 (.097)	1.352 (.148)	1.892 (.236)	1.141 (.173)
FCS9	1.326 (.095)	1.245 (.152)	1.576 (.218)	1.156 (.167)
FCS10	0.990 (.100)	0.788 (.139)	1.112 (.203)	0.755 (.189)
Item intercepts				
FCS1[b]	—	—	—	—
FCS2	–0.685 (.292)	–1.138 (.460)	–1.639 (.630)	–1.175 (.588)
FCS3[c]	$–0.327\ (.289)_{ns}$	$–0.598\ (.413)_{ns}$	$–0.918\ (.520)_{ns}$	–0.180 (.548)
FCS4	–1.388 (.283)	–1.161 (.429)	–2.096 (.620)	$–0.934\ (.498)_{ns}$
FCS5	–1.300 (.290)	–1.212 (.457)	–1.608 (.642)	$–1.861\ (.690)_{ns}$
FCS6	–1.089 (.340)	–1.914 (.519)	–2.379 (.739)	–2.090 (.660)
FCS7	–1.594 (.314)	–1.919 (.482)	–3.064 (.734)	–1.781 (.482)
FCS8	–1.207 (.321)	–1.655 (.473)	–3.174 (.735)	–1.399 (.537)
FCS9	–1.435 (.312)	–1.265 (.487)	–2.155 (.676)	–1.311 (.518)
FCS10[c]	–0.870 (.328)	$–0.030\ (.067)_{ns}$	–1.015 (.629)	$–0.488\ (.584)_{ns}$
Uniqueness terms				
FCS1[c]	0.742 (.061)	1.000 (.087)	0.982 (.086)	0.991 (.073)
FCS2	1.168 (.105)	1.122 (.105)	1.177 (.105)	1.435 (.098)
FCS3	1.282 (.100)	1.151 (.081)	1.264 (.107)	1.870 (.108)
FCS4[c]	0.687 (.067)	0.985 (.094)	0.862 (.087)	1.124 (.104)
FCS5	0.828 (.082)	1.006 (.093)	0.917 (.097)	1.130 (.100)
FCS6	1.221 (.115)	1.102 (.102)	1.226 (.121)	0.606 (.073)
FCS7	0.819 (.077)	0.851 (.077)	0.669 (.074)	0.749 (.065)
FCS8	0.840 (.087)	0.885 (.089)	0.546 (.063)	0.783 (.077)
FCS9[c]	0.870 (.086)	1.116 (.095)	1.004 (.097)	0.876 (.081)
FCS10	1.245 (.096)	1.416 (.116)	1.431 (.130)	1.447 (.096)
Factor covariance[c]	0.655 (.083)	0.443 (.085)	0.316 (.076)	0.293 (.071)
Latent means	3.185 (.065)	3.140 (.069)	3.063 (.070)	3.062 (.063)

Note: FCS = Asian American Family Conflicts Scale; *ns* = non-significant parameter estimate. Standard errors are presented in parentheses.
a. Factor loading was fixed to 1.0 for purposes of latent factor identification.
b. Item intercept was fixed to 1.0 for purposes of latent factor identification.
c. Demonstrated variance across groups.

Nationality. The omnibus test (see Table 6) of uniqueness invariance across Chinese Americans and Chinese Nationals resulted in a significant worsening in model fit, $T_d(10, N = 593) = 107.389$, $p < .000$. Equality constraints analyses found that five uniqueness terms (associated with Items 2, 3, 5, 6, and 8) demonstrated variance across groups (see Table 5). The uniqueness terms for Items 2, 3, 5, and 8 were larger for Chinese Nationals.

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Step Five: Invariance of Factor Variances

Ethnic groups. A partially invariant baseline model, based on the preceding measurement invariance tests, was used to assess the equivalence of factor variances (see Table 2) across ethnic groups. Constraining factor variances to be equivalent across ethnic groups resulted in a significant worsening in model fit, $T_d(2, N = 836) = 14.953$, $p < .000$. The factor variance for the Hmongs was significantly broader than the Korean, $T_d(1, N = 695) = 13.146$, $p < .000$, and Chinese, $T_d(1, N = 695) = 19.993$, $p < .000$, ethnic groups (see Table 3). There was no significant difference in factor variance for the Chinese and Korean ethnic groups, $T_d(1, N = 695) = .589$, $p > .900$.

Sex. An omnibus test of the invariance of factor variances across females and males resulted in a significant worsening of model fit, $T_d(1, N = 693) = 13.405$, $p < .000$, which suggests that the range or breadth of participant responses was nonequivalent across female and male samples (see Tables 4 and 7). The breadth of responses was broader for women than for men.

Generational status. An omnibus test of the equivalence of latent factor variances across generational statuses resulted in a nonsignificant change in model fit, $T_d(1, N = 647) = 0.014$, $p > .990$, which suggests that the range or breadth of participant responses was equivalent across first- and second-generation Asian Americans (see Table 5).

Nationality. Constraining factor variances (see Table 6) to be equivalent across groups resulted in a significant worsening in model fit, $T_d(1, N = 593) = 48.509$, $p < .000$ (see Table 7). The factor variance for the Chinese American sample was broader than that of the Chinese National sample.

Step Six: Invariance of Latent Factor Means

Ethnic groups. Constraining latent means (see Table 2) to be equivalent across ethnic groups resulted in a significant worsening in model fit, $T_d(2, N = 836) = 21.725$, $p < .000$ (see Table 3). This result was because of the significant difference between Hmong and Korean ethnic groups, $T_d(1, N = 695) = 16.701$, $p < .000$, whereas the Hmong ethnic group had a higher latent mean value ($d = 0.234$; 95% CI = 0.044 to 0.425).

Sex. Constraining latent means (see Tables 4 and 7) to be equivalent across females and males resulted in a nonsignificant change in model fit, $T_d(1, N = 693) = 0.105$, $p > .990$.

Generational status. Consistent with the prior equivalence tests, constraining latent means to be equivalent across generational statuses resulted in a nonsignificant change in model fit, $T_d(1, N = 647) = 4.024$, $p > .045$ (see Table 5).

Nationality. Constraining latent means (see Tables 6 and 7) to be equivalent across ethnic groups resulted in a nonsignificant change in model fit, $T_d(1, N = 593) = 0.545$, $p > .990$.

Discussion

The study examines the measurement and structural invariance of the FCS Likelihood subscale. At the measurement level, FCS-L items demonstrated an equivalent relationship to their respective latent factor, which suggests that these items were being interpreted in an equivalent fashion across women and men and first- and second-generation Asian Americans. In addition, a

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clear majority of items were being interpreted in the same way for Chinese Americans, Korean Americans, Hmong Americans, and Chinese Nationals. A similar pattern of invariant and variant model parameters was also evidenced when assessing item intercepts and item uniqueness terms. That is, in almost each instance, a clear majority of item intercept and uniqueness terms were invariant across groups. It might be important to note that the observed differences in item intercepts in this study might be sample specific (cf. Vandenberg & Lance, 2000) and, therefore, somewhat arbitrary. At the structural level, the factor variance was significantly varied across ethnic groups, gender, and nationality. Lastly, latent means were equivalent across gender, generational status, and nationality with one exception between Korean and Hmong Americans. Overall, the results of this study suggest that researchers can be fairly confident that the FCS-L operationalizes culture-specific family conflicts in an equivalent manner across a number of Asian ethnic and demographic groups.

Perhaps the most salient implication for research is the need to examine the measurement and structural invariance of the FCS-L across other Asian ethnic groups. For example, at a broader level, these analyses likely reflect the experiences of East Asian Americans, Southeast Asians, and East Asian Nationals. However, given the current sociopolitical milieu, it is possible to imagine how the cultural experiences of such Asian ethnic groups as South Asians (e.g., Pakistani, Sri Lankan, etc.) may differentially affect family conflict. It would likely be beneficial to provide evidence of measurement and structural invariance before using the FCS-L to run comparisons across such ethnic groups. In addition, this study examined the FCS-L and did not test the Severity scale because the archival data examined were collected inconsistently. Future research could examine the invariance of this scale separately or could examine a measurement and structural model that incorporates both scales. Also, if the trend of using the FCS with European Americans, African Americans, and/or Latinos/Latinas continues, future research could examine the measurement equivalence of the instrument across racial groups.

Importantly, these findings should be weighed against a number of study limitations. First, this study used samples of college-aged participants. Therefore, the external validity of the study and its ability to represent the study findings across various Asian Americans in the community is restricted. Second, although the study included an analysis of specific Asian ethnic groups, it did not represent the entirety of Asian ethnic groups (cf. Nagayama Hall & Barongan, 2002). Thus, it is not clear whether these findings would apply to the numerous Asian ethnic groups not represented in these analyses. Finally, because the focus of the studies was to examine the measurement and structural invariance of the FCS-L, alternative models of the FCS-L were not identified or tested. Therefore, it is important to note that these results do not speak to the issue of the ideal measurement model of the FCS-L; rather, they speak to the invariance of a one-factor measurement model.

Appendix

Asian American Family Conflicts Scale–Likelihood[1]

The following statements are parent–child situations that may occur in families. Consider how likely each situation occurs in your *present* relationship with your parents and how serious these conflicts are. Read each situation and answer the following questions using the following rating scales:

How likely is this type of situation to occur in your family?

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Appendix (continued)

1 = almost never; 2 = once in a while; 3 = sometimes; 4 = often or frequently; 5 = almost always

How serious a problem is this situation in your family?

1 = not at all; 2 = slightly; 3 = moderately; 4 = very much; 5 = extremely

1. Your parents tell you what to do with your life, but you want to make your own decisions.
2. Your parents tell you that a social life is not important at this age, but you think that it is.
3. You have done well in school, but your parents' academic expectations always exceed your performance.
4. Your parents want you to sacrifice personal interests for the sake of the family, but you feel this is unfair.
5. Your parents always compare you to others, but you want them to accept you for being yourself.
6. Your parents argue that they show you love by housing, feeding, and educating you, but you wish they would show more physical and verbal signs of affection.
7. Your parents don't want you to bring shame upon the family, but you feel that your parents are too concerned with saving face.
8. Your parents expect you to behave like a proper Asian male or female, but you feel your parents are being too traditional.
9. You want to state your opinion, but your parents consider it to be disrespectful to talk back.
10. Your parents demand that you always show respect for elders, but you believe in showing respect only if they deserve it.

Note

1. Permission to use the Asian American Family Conflicts Scale must be obtained from Richard M. Lee.

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Matthew J. Miller received his PhD in counseling psychology from Loyola University Chicago. He is an assistant professor in the counseling psychology program at the University of Maryland. His program of research spans four related areas: multiculturalism, vocational psychology, social justice advocacy, and applied psychological measurement.

Richard M. Lee received his PhD in psychology from Virginia Commonwealth University in 1996 and is currently an associate professor of psychology at the University of Minnesota. His research focuses on the role and relevance of aspects of cultural socialization on the well-being, adjustment, and mental health of Asian Americans, particularly children of immigrant families and international adoptive families.

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