Measurement Invariance of the Five Factor Model of Personality:
Facet-Level Analyses among Euro and Asian Americans

P. Priscilla Lui, Ph.D.

Southern Methodist University

Douglas B. Samuel, Ph.D. and David Rollock, Ph.D.

Purdue University

Frederick T. L. Leong, Ph.D.

Michigan State University

Edward C. Chang, Ph.D.

University of Michigan

Author Note. The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. This project was partially supported by American Psychological Foundation and American Psychological Association funds awarded to the first author. Correspondence author: P. Priscilla Lui, Department of Psychology, Southern Methodist University, PO Box 750442, Dallas, TX 75275-0442, USA. Email: plui@smu.edu

Manuscript accepted for publication in *Assessment* (August 8, 2019).

Abstract

Relative to broad Big Five domains, personality facets provide incremental value in predicting life outcomes. Valid between-group comparisons of means and correlates of facet scores are contingent upon measurement invariance of personality measures. Research on culture and Big Five personality has been largely limited to cross-national comparisons of domains, without assessing measurement invariance across ethnoracial groups within the same country. Using the NEO Inventories, we tested facet-level measurement invariance between Euro ($N = 418$, 63.2% women, $M_{age} = 18.43$) and Asian Americans ($N = 429$, 56.6% women, $M_{age} = 18.00$). Multigroup exploratory factor analysis within a confirmatory factor analysis framework showed partial strong invariance. *Assertiveness* and *activity* did not load onto *extraversion* as strongly for Asian Americans. *Self-consciousness* showed a stronger cross-loading onto *extraversion* among Asian Americans than Euro Americans. *Achievement striving*, *competence*, *warmth*, *tender-mindedness*, and *excitement seeking* showed noninvariant intercepts across groups. Collectivistic values emphasizing interpersonal harmony and modesty should be considered when examining narrow and broad traits among Asian Americans.

Keywords: culture; equivalence; ethnicity; factor structure; Five Factor Model; NEO; exploratory structural equation modeling

Measurement Invariance of the Five Factor Model of Personality:

Facet-Level Analyses among Euro and Asian Americans

The five-factor model (FFM) provides a conceptual framework that characterizes the associations among Big Five personality dimensions and narrower traits that define these dimensions (Digman, 1990; Paunonen & Ashton, 2001). For example, narrower systematic traits such as *impulsiveness* and *vulnerability to stress* indicate the broad dimension of *neuroticism*, whereas *warmth* and *excitement-seeking* indicate *extraversion*. Over and above broad personality domains, specific facets have shown additive value in predicting life outcomes including subjective well-being, externalizing behaviors such as aggression and alcohol and drug use, personality disorder symptoms, identity formation, engagement in physical activity, and job performance (Anglim & Grant, 2016; Dudley, Orvis, Lebiecki, & Cortina, 2006; Klimstra, Luyckx, Hale, & Goossens, 2014; Miller, Lynam, & Jones, 2008; Samuel & Widiger, 2008). Despite the incremental validity offered by lower-order characteristics over global traits, research still has not realized the full empirical and clinical utility of facet scores. Particularly, few efforts have examined the nomological network and functional importance of personality facets in ethnoracial groups that are underrepresented in the literature. This is critical because facets may be more likely than broad factors to be shaped by specific cultural socialization and thus show greater ethnoracial and cross-cultural variability than general factors (Mastor, Jin, & Cooper, 2000). The predictive value of personality facets may be undermined if the structure underlying associations between domains and facets varies systematically by ethnoracial groups. To address this research gap, we investigated personality structure at the facet level and examined measurement invariance across two ethnoracial groups in the United States.

The NEO Inventories are among the most commonly used instruments to assess higher-

order Big Five personality domains and 30 lower-order facets (Carlo, Knight, Roesch, Opal, & Davis, 2014; McCrae, 2017; McCrae, Costa, Del Pilar, Rolland, & Parker, 1998). A large body of research has been generated on their psychometric properties and aggregated national comparisons (Allik et al., 2017; McCrae et al., 1998; McCrae & Terracciano, 2005). Still, these cross-cultural studies have proven limited in specifying the sources of variance in personality mean scores and structure across national boundaries. Cross-cultural research usually uses an etic approach aimed at identifying (the limits to) commonality across geographical regions; however, it minimizes and underestimates within-nation contexts and ethnoracial groups' distinct characteristics and experiences. In contrast, whereas indigenous and group-specific research using an emic approach does illuminate cultural nuances, findings generated by these methods do not lend themselves easily to direct ethnoracial group comparisons. Asian Americans make up the fastest-growing ethnoracial group and include the largest proportion of immigrants in the U.S.; yet, basic research on personality patterns—and the validity of relevant measures—has been very limited with this population (Chang, Chang, & Chu, 2007; Ramakrishnan & Ahmad, 2014). Compared to Euro Americans, Asian Americans have been perceived as aloof, formal, and anxious, but it is unclear whether these stereotypes reflect true personality differences or differential scale functioning. We therefore examined measurement invariance of the NEO Inventories across Euro and Asian Americans and used a combined etic-emic framework to conceptualize facet-level structure, while holding constant national context and assessment language.

Structure of Personality: Commonality and Differences Across Cultures

A tripartite perspective of personality formation holds that “every [person] is in certain aspects like all other [persons], like some other [persons], and like no other [person]”

(Kluckhohn & Murray, 1950, p. 53). To best understand the extent to which lower-order traits inform scientific conceptualization of Big Five factors and how personality traits explain life outcomes for individuals from all ethnoracial and cultural backgrounds, research should examine not only individual differences but also group differences in the facet-level structure.

Additionally, measurement invariance research provides evidence on whether and how ethnoracial groups differ in the general configuration of the facet structure, associations between facets and personality domains, and endorsement of facet-level traits. Research using imposed-etic and emic approaches thus far has contributed to the knowledge base regarding ethnoracial commonality and differences in personality.

Etic Universality and Group Differences Research

Etic personality research assumes that similar elements and processes underlie personality formation, therefore, trait assessments from one culture can be transported and used in other cultures and ethnoracial populations. Existing research has tended to focus on common dimensions of human individuality (McAdams & Pals, 2006). A large body of research also has identified the FFM and compared national means of Big Five traits (cf. Allik & McCrae, 2004; De Fruyt, De Bolle, McCrae, Terracciano, & Costa, 2009; Heine, 2001; Triandis & Suh, 2002). For example, nationally aggregated scores show that (Euro) Americans are more extraverted than people from countries such as Indonesia and Germany and are less neurotic than people from countries such as Japan and Argentina (McCrae & Terracciano, 2005).

In addition to mean differences, etic research also has considered similarity in personality structure across nations. Many researchers consider the FFM a cross-culturally valid and reproducible structure (McCrae & Costa, 1997; McCrae & Terracciano, 2005); existing factor analyses of the NEO-PI-R suggest high degrees of congruence in neuroticism and

conscientiousness between the U.S. and 15 other national samples. By contrast, extraversion and agreeableness—the more socially-relevant personality domains—have been found to be more sensitive to linguistic and/or sociocultural influences (Rolland, 2002). Compared to cross-national investigations, fewer studies have focused on ethnoracial differences in the U.S. (see Foldes, Duehr, & Ones, 2008 for review).¹ Even within the same nation, group differences in response styles, expression of personality traits, and functional meaning of personality on life outcomes may be shaped by ethnic norms, cultural contexts, and racialized experiences (Rollock & Lui, 2016). Specifically, Euro and Asian American comparisons have revealed meaningful personality differences (Eap et al., 2008; Lui, Vidales, & Rollock, 2018).

Despite within-group variations in heritage cultures and languages, Asian Americans share a core set of fundamental values that likely shape the constellation of their lower-order personality traits. Emerging evidence on personality structure differences is consistent with cultural value orientations in Euro and Asian American groups. Euro Americans are generally characterized as highly independent in their personhood orientation. Consequently, individualistic values likely reinforce people to pay attention to self-relevant stimuli and situations that differentiate them from other individuals. It is therefore reasonable to expect Euro Americans to be more attuned to their distinct, signature personality traits and prefer a more self-enhancing presentation. In contrast, most non-Western countries outside of Anglo-Saxon traditions are more interdependent in their conceptualization of the self (Markus & Kitayama, 1991; Oyserman, Coon, & Kemmelmeier, 2002). Asian Americans from collectivistic cultures are more likely to consider their personality characteristics as somewhat dependent on their

¹ Note that most studies used in the (Foldes et al., 2008) study did not use measures developed specifically to assess the FFM. Rather, authors of this meta-analysis coded study effect sizes to fit the general framework of the Big Five personality traits.

social contexts and relationships, thus likely result in a more self-effacing presentation. These data have suggested meaningful ethnoracial differences in average domain scores but no studies have systematically considered FFM at the facet-level.

Emic Specificity Research

Despite the dominance of etic (i.e. universality and cross-cultural) approaches to personality research, evidence does not always capture ethnoracial and cultural nuances in personality traits adequately (Cheung, Cheung, Wada, & Zhang, 2003; Ortiz et al., 2007). Emic research using Asian indigenous measures of personality has revealed important attributes in Asian and Asian American populations that are not well defined in existing FFM measures (e.g., practicality and unemotionality in Japanese culture (Tsuji et al., 1997), interpersonal relatedness in Chinese culture (Cheung et al., 1996), and social curiosity in Filipino culture (Katigbak, Church, Guanzon-Lapeña, Carlota, & del Pilar, 2002). As shown in the limited body of literature on Asian American personality, Asian Americans generally have been characterized in a more negative light than their Euro American counterparts. Compared to Euro Americans, Asian Americans tend to score lower on interpersonal warmth, and higher on negative impression management and psychological symptoms associated with (social) anxiety and paranoia (Chang & Smith, 2015). Yet, measurement bias could have resulted in mistaken conclusions about personality and psychological functioning among Asian Americans in particular (Abe & Zane, 1990), and the larger structure of personality in general.

Emotionality and activity. Subdued emotionality has been shown to be a manifestation of collectivistic orientations in Asian cultures (Ruby, Falk, Heine, Villa, & Silberstein, 2012). Emotional control and modulation are valued in Asian American groups (Kim, Li, & Ng, 2005); these socialized tendencies may be exaggerated into the common stereotypes of Asians and

Asian Americans as self-effacing, polite, conflict-avoidant, and socially anxious (Lee, Okazaki, & Yoo, 2006; Okazaki, 1997). Anxiety, self-consciousness, and broader-level neuroticism possibly reflect a cultural emphasis on group needs over individual needs (i.e., relationality; Markus & Kitayama, 1998), and therefore the tendency to modulate emotional expressivity. In the absence of group differences in physiological responses to negative stimuli, research has shown robust variations in behavioral expression and self-reported levels of negative emotions (Mauss, Butler, Roberts, & Chu, 2010). Many Asian cultures promote the belief that “the nail that stands out gets pounded down” (Chu & Kwan, 2007, p. 271); thus, individuals are socialized to be conscious of cues in their environments and to attune to how they are perceived by others (Lau, Fung, Wang, & Kang, 2009; Mastor et al., 2000). In contrast to negative emotions, research does not show differences in positive emotion expressivity and the relations between positive emotions and intrapersonal functioning across Asian and Euro Americans (Tsai, Sun, Wang, & Lau, 2016). By the same token, similar to (negative) emotion expressivity, cultural values likely influence the extent to which activity and arousal levels indicate individual differences in extraversion. Euro Americans and individuals from individualistic cultures are more likely to prefer high-arousal activities in goal pursuits than their counterparts from more collectivistic cultures (Tkach & Lyubomirsky, 2006). Taken together, compared to Euro Americans, negative emotionality and self-consciousness may be less indicative of neuroticism, whereas activity might be less indicative of extraversion among Asian Americans.

Assertiveness. Asian Americans also have been found to be more agreeable than Euro Americans, and that assertiveness and verbal aggression may be measures of controlled affect (Maier et al., 2009). On the one hand, lower scores on trait assertiveness among Asian Americans in previous research not only are consistent with Asian values associated with

conformity, obedience, and emotional self-control (Kim et al., 2005). Being assertive in close relationships risks disrupting interpersonal harmony in cultures that are higher on collectivism. On the other hand, lower levels of assertiveness also are consistent with Asian values that reinforce prosocial behaviors, harmony in interpersonal relationships, and concerns for face (Lui & Rollock, 2018). Furthermore, there is a greater situational variability in the expression of trait assertiveness among Asian Americans than among Euro Americans (Uba, 1994). These patterns suggest that trait assertiveness may not be a reliable indicator of extraversion, but rather is a robust indicator of agreeableness among Asian Americans.

Modesty, competence, and achievement orientation. Cross-cultural research has yielded consistent findings regarding cultural influences on self-presentation. Individualistic societies such as (Euro) American cultures are more likely to promote self-enhancement, whereas collectivistic societies such as Asian cultures are more likely to value modesty. Modesty is an appropriate and culturally-expected response to praises and accomplishments (Han, 2011); modesty also functions as a social script that suppresses Asian Americans' endorsement of their own competence levels. Modesty not only engenders low levels of affectivity and arousal to avoid drawing attention to individual selves, it also encourages people to downplay their accomplishments. Additionally, many Asian American immigrants in recent decades have been selected to the U.S. for their high academic and professional proficiencies (Lui & Rollock, 2013). Having witnessed and enjoyed advantages in social mobility through academic and career achievements likely results in foreign-born Asian Americans overreporting their own levels of achievement orientation, as well as socializing their later-generation descendants on the importance of achievement striving (Chung, 2001; Kim et al., 2005).

Combined Etic-Emic Considerations of Facet Structure

Group comparisons of personality characteristics are valid only if the constructs mean the same thing and if the measures are culturally equivalent (McCrae, Yik, Trapnell, Bond, & Paulhus, 1998). Although extremely valuable in discovering culturally specific attributes, existing indigenous measures alone nevertheless do not allow comparisons regarding facet structure across ethnoracial groups. Psychometric research using a combined etic-emic approach can use imposed-etic scales such as the NEO Inventories to identify measurement noninvariance across ethnoracial groups and apply emic considerations to contextualize these systematic group differences. Culturally prescribed behaviors including modesty and self-presentation can meaningfully affect how Asian Americans respond to self-report personality instruments (McCrae et al., 1998). Thus, any observed scale score differences could mean a number of things: true personality differences on the same constructs, measurement bias in assessing the same constructs, and/or response style variations. Interpretation of meaningful, valid correlational differences rests on achieving a similar structure (configural invariance) and equivalent relations between lower- and higher-order traits (metric invariance). Above and beyond these assumptions, valid interpretation of latent factor mean differences also requires having similar endorsement rates of lower-order attributes across groups (scalar invariance). Once empirical evidence points to the scope or limitations of measurement similarities across ethnoracial populations, research on personality and behavioral outcomes can contend with the important question further concerning how cultural values influence the expressions of personality attributes across groups.

The Present Study

To date, no studies have systematically examined measurement issues pertaining to personality facets among Asian Americans. In a literature search, we used the combination of

keywords “Asian American,” “facet,” and “five factor model” or “big five” in *PsycINFO*, and found zero studies on facet-level Big Five personality among Asian Americans. We first aimed to examine the extent to which the associations among lower-order facets and higher-order domains in the FFM were equivalent across Euro and Asian American groups. This was to uncover a shared underlying personality structure across ethnoracial groups. Second, we aimed to estimate true mean levels of facets across groups to determine the possible impact of culture on personality. We tested the measurement invariance of the NEO Inventories as a way to examine ethnoracial similarities in the structure of the Big Five traits, domain-facet associations, and true mean levels of narrower personality attributes. We focused on facet-level measurement invariance of the NEO Inventories for two reasons: incremental value of facet-level information in relation to life outcomes, and because previous research has suggested that it is difficult—and perhaps unrealistic—to achieve item-level invariance across ethnoracial groups (Labouvie & Ruetsch, 1995; Lui et al., 2018). We used composite facet-level scores to account for ethnoracial variations in response patterns and item-level noninvariance (e.g., negatively worded items) that have been observed previously (Church et al., 2011; Rollock & Lui, 2016).

To control for the possible confounding roles of intercultural/national differences in physical environment, translation, and individual differences in language fluency, we sampled domestic U.S. Americans of Euro and Asian backgrounds with comparable demographic characteristics. Some scholars have emphasized the value of exploring personality differences across ethnoracial groups as they emerge (McCrae, 2000); still, based on prior research on FFM and Asian American psychology, we expected that,

H1: *Assertiveness, activity, and self-consciousness* would show smaller primary loadings in the Asian American group than in the Euro American group;

H2: *Assertiveness* would show a stronger, negative cross-loading on *agreeableness* among Asian Americans than among Euro Americans; and,

H3: Compared to Euro Americans, Asian Americans would overreport their levels of *achievement striving* but underreport their levels of *competence*.

Method

Participants and Procedures

Data were from 847 Euro American and Asian American freshman college students across four large predominantly White universities in the Midwestern United States. International students were not included in this study. The present data with the NEO Inventories and basic demographic information were collected from two studies published elsewhere (Lui, Rollock, Chang, Leong, & Zamboanga, 2016; Samuel, Riddell, Lynam, Miller, & Widiger, 2012). All four universities were in suburban settings and their student bodies were similar in ethnoracial distribution. Euro Americans ($N = 418$; 63.2% women; $M_{age} = 18.43$, $SD_{age} = .56$) were recruited from psychology subject pools on their respective campuses and received research credits for their participation. These subject pools provided representative samples of Euro American students from their respective campuses.² Asian Americans were underrepresented at these predominantly White universities, including in the psychology subject pools. To encourage participation from individuals who were representative of the college population, we recruited Asian Americans ($N = 429$; 56.6% women; $M_{age} = 18.00$, $SD_{age} = .68$) via mass emails at the universities and provided cash compensation for their participation. Our Asian sample consisted of people from diverse heritages (largest ethnic groups included 179 Chinese, 77 Asian Indian, 50 Korean, 27 Vietnamese). Two-thirds of Asian Americans identified as U.S.-born to at least

² Nativity status data were not collected from Euro Americans. Information from other studies at these universities suggested that vast majority of Euro Americans were U.S.-born.

one immigrant parent ($n = 300$). Other Asian American participants identified as foreign-born individuals who immigrated to the U.S. before 12 years of age ($n = 129$). This is the age when individuals begin middle school, where there is a significant increase in peer socialization to the mainstream (Euro) American culture. Along with native-born individuals, immigrant Asian Americans are expected to be as fluent in American English as their Euro American counterparts. These demographic backgrounds provide rough estimation of the U.S. cultural influence on our Asian American participants.

Measure

NEO Inventories. NEO Inventories provide comprehensive assessment of personality among adults and adolescents. Euro Americans completed the Revised NEO Personality Inventory (NEO PI-R; McCrae & Costa, 1992) and Asian Americans completed the NEO Personality Inventory-3 (NEO PI-3; McCrae & Costa, 2010). The NEO PI-R and the NEO PI-3 both consist of 240 items assessing five basic personality domains (*neuroticism*, *extraversion*, *openness to experience*, *agreeableness*, and *conscientiousness*), as well as 30 narrowband personality traits. There are six facets for each personality domain. For example, the domain of *neuroticism* includes facets of *anxiety*, *depression*, and *angry hostility*. *Extraversion* includes *warmth* and *gregariousness*. *Openness* includes *fantasy* and *aesthetics*. *Agreeableness* includes *trust* and *straightforwardness*. *Conscientiousness* includes *competence* and *order*. NEO PI-3 contains minor revisions to 37 items in the NEO PI-R with the specific goal of lowering the reading level. Previous validation research has shown that the NEO PI-3 showed slightly better readability and internal consistency reliability than the NEO PI-R, and nevertheless retained the same intended factor structure. The more notable readability improvements were observed for *A6 tender-mindedness* indicating *agreeableness*, and *C2 dutifulness* indicating *conscientiousness*.

(McCrae, Costa, & Martin, 2005). Previous research has suggested that language of assessment may affect the reliability of the NEO items among Asian nationals (Rollock & Lui, 2016). Thus, we administered the NEO PI-3 among Asian Americans to reduce the possibility that language fluency confounds our tests of measurement invariance. In the present study, the five personality domain scores demonstrated adequate internal consistency reliability. Table 1 summarizes the means, standard deviations, and Cronbach's alphas for the facet scores for Euro and Asian Americans.

Data Analytic Plan

Structural equation models. The present factor analytic procedures were conducted using Mplus v8. Consistent with previous measurement studies with NEO Inventories (Furnham, Guenole, Levine, & Chamorro-Premuzic, 2013), maximum likelihood parameter estimates with standard errors and a chi-square test statistic (MLR) were used because the parameters are robust to non-normality in the data. With geomin rotation, we first fitted a five-factor structure using exploratory structural equation modeling (ESEM) to the overall sample, and to Euro American and Asian American samples separately. All 30 personality facets were specified to load onto all five domains, as posited in previous research with the NEO Inventories. ESEM has been used to examine measurement invariance of personality scale data (Booth & Hughes, 2014; Marsh et al., 2010; Samuel, South, & Griffin, 2015). Similar to its confirmatory factor analysis (CFA) counterpart, an ESEM estimates the primary loadings that are specified in a factor structure that is determined a priori. For our current purposes, each facet (e.g., *NI anxiety*) was specified to load onto its corresponding personality domain (in this case, *neuroticism*). Different from a CFA, an ESEM allows non-primary factor loadings to be estimated. ESEMs with personality data have shown several advantages over traditional CFAs: producing better model fit, more accurately

representing the complex nature of the data, and demonstrating better factor distinctiveness, and still resulting in similar factor scores that correlate with sums of observed scores (Chiorri, Marsh, Ubbiali, & Donati, 2016; Furnham et al., 2013; Herrmann & Pfister, 2013; Wright, 2017). Thus, facet scores were specified to cross load on other personality domains (e.g., N1-N6 onto *extraversion*).

Measurement invariance models. Next, we conducted multigroup ESEMs to test measurement invariance of the facet-level data. In the event that a metric invariance ESEM was rejected, we replicated the initial five-factor solution using exploratory factor analysis within a confirmatory factor analysis framework (E-CFA). Under conditions of metric noninvariance, E-CFAs were used rather than ESEMs because ESEM did not permit testing partial measurement invariance in subsequent multigroup analyses (Marsh, Morin, Parker, & Kaur, 2014; Marsh et al., 2009; Vassend & Skrondal, 2011). In E-CFAs testing metric and scalar invariance, the strongest-loading facet for each personality domain was fixed to 1.0 and mean of the latent factor was fixed at 0 in both groups.

Consistent with the forward, sequential constraint imposition approach (Meredith, 1993), our tests of measurement invariance used Euro Americans as the reference group in multigroup E-CFAs where the parameter estimates were freely estimated. Asian Americans were treated as the comparison group and parameter estimates were constrained to be equal to those of the Euro American group. First, we tested configural invariance to determine whether Euro and Asian American data were similar in structural pattern, while factor loadings, facet score means, and residual variances were freely estimated for each group. Second, we tested metric/weak invariance to determine whether factor loadings were equivalent across groups, while facet means and residual variances were estimated for each group. Third, we tested scalar/strong

invariance by holding the facet intercepts equal for both groups as well, while freely estimating residual variances. Further constraints as they pertain to residual variances of the facet scores, factor variances, factor covariances, etc. are possible, but these requirements are not necessary for interpreting factor mean differences.

Statistical criteria used to evaluate model fit and measurement invariance. We used comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square of approximation (RMSEA), and standardized root mean square residual (SRMR) to evaluate the overall fit of the ESEM and E-CFA solutions. We consulted the typical standards to evaluate the fit of all models tested in this study. A model would be considered to be an adequate fit to the data if CFI and TLI $\geq .90$, RMSEA $\leq .08$, and SRMR $\leq .10$, and a model to be an excellent fit to the data if CFI and TLI $\geq .95$, RMSEA $\leq .06$, and SRMR $\leq .08$ (Hu & Bentler, 1999). It is important to note that no universal cutoff values were appropriate to evaluate models with different features (e.g., indicator-to-factor ratio, strength of loadings, number of categories in ordinal-categorical variables). Thus, we considered these typical standards along with theories and prior research findings in our evaluations of model fit. We report χ^2 statistic and its statistical significance, but did not use this information to evaluate the model fit because χ^2 values tend to be large in sample sizes like in this study and therefore are not necessarily informative.

For each measurement invariance model, we evaluated how well each multigroup E-CFA fit our data. Models with fewer freely estimated parameters (i.e., more equality constraints across groups) were considered more parsimonious. For example, metric invariance model was nested within configural invariance model, and scalar invariance model was nested within metric (and configural) invariance model(s). We examined changes in CFI (Δ CFI), RMSEA (Δ RMSEA), and SRMR (Δ SRMR) to compare the nested model against its less parsimonious model. The

invariance model was supported when $\Delta\text{CFI} \leq -.010$ and $\Delta\text{RMSEA} \leq .015$, and $\Delta\text{SRMR} \leq .030$ and $\text{SRMR} \leq .015$ for metric and scalar invariance, respectively (Chen, 2007; Cheung & Rensvold, 2002).

In instances where increasing constraints resulted in worse fit and models assuming full metric or scalar invariance were rejected, we tested partial measurement invariance by identifying parameters that produced large modification indices (Byrne, Shavelson, & Muthén, 1989). For example, in the case that full metric invariance was not supported, we allowed noninvariant factor loadings to be freely estimated in each group one at a time. We then compared the partial metric invariance models against the configural invariance model. Because ΔCFI has been the most regularly reported fit index in measurement invariance research (Putnick & Bornstein, 2016), we stopped freeing up additional parameter constraints when ΔCFI fell in the accepted range and when we obtained an adequate partial invariance model. We examined effect sizes for standardized parameter estimates to aid our interpretation of salient primary loadings and cross-loadings, and trivial loadings. Consistent with previous E-CFA research with the NEO Inventories, we considered factor loadings $\geq .40$ and $\geq .20$ to be salient and modest indicators of the latent factor, respectively (Vassend & Skrondal, 2011). Loadings $\leq .20$ were considered trivial.

Results

There were relatively more missing cases for facet scores among Euro Americans; the most egregious (5%) missingness was observed for *value* (O6). Our data did not contain systematic missingness, thus we used full information maximum likelihood to handle missing data in our analyses (Enders, 2010). We calculated the internal consistency to estimate the degree to which scale items within each facet were intercorrelated (observed median Cronbach's α

= .72; Cronbach's α ranged from .47 to .86 for Euro Americans, and .53 to .84 for Asian Americans; see Table 1 for all internal consistency reliability coefficients). Although some facet scores showed Cronbach's α values below the typical standards for internal consistency (e.g., *E4 activity*, *O4 actions*, and *A6 tender-mindedness*), our internal consistency of the facet scores was similar to values reported in previous research (median α = .76, range = .54 to .83).

Factor Analyses and Measurement Invariance Models

Table 2 shows the fit indices for all E-CFA models in this study. Except for TLI, fit indices showed that the five-factor model with 30 facets generally fit our data with the full sample adequately, $\chi^2(295) = 1090.32$, CFI = .91, TLI = .87, RMSEA = .06 (90% CI = .05, .06), SRMR = .03. The five-factor E-CFA model also fit adequately for Euro Americans. Although the model fit slightly less well for Asian Americans, results also showed that the baseline multigroup model exhibited adequate fit, supporting configural invariance, $\chi^2(590) = 1503.27$, CFI = .91, TLI = .86, RMSEA = .06 (90% CI = .06, .06), SRMR = .03. TLI fell below the .90 guideline for adequate model fit; still, considering all fit indices we deemed the baseline configural model sufficient for further examination of metric invariance.

Metric/weak invariance. Model fit worsened when we imposed equality constraints on factor loadings across groups ($\Delta\text{CFI} = -.025$, $\Delta\text{RMSEA} = .001$, $\Delta\text{SRMR} = .045$). Although ΔRMSEA did not show a large degree of model misfit, we used modification indices to identify parameters that resulted in the largest increase in χ^2 when equality constraints were imposed. These equality constraints were released one at a time until the partial weak invariance model was not significantly worse than the configural invariance model (based on ΔCFI). In both groups, three primary loadings were freely estimated: *E4 activity* and *E3 assertiveness* on *extraversion* (F2), and *N5 impulsiveness* on *neuroticism* (F1). Four cross-loadings also were

freely estimated: *E3 assertiveness* on *openness* (F3), *N3 depression* on *conscientiousness* (F5), *N4 self-consciousness* on *extraversion* (F2), and *E6 positive emotions* on *openness* (F3). Table 3 summarizes partial metric invariance results with standardized factor loading estimates.

Consistent with H1, we found group differences in the factor loadings of *assertiveness* and *activity* on *extraversion*. There was a trivial relation between *extraversion* and *E3 assertiveness* (.08) for Asian Americans, but a modest relation for Euro Americans (.27). We also found a modest factor loading of *E4 activity* (.28) on *extraversion* for Euro Americans but not Asian Americans (.13). We did not find support for H2, however. Whereas there were cross-loadings of *assertiveness* on *agreeableness*, the parameter estimates were similar across the two ethnoracial groups. Overall, data showed group equivalent primary loadings on *openness*, *agreeableness*, and *conscientiousness*. Data also showed an FFM-congruent, modest relation between *neuroticism* and *N5 impulsiveness* (.24) among Asian Americans, but an unexpectedly trivial loading among Euro Americans (.12). Together, these patterns showed relatively more ethnoracial variations in the relations between *extraversion* and lower-order facets than other broad personality domains.

In terms of cross-loadings, data showed a modest cross-loading of *E6 positive emotions* (.20) on *openness* in the Euro American group. Although modification indices revealed that there were ethnoracial differences in terms of cross-loadings of *self-consciousness*, *depression*, and *assertiveness*, they did not fall in the range for salient or modest loadings. Furthermore, results revealed several cross-loadings that were similar across ethnoracial groups, particularly concerning *extraversion* and *agreeableness*. *A1 trust* (.23) and *A3 altruism* (.30) demonstrated modest cross-loadings on *extraversion*. Also, *O3 feelings* showed modest cross-loadings onto both *neuroticism* (.26) and *extraversion* (.29). Finally, *N2 angry hostility* showed a larger—albeit

modest—cross-loading on *agreeableness* (-.38) than on *neuroticism* (.21).

Scalar/strong invariance. As shown in Table 2, one fit index showed that the model fit worsened when we imposed equality constraints on the facet score means ($\Delta\text{CFI} = -.032$, $\Delta\text{RMSEA} = .007$, $\Delta\text{SRMR} = .005$). As suggested by modification indices, we removed the equality constraints for the facet means of *C4 achievement striving*, *O4 actions*, *C1 competence*, *E5 excitement seeking*, *A6 tender-mindedness*, and *E1 warmth*. Consistent with H3, compared to Euro Americans, Asian Americans were inclined to overreport on *achievement striving* but underreport on *competence*. We also found that Asian Americans overreported on *warmth*, *openness to actions*, *tender-mindedness*, and underreported on *excitement seeking*. See Table 3 for a summary of the final partial scalar invariance results.

Discussion

Overall, we found that the FFM remains a reasonable nomological network that organizes personality attributes for Asian Americans; it is particularly helpful in studies that aim to compare domain and facet scores between Asian and Euro Americans. Our data suggested that there was reasonable metric invariance between Asian and Euro Americans. There were fewer than 5% nonequivalent parameters when considering all 150 primary and cross-loadings in the E-CFA, and 10% primary loadings of facet scores onto domains that showed noninvariance across groups. Data also suggested some evidence for partial scalar invariance, given that 20% facet mean scores were systemically different across groups (Byrne et al., 1989).

Our study contributed to the literature by considering the complex facet structure and ethnoracial differences in personality. This is the first investigation to examine facet-level (non)invariance among Euro Americans and Asian Americans, the latter being the fastest-growing domestic U.S. ethnoracial group. We presented data that reconciled issues pertaining to

commonality and ethnoracial variability in the facet structure. First, our findings indicated that there was generally a large degree of consensus on the higher-order structure of personality traits among Euro and Asian Americans. There were relatively more ethnoracial differences in the associations among extraversion and its facets. Second, results revealed facets where Euro and Asian Americans differed in the expression of traits. Overall, our results suggested the importance of considering not only cultural differences in attention to the environment and social processes (Lewis, Goto, & Kong, 2008). To the extent that self-presentation is highly valued among Asian Americans (Church et al., 2008), the present findings reflect salient norms and values associated with collectivism, including modesty, subdued arousal level, and interpersonal harmony. It appears that these cultural values remain deep-rooted even among Asian Americans who were born in the U.S. or immigrated at a young age (Chu & Kwan, 2007; English & Chen, 2007; Kim et al., 2005; Lui & Rollock, 2018).

Some facet scores showed less-than-adequate internal consistency reliability as indicated by Cronbach's α s, but reliabilities in our Euro American sample were very similar to those from a previous predominantly White "United States" sample whereas reliabilities in our Asian American sample were more similar to those from a previous Filipino sample (Church et al., 2011). Cronbach's α is contingent upon redundancy in items. To ensure broad content coverage, many items within the same facet ask varied questions (see professional manual; McCrae & Costa, 2010). Given that Cronbach's α is limited in capturing measurement error, and is influenced by data structure (e.g., scale length, sample characteristics, composition of items with content redundancy) apart from construct-related internal consistency, future studies should consider using latent variable modeling approach to estimate scale reliability (Raykov, 2004).

The internal consistency with our Asian American NEO PI-3 data were slightly superior

to the NEO PI-R data with Filipino nationals, suggesting that the NEO PI-3 likely improved the reliabilities of certain facets and/or that Asian Americans are more similar to Euro Americans than to Asian nationals. Similar to previous research with Asian nationals, there was greater ethnoracial noninvariance concerning extraversion than other domains, an interpersonally relevant trait in the FFM (Rollock & Lui, 2016), but we found a smaller degree of facet-level measurement noninvariance than item-level measurement noninvariance (40-50%) shown in previous studies (cf. Church et al., 2011).

As predicted, *assertiveness* and *activity* were not meaningful indicators of extraversion among Asian Americans. *Assertiveness* loaded onto agreeableness equivalently across Euro and Asian American groups, however. These findings expanded upon prior knowledge about mean level differences in *assertiveness* and *activity* among Chinese nationals, Chinese Americans, and Euro Americans (McCrae et al., 1998). Consistent with earlier research, Asian Americans are not necessarily less assertive in social interactions because of a lack of social skills (Sue, Ino, & Sue, 1983; Sue, Sue, & Ino, 1990); rather, assertive Asian individuals risk being evaluated negatively as rude, demanding, and entitled by others in their cultural contexts (Leong & Lee, 2006). Asian American individuals who have been socialized in both Asian culture and the mainstream U.S. culture may learn to be more aware of their image in social settings, and use this information to monitor their behaviors. As observed also in previous research with Asian and African nationals (Rollock & Lui, 2016; Zecca et al., 2013), cross-loadings of agreeableness facets (e.g., *trust* and *altruism*) on extraversion likely indicate cultural expectations in interpersonal relatedness. Thus, Asian American individuals may be more likely to use high-context communications styles to avoid rupturing social harmony and to preserve face for themselves and others (Chunyan Peng & Tjosvold, 2011; Leong & Lee, 2006; Zane & Yeh, 2002). Alternatively, the present findings also

may reflect a differential preference of high activity and arousal levels to subdued energy among Euro Americans (Tkach & Lyubomirsky, 2006). More research is warranted to examine whether these cultural differences in activity and assertiveness are driven by the unusual preferences among Euro Americans or Asians/Asian Americans.

The observed discrepancy between ethnoracial mean differences in *achievement striving* and *competence* had been shown in other studies (e.g., Mastor et al., 2000). Given that there was no intercept noninvariance in *modesty*, it was unlikely that Asian Americans underreported their competence because of self-presentation. Rather, cultural psychology has suggested that Asian societies are more likely to promote dialecticism, wherein thoughts that are seemingly contradictory are accepted, and the personhood is likely to be conceptualized as a dynamic entity and within contexts (Hamamura, Heine, & Paulhus, 2008; Spencer-Rodgers, Boucher, Mori, Lei, & Kaiping, 2009; Spencer-Rodgers, Williams, & Kaiping, 2010). For example, given high emphasis placed on achievement and family honor among Asian Americans (Kim et al., 2005; Lui & Rollock, 2018), the standard for competence may be particularly high in this ethnoracial group. Asian Americans may be describing their levels of competence when referencing their internalized cultural expectations or comparing against other Asian Americans (Leininger, 2002). It also is possible that Asian Americans in our sample are evaluating their levels of competence by comparing against an aspirational standard and/or consider times when they have not been as competent (cf. English & Chen, 2007). Furthermore, underreports of competence may constitute a culturally prescribed tactic used to maintain a modest self-impression. For example, previous studies show that Chinese individuals may explicitly underreport positive characteristics of the individual self; instead, because modesty is a desirable trait in collectivistic cultures, showing overt levels of modesty may inadvertently become a positive impression management tactic (Cai

et al., 2011).

Application Implications

The present results yielded some recommendations for administering and interpreting the NEO Inventories. First, there was minimal facet loading noninvariance across Euro and Asian Americans. With exception of seven facets that showed nonequivalent primary and cross-loadings, the NEO Inventories may be used to compare the correlates of personality traits across groups. It is most noteworthy that assertiveness and activity are less relevant behavioral indicators of extraversion among Asian Americans than Euro Americans. Second, using a conservative approach that requires a majority of the facets to be invariant across groups (Church et al., 2011), it would be appropriate to compare levels of personality domains using partially invariant facet scores between Euro and Asian Americans.

Researchers and practicing professionals administering the NEO Inventories should be aware of the small degree of loading nonequivalence and ethnoracial differences in the endorsement of personality attributes. Although using all facet information may ensure a comprehensive content coverage of each domain, direct group comparisons of mean differences in the Big Five personality traits should exclude the six facets that showed intercept noninvariance. We have shown that Asian Americans are more likely than Euro Americans to characterize themselves as warm and tender-minded, open to new actions, achievement striving, but less excitement seeking and competent. These ethnoracial variations reflect cultural values associated with collectivism, modesty, and humility, as well as possibly the selective immigration of high-achieving Asian individuals. The functions of these personality characteristics should be contextualized in people's cultural milieu to gain a comprehensive and sensitive understanding of individual differences.

Strengths, Limitations, and Future Directions

A key strength of our study was minimizing sources of variation that confounded previous work of comparing ethnoracial groups from different backgrounds (e.g., nativity status, nations, language of assessment). By holding constant age group, student status, geographical location, and the mainstream cultural context, we can be more confident in attributing cultural prescription and socialization as the underlying reasons for measurement noninvariance of the NEO Inventories. A second strength of this study was the use of ESEM and E-CFA to model complex factor relations among personality facets and domains, and allow primary and cross-loadings for both ethnoracial groups. This advanced the field by demonstrating construct validity of personality attributes in the understudied Asian American population and offering some caution for interpreting crude facet and domain-level group differences. Findings can be applicable to domestic Euro and Asian American adults who are fluent in English.

Simultaneously, the present findings should be interpreted and generalized with the following limitations in mind. First, although our findings are consistent with prior research on some common Asian cultural values and personality stereotypes of Asians/Asian Americans, it is important to note that reliable group differences usually are smaller than within-group variability (Leininger, 2002). Second, some of our results may be specific to our methods. The two ethnoracial groups completed two slightly different versions of the NEO Inventories. Although the NEO PI-3, which was completed by the Asian Americans, is very similar to the NEO PI-R, there were 37 items that were adjusted to simply the reading level. While we do not believe this had an appreciable impact on our results, future studies should use identical versions of the NEO for ethnoracial comparisons. Additionally, to improve model fit and achieve partial invariance, we relied on modification indices to identify group-variant factor loadings and intercepts.

Although this method is consistent with the current best practices for measurement invariance, future research should aim to replicate these findings in new samples of similar demographic characteristics. Some of our model fit indices (TLI, and in some cases CFI) fell below the typically-used guidelines for adequate fit. Considering our complex model using multigroup E-CFA technique, more work is needed to replicate our current findings.

Third, external validity of using college students should be considered. Euro Americans were recruited from a psychology subject pool and received research credits whereas Asian American participants were recruited via mass student emails and received cash compensation. Recruiting participants from ethnoracial minority communities is more challenging than from the ethnoracial majority across research domains and age groups (e.g., Alvarez, Vasquez, Mayorga, Feaster, & Mitrani, 2006; Ejiogu et al., 2011). Consistent with existing evidence-based recommendations, we used these recruitment strategies to enhance participation from minority individuals and therefore were able to achieve comparable sample sizes of Asian and Euro Americans for this study (Sugden & Moulson, 2015; Yancey, Ortega, & Kumanyika, 2006). Nevertheless, it was unclear whether different recruitment strategies affected our results. We did not sample a general adult population, this may have limited the generalizability of our findings. Many studies with the NEO Inventories, and FFM in general, have been conducted with college students (Mullins-Sweatt, Jamerson, Samuel, Olson, & Widiger, 2006). We did not have strong reason to believe that our findings would be fundamentally different in other general adult samples (Samuel et al., 2015). Nevertheless, future research with adult samples should test the generalizability of our current findings.

Fourth, we focused on self-report data in the present study; thus, it was difficult to rule out whether the observed ethnoracial measurement invariance was a function of subjective self-

views or true personality differences across groups. Research suggests that the degree of interrater agreement in self-report personality data and observer ratings is similar in U.S. and other countries (McCrae, 2004). Yet, research with East Asian American has shown that their self-concept tends to be influenced by relationship contexts and there are greater cultural differences in self-descriptions among Asian Americans than Euro Americans (English & Chen, 2007). The effect of culturally-prescribed self-description tendencies likely vary by personality domains and facets. It may be reasonable to expect consistent cultural impact on self- and other-reports of agreeableness and extraversion, but little to no cultural impact on other-reports of conscientiousness (McCrae et al., 1998).

Fifth, existing personality research has focused on East Asian nationals and East Asian Americans. Whereas people from Chinese, Japanese, and Korean (CJK) backgrounds share a Confucian cultural tradition (Lui & Rollock, 2018), there are notable ethnic, cultural, social, political and other demographic differences between the groups—including in their histories in the American context. Although we took advantage of the shared core cultural values and sampled a pan-Asian American sample with the aim of generalizing findings to individuals of diverse Asian heritages, our sample nevertheless included predominantly CJK Americans. Families from CJK backgrounds are more likely to have immigrated to the U.S. for educational or career advancement opportunities, whereas those from Southeast Asian backgrounds are more likely to have moved to the U.S. for reasons such as political exiles (Lui & Rollock, 2012). Scholars have suggested that more voluntary and gradual migration is likely to be associated with more favorable acculturation attitudes than more abrupt cultural shift (Berry, Poortinga, Segall, & Dasen, 2002). Thus, there may be cultural value and acculturation differences between CJK Americans and Southeast and South Asian Americans that underlie within-group

personality variations. There is a critical need for more personality studies with underrepresented Asian American populations.

Finally, this study was designed to evaluate ethnoracial equivalence of the personality facet structure; we did not consider possible differential item functioning of the NEO Inventories. Cultural norms around specific behavioral domains (e.g., assertiveness and activity) likely influence the appropriateness of the item pools for the facets and in turn domains (e.g., Fukuyama & Greenfield, 1983). More research can employ rigorous measurement invariance procedures to further explore the impact of culture on personality and personality assessment, especially before generalizing concepts, their operationalization, or interpretations of their measures across diverse groups.

Conclusion

The facet-level personality structure offers a conceptual framework for close understanding of human behaviors, emotions, and thoughts. To the extent that measurement invariance is critical to valid ethnoracial comparisons on the facet-domain associations and level of facet endorsement, our study demonstrated initial data on facet structure equivalence and some major caveats to comparisons across Asian and Euro Americans. Assertiveness and activity are not adequate facet-level indicators of extraversion among Asian Americans; researchers and practitioners who compare the correlates of extraversion between Asian and Euro Americans are advised against considering these two facets. Cultural values likely affect Asian Americans' relatively harsher evaluation of their own competence, despite their elevated tendency to strive for high achievements. Findings not only illustrate the roles of culture on measurement (non)invariance of the NEO Inventories across Euro and Asian American groups, but also suggest exciting opportunities to further examine how traits may differentially predict life

outcomes across ethnoracial populations.

References

- Abe, J. S., & Zane, N. W. S. (1990). Psychological maladjustment among asian and white american college students: Controlling for confounds. *Journal of Counseling Psychology*, 37, 437-444. doi:10.1037/0022-0167.37.4.437
- Allik, J., Church, A. T., Ortiz, F. A., Rossier, J., Hřebíčková, M., de Fruyt, F., . . . McCrae, R. R. (2017). Mean profiles of the neo personality inventory. *Journal of Cross-Cultural Psychology*, 48, 402-420. doi:10.1177/0022022117692100
- Allik, J., & McCrae, R. R. (2004). Toward a geography of personality traits: Patterns of profiles across 36 cultures. *Journal of Cross-Cultural Psychology*, 35, 13-28. Retrieved from Ebscohost.
- Alvarez, R. A., Vasquez, E., Mayorga, C. C., Feaster, D. J., & Mitrani, V. B. (2006). Increasing minority research participation through community organization outreach. *Western Journal of Nursing Research*, 28, 541-563. doi:10.1177/0193945906287215
- Anglim, J., & Grant, S. (2016). Predicting psychological and subjective well-being from personality: Incremental prediction from 30 facets over the Big 5. *Journal of Happiness Studies*, 17, 59-80. doi:10.1007/s10902-014-9583-7
- Berry, J. W., Poortinga, Y. H., Segall, M. H., & Dasen, P. R. (2002). *Cross-cultural psychology: Research and applications (2nd ed.)*. New York: Cambridge University Press.
- Booth, T., & Hughes, D. J. (2014). Exploratory structural equation modeling of personality data. *Assessment*, 21, 260-271. doi:10.1177/1073191114528029
- 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. Retrieved from Ebscohost.

Cai, H., Sedikides, C., Gaertner, L., Wang, C., Carvallo, M., Xu, Y., . . . Jackson, L. E. (2011).

Tactical self-enhancement in China: Is modesty at the service of self-enhancement in East Asian culture? *Social Psychological and Personality Science*, 2, 59-64.

doi:10.1177/1948550610376599

Carlo, G., Knight, G. P., Roesch, S. C., Opal, D., & Davis, A. (2014). Personality across

cultures: A critical analysis of big five research and current directions. In F. T. L. Leong, L. Comas-Díaz, G. C. Nagayama Hall, V. C. McLoyd, & J. E. Trimble (Eds.), *APA handbook of multicultural psychology, vol. 1: Theory and research*. (pp. 285-298).

Washington, DC: American Psychological Association.

Chang, E. C., Chang, R., & Chu, J. P. (2007). In search of personality in asian americans: What we know and what we don't know. In F. T. L. FLeong, A. G. Inman, A. Ebreo, L. H.

Yiang, L. Kinoshita, & M. Fu (Eds.), *Handbook of Asian American psychology* (pp. 265-282). Thousand Oaks, CA: Sage.

Chang, J., & Smith, S. R. (2015). An exploration of how Asian Americans respond on the Personality Assessment Inventory. *Asian American Journal of Psychology*, 6, 25-30.

doi:10.1037/a0036173

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance.

Structural Equation Modeling, 14, 464-504. doi:10.1080/10705510701301834

Cheung, F. M., Cheung, S. F., Wada, S., & Zhang, J. (2003). Indigenous measures of personality assessment in Asian countries: A review. *Psychological Assessment*, 15, 280-289.

doi:10.1037/1040-3590.15.3.280

Cheung, F. M., Leung, K., Fan, R. M., Song, W.-z., Zhang, J.-x., & Zhang, J.-p. (1996).

Development of the Chinese Personality Assessment Inventory. *Journal of Cross-*

- Cultural Psychology*, 27, 181-199. doi:10.1177/0022022196272003
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, 9, 233-255. doi:10.1207/S15328007SEM0902_5
- Chiorri, C., Marsh, H. W., Ubbiali, A., & Donati, D. (2016). Testing the factor structure and measurement invariance across gender of the Big Five Inventory through exploratory structural equation modeling. *Journal of Personality Assessment*, 98, 88-99. doi:10.1080/00223891.2015.1035381
- Chu, T., & Kwan, V. S. Y. (2007). Effect of collectivistic cultural imperatives on Asian American meta-stereotypes. *Asian Journal of Social Psychology*, 10, 270-276. doi:10.1111/j.1467-839X.2007.00236.x
- Chung, R. H. G. (2001). Gender, ethnicity, and acculturation in intergenerational conflict of Asian American college students. *Cultural Diversity and Ethnic Minority Psychology*, 7, 376-386. doi:10.1037/1099-9809.7.4.376
- Chunyan Peng, A., & Tjosvold, D. (2011). Social face concerns and conflict avoidance of Chinese employees with their western or Chinese managers. *Human Relations*, 64, 1031-1050. Retrieved from psych
- Church, A. T., Alvarez, J. M., Mai, N. T. Q., French, B. F., Katigbak, M. S., & Ortiz, F. A. (2011). Are cross-cultural comparisons of personality profiles meaningful? Differential item and facet functioning in the Revised NEO Personality Inventory. *Journal of Personality and Social Psychology*, 101, 1068-1089. doi:10.1037/a0025290
- Church, A. T., Anderson-Harumi, C. A., del Prado, A. M., Curtis, G. J., Tanaka-Matsumi, J., Valdez Medina, J. L., . . . Katigbak, M. S. (2008). Culture, cross-role consistency, and

- adjustment: Testing trait and cultural psychology perspectives. *Journal of Personality and Social Psychology*, 95, 739-755. doi:10.1037/0022-3514.95.3.739
- De Fruyt, F., De Bolle, M., McCrae, R. R., Terracciano, A., & Costa, P. T., Jr. (2009). Assessing the universal structure of personality in early adolescence: The NEO-PI-R and NEO-PI-3 in 24 cultures. *Assessment*, 16, 301-311. doi:10.1177/1073191109333760
- Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology*, 41, 417. Retrieved from Ebscohost.
- Dudley, N. M., Orvis, K. A., Lebiecki, J. E., & Cortina, J. M. (2006). A meta-analytic investigation of conscientiousness in the prediction of job performance: Examining the intercorrelations and the incremental validity of narrow traits. *Journal of Applied Psychology*, 91, 40-57. doi:10.1037/0021-9010.91.1.40
- Eap, S., DeGarmo, D. S., Kawakami, A., Hara, S. N., Hall, G. C. N., & Teten, A. L. (2008). Culture and personality among European American and Asian American men. *Journal of Cross-Cultural Psychology*, 39, 630-643. doi:10.1177/0022022108321310
- Ejiogu, N., Norbeck, J. H., Mason, M. A., Cromwell, B. C., Zonderman, A. B., & Evans, M. K. (2011). Recruitment and retention strategies for minority or poor clinical research participants: Lessons from the healthy aging in neighborhoods of diversity across the life span study. *The Gerontologist*, 51, S33-S45. doi:10.1093/geront/gnr027
- Enders, C. K. (2010). *Applied missing data analysis*. New York: Guilford Press.
- English, T., & Chen, S. (2007). Culture and self-concept stability: Consistency across and within contexts among asian americans and european americans. *Journal of Personality and Social Psychology*, 93, 478-490. doi:10.1037/0022-3514.93.3.478
- Foldes, H. J., Duehr, E. E., & Ones, D. S. (2008). Group differences in personality: Meta-

- analyses comparing five US racial groups. *Personnel Psychology*, 61, 579-616.
doi:10.1111/j.1744-6570.2008.00123.x
- Fukuyama, M. A., & Greenfield, T. K. (1983). Dimensions of assertiveness in an Asian-American student population. *Journal of Counseling Psychology*, 30, 429-432.
doi:10.1037/0022-0167.30.3.429
- Furnham, A., Guenole, N., Levine, S. Z., & Chamorro-Premuzic, T. (2013). The NEO Personality Inventory–Revised: Factor structure and gender invariance from exploratory structural equation modeling analyses in a high-stakes setting. *Assessment*, 20, 14-23.
doi:10.1177/1073191112448213
- Hamamura, T., Heine, S. J., & Paulhus, D. L. (2008). Cultural differences in response styles: The role of dialectical thinking. *Personality and Individual Differences*, 44, 932-942.
doi:10.1016/j.paid.2007.10.034
- Han, K. H. (2011). The self-enhancing function of Chinese modesty: From a perspective of social script. *Asian Journal of Social Psychology*, 14, 258-268. doi:10.1111/j.1467-839X.2011.01354.x
- Heine, S. J. (2001). Self as cultural product: An examination of East Asian and North American selves. *Journal of Personality*, 69, 881-905. doi:doi:10.1111/1467-6494.696168
- Herrmann, A., & Pfister, H.-R. (2013). Simple measures and complex structures: Is it worth employing a more complex model of personality in Big Five inventories? *Journal of Research in Personality*, 47, 599-608. doi:https://doi.org/10.1016/j.jrp.2013.05.004
- Hu, L.-t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1-55.
doi:10.1080/10705519909540118

- Katigbak, M. S., Church, A. T., Guanzon-Lapeña, M. A., Carlota, A. J., & del Pilar, G. H. (2002). Are indigenous personality dimensions culture specific? Philippine Inventories and the five-factor model. *Journal of Personality and Social Psychology*, 82, 89-101. doi:10.1037/0022-3514.82.1.89
- Kim, B. K., Li, L. C., & Ng, G. F. (2005). The Asian American Values Scale—Multidimensional: Development, reliability, and validity. *Cultural Diversity and Ethnic Minority Psychology*, 11, 187-201. Retrieved from Ebscohost.
- Klimstra, T. A., Luyckx, K., Hale, W. W., III, & Goossens, L. (2014). Personality and externalizing behavior in the transition to young adulthood: The additive value of personality facets. *Social Psychiatry and Psychiatric Epidemiology*, 49, 1319-1333. doi:10.1007/s00127-014-0827-y
- Kluckhohn, C., & Murray, H. A. (1950). Personality formation: The determinants. In C. Kluckhohn & H. A. Murray (Eds.), *Personality in nature, society, and culture* (pp. 35-48). New York: Alfred A. Knopf.
- Labouvie, E., & Ruetsch, C. (1995). Testing for equivalence of measurement scales: Simple structure and metric invariance reconsidered. *Multivariate Behavioral Research*, 30, 63-76. doi:10.1207/s15327906mbr3001_4
- Lau, A. S., Fung, J., Wang, S.-w., & Kang, S.-M. (2009). Explaining elevated social anxiety among Asian Americans: Emotional attunement and a cultural double bind. *Cultural Diversity and Ethnic Minority Psychology*, 15, 77-85. doi:10.1037/a0012819
- Lee, M. R., Okazaki, S., & Yoo, H. C. (2006). Frequency and intensity of social anxiety in Asian Americans and European Americans. *Cultural Diversity and Ethnic Minority Psychology*, 12, 291-305. doi:10.1037/1099-9809.12.2.291

- Leininger, A. (2002). Vietnamese-american personality and acculturation. In R. R. McCrae & J. Allik (Eds.), *The five-factor model of personality across cultures* (pp. 197-225). New York: Kluwer Academic/Plenum Publishers.
- Leong, F. T., & Lee, S.-H. (2006). A cultural accommodation model for cross-cultural psychotherapy: Illustrated with the case of asian americans. *Psychotherapy: Theory, Research, Practice, Training*, 43, 410-423. doi:10.1037/0033-3204.43.4.410
- Lewis, R. S., Goto, S. G., & Kong, L. L. (2008). Culture and context: East Asian American and European American differences in P3 event-related potentials and self-construal. *Personality and Social Psychology Bulletin*, 34, 623-634.
doi:10.1177/0146167207313731
- Lui, P. P., & Rollock, D. (2012). Acculturation and psychosocial adjustment among Southeast Asian and Chinese immigrants: The effects of domain-specific goals. *Asian American Journal of Psychology*, 3, 79-90. doi:10.1037/a0025411
- Lui, P. P., & Rollock, D. (2013). Tiger mother: Popular and psychological scientific perspectives on Asian culture and parenting. *American Journal of Orthopsychiatry*, 83, 450-456.
Retrieved from psyh
- Lui, P. P., & Rollock, D. (2018). Greater than the sum of its parts: Development of a measure of collectivism among Asians. *Cultural Diversity and Ethnic Minority Psychology*, 24, 242-259. doi:10.1037/cdp0000163
- Lui, P. P., Rollock, D., Chang, E. C., Leong, F. T. L., & Zamboanga, B. L. (2016). Big 5 personality and subjective well-being in Asian Americans: Testing optimism and pessimism as mediators. *Asian American Journal of Psychology*, 7, 274-286.
doi:10.1037/aap0000054

- Lui, P. P., Vidales, C. A., & Rollock, D. (2018). Personality and the social environment: Contributions to psychological adjustment among Asian and Euro American students. *Journal of Social and Clinical Psychology, 37*, 659-696. doi:10.1521/jscp.2018.37.9.659
- Maier, K. J., Goble, L. A., Neumann, S. A., Giggey, P. P., Suarez, E. C., & Waldstein, S. R. (2009). Dimensions across measures of dispositional hostility, expressive style, and depression show some variation by race/ethnicity and gender in young adults. *Journal of Social and Clinical Psychology, 28*, 1199-1225. doi:10.1521/jscp.2009.28.10.1199
- 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
- Markus, H. R., & Kitayama, S. (1998). The cultural psychology of personality. *Journal of Cross-Cultural Psychology, 29*, 63-87. doi:10.1177/0022022198291004
- Marsh, H. W., Lüdtke, O., Muthén, B., Asparouhov, T., Morin, A. J. S., Trautwein, U., & Nagengast, B. (2010). A new look at the Big Five factor structure through exploratory structural equation modeling. *Psychological Assessment, 22*, 471-491. doi:10.1037/a0019227
- Marsh, H. W., Morin, A. J. S., Parker, P. D., & Kaur, G. (2014). Exploratory structural equation modeling: An integration of the best features of exploratory and confirmatory factor analysis. *Annual review of clinical psychology, 10*, 85-110. doi:10.1146/annurev-clinpsy-032813-153700
- Marsh, H. W., Muthén, B., Asparouhov, T., Lüdtke, O., Robitzsch, A., Morin, A. J. S., & Trautwein, U. (2009). Exploratory structural equation modeling, integrating CFA and EFA: Application to students' evaluations of university teaching. *Structural Equation Modeling, 16*, 439-476. doi:10.1080/10705510903008220

- Maistor, K. A., Jin, P., & Cooper, M. (2000). Malay culture and personality: A Big Five perspective. *American Behavioral Scientist*, 44, 95-111.
doi:10.1177/00027640021956116
- Mauss, I. B., Butler, E. A., Roberts, N. A., & Chu, A. (2010). Emotion control values and responding to an anger provocation in Asian-American and European-American individuals. *Cognition and Emotion*, 24, 1026-1043. doi:10.1080/02699930903122273
- McAdams, D. P., & Pals, J. L. (2006). A new Big Five: Fundamental principles for an integrative science of personality. *American Psychologist*, 61, 204-217. doi:10.1037/0003-066X.61.3.204
- McCrae, R. R. (2000). Trait psychology and the revival of personality and culture studies. *American Behavioral Scientist*, 44, 10-31. doi:10.1177/00027640021956062
- McCrae, R. R. (2004). Human nature and culture: A trait perspective. *Journal of Research in Personality*, 38, 3-14. doi:https://doi.org/10.1016/j.jrp.2003.09.009
- McCrae, R. R. (2017). The five-factor model across cultures. In A. T. Church (Ed.), *The praeger handbook of personality across cultures: Trait psychology across cultures., vol. 1.* (pp. 47-71). Santa Barbara, CA: Praeger/ABC-CLIO.
- McCrae, R. R., & Costa, P. T. (1992). *Revised Neo Personality Inventory (NEO-PI-R) and NEO Five Factor Inventory (NEO-FFI) professional manual*. Odesa, FL: Psychological Assessment.
- McCrae, R. R., & Costa, P. T. (2010). *NEO Inventories for the NEO Personality Inventory-3 (NEO-PI-3), NEO Five-Factor Inventory-3 (NEO-FFI-3), NEO Personality Inventory-Revised (NEO PI-R): Professional manual*. Lutz, FL: Psychological Assessment.
- McCrae, R. R., & Costa, P. T., Jr. (1997). Personality trait structure as a human universal.

- American Psychologist*, 52, 509-516. doi:10.1037/0003-066X.52.5.509
- McCrae, R. R., Costa, P. T., Jr., Del Pilar, G. H., Rolland, J.-P., & Parker, W. D. (1998). Cross-cultural assessment of the five-factor model: The Revised NEO Personality Inventory. *Journal of Cross-Cultural Psychology*, 29, 171-188. doi:10.1177/0022022198291009
- McCrae, R. R., Costa, P. T., Jr., & Martin, T. A. (2005). The NEO-PI-3: A more readable revised NEO personality inventory. *Journal of Personality Assessment*, 84, 261-270. doi:10.1207/s15327752jpa8403_05
- McCrae, R. R., & Terracciano, A. (2005). Personality profiles of cultures: Aggregate personality traits. *Journal of Personality and Social Psychology*, 89, 407-425. doi:10.1037/0022-3514.89.3.407
- McCrae, R. R., Yik, M. S. M., Trapnell, P. D., Bond, M. H., & Paulhus, D. L. (1998). Interpreting personality profiles across cultures: Bilingual, acculturation, and peer rating studies of Chinese undergraduates. *Journal of Personality and Social Psychology*, 74, 1041-1055. doi:10.1037/0022-3514.74.4.1041
- Meredith, W. (1993). Measurement invariance, factor analysis and factorial invariance. *Psychometrika*, 58, 525-543. Retrieved from Ebscohost.
- Miller, J. D., Lynam, D. R., & Jones, S. (2008). Externalizing behavior through the lens of the five-factor model: A focus on agreeableness and conscientiousness. *Journal of Personality Assessment*, 90, 158-164. doi:10.1080/00223890701845245
- Mullins-Sweatt, S. N., Jamerson, J. E., Samuel, D. B., Olson, D. R., & Widiger, T. A. (2006). Psychometric properties of an abbreviated instrument of the five-factor model. *Assessment*, 13, 119-137. doi:10.1177/1073191106286748
- 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
- Ortiz, F. A., Church, A. T., Vargas-Flores, J. D. J., Ibáñez-Reyes, J., Flores-Galaz, M., Iuit-Briceño, J. I., & Escamilla, J. M. (2007). Are indigenous personality dimensions culture-specific? Mexican inventories and the five-factor model. *Journal of Research in Personality*, 41, 618-649. Retrieved from Ebscohost.
- 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:1037/0033-2909.128.1.3
- Paunonen, S. V., & Ashton, M. C. (2001). Big five factors and facets and the prediction of behavior. *Journal of Personality and Social Psychology*, 81, 524-539. doi:10.1037/0022-3514.81.3.524
- Putnick, D. L., & Bornstein, M. H. (2016). Measurement invariance conventions and reporting: The state of the art and future directions for psychological research. *Developmental Review*, 41, 71-90. doi:https://doi.org/10.1016/j.dr.2016.06.004
- Ramakrishnan, K., & Ahmad, F. Z. (2014). *State of Asian Americans and Pacific Islanders series: A multifaceted portrait of a growing population*. Washington, DC: Asian Pacific Institute on Gender-Based Violence. Retrieved from <https://www.api-gbv.org/resources/state-asians-americans-pacific-islanders-series-2014/>
- Raykov, T. (2004). Behavioral scale reliability and measurement invariance evaluation using latent variable modeling. *Behavior Therapy*, 35, 299-331. doi:10.1016/S0005-7894(04)80041-8
- Rolland, J.-P. (2002). The cross-cultural generalizability of the five-factor model of personality.

- In R. R. McCrae & J. Allik (Eds.), *The five-factor model of personality across cultures*. (pp. 7-28). New York: Kluwer Academic/Plenum Publishers.
- Rollock, D., & Lui, P. P. (2016). Measurement invariance and the five-factor model of personality: Asian international and Euro American cultural groups. *Assessment, 23*, 571-587. doi:10.1177/1073191115590854
- Ruby, M. B., Falk, C. F., Heine, S. J., Villa, C., & Silberstein, O. (2012). Not all collectivism are equal: Opposing preferences for ideal affect between East Asians and Mexicans. *Emotion, 12*, 1206-1209. doi:10.1037/a0029118
- Samuel, D. B., Riddell, A. D. B., Lynam, D. R., Miller, J. D., & Widiger, T. A. (2012). A five-factor measure of obsessive-compulsive personality traits. *Journal of Personality Assessment, 94*, 456-465. doi:10.1080/00223891.2012.677885
- Samuel, D. B., South, S. C., & Griffin, S. A. (2015). Factorial invariance of the five-factor model rating form across gender. *Assessment, 22*, 65-75. doi:10.1177/1073191114536772
- Samuel, D. B., & Widiger, T. A. (2008). A meta-analytic review of the relationships between the five-factor model and DSM-IV-TR personality disorders: A facet level analysis. *Clinical Psychology Review, 28*, 1326-1342. doi:https://doi.org/10.1016/j.cpr.2008.07.002
- Spencer-Rodgers, J., Boucher, H. C., Mori, S. C., Lei, W., & Kaiping, P. (2009). The dialectical self-concept: Contradiction, change, and holism in East Asian cultures. *Personality and Social Psychology Bulletin, 35*, 29-44. doi:10.1177/0146167208325772
- Spencer-Rodgers, J., Williams, M. J., & Kaiping, P. (2010). Cultural differences in expectations of change and tolerance for contradiction: A decade of empirical research. *Personality and Social Psychology Review, 14*, 296-312. doi:10.1177/1088868310362982
- Sue, D., Ino, S., & Sue, D. M. (1983). Nonassertiveness of Asian Americans: An inaccurate

- assumption? *Journal of Counseling Psychology*, 30, 581-588. doi:10.1037/0022-0167.30.4.581
- Sue, D., Sue, D. M., & Ino, S. (1990). Assertiveness and social anxiety in Chinese-American women. *The Journal of Psychology*, 124, 155-163.
doi:10.1080/00223980.1990.10543212
- Sugden, N. A., & Moulson, M. C. (2015). Recruitment strategies should not be randomly selected: Empirically improving recruitment success and diversity in developmental psychology research. *Frontiers in psychology*, 6, 523-523. doi:10.3389/fpsyg.2015.00523
- Tkach, C., & Lyubomirsky, S. (2006). How do people pursue happiness?: Relating personality, happiness-increasing strategies, and well-being. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being*, 7, 183-225. doi:10.1007/s10902-005-4754-1
- Triandis, H. C., & Suh, E. M. (2002). Cultural influences on personality. *Annual Review of Psychology*, 53, 133-160. doi:10.1146/annurev.psych.53.100901.135200
- Tsai, W., Sun, M., Wang, S.-W., & Lau, A. S. (2016). Implications of emotion expressivity for daily and trait interpersonal and intrapersonal functioning across ethnic groups. *Asian American Journal of Psychology*, 7, 52-63. doi:10.1037/aap0000043
- Tsuji, H., Fujishima, Y., Tsuji, H., Natsuno, Y., Mukoyama, Y., Yamada, N., . . . Hata, K. (1997). Five-factor model of personality: Concept, structure, and measurement of personality traits. *Japanese Psychological Review*, 40, 239-259. Retrieved from Ebscohost.
- Uba, L. (1994). *Asian Americans: Personality patterns, identity, and mental health*. New York: Guilford Press.

- Vassend, O., & Skrondal, A. (2011). The NEO Personality Inventory Revised (NEO-PI-R): Exploring the measurement structure and variants of the five-factor model. *Personality and Individual Differences*, 50, 1300-1304. doi:10.1016/j.paid.2011.03.002
- Wright, A. G. C. (2017). Factor analytic support for the five factor model. In T. A. Widiger (Ed.), *The oxford handbook of the five factor model*. (pp. 217-242). New York: Oxford University Press.
- Yancey, A. K., Ortega, A. N., & Kumanyika, S. K. (2006). Effective recruitment and retention of minority research participants. *Annual Review of Public Health*, 27, 1-28. doi:10.1146/annurev.publhealth.27.021405.102113
- Zane, N., & Yeh, M. (2002). The use of culturally-based variables in assessment: Studies on loss of face. In K. S. Kurasaki, S. Okazaki, & S. Sue (Eds.), *Asian american mental health: Assessment theories and methods*. (pp. 123-138). New York: Kluwer Academic/Plenum Publishers.
- Zecca, G., Verardi, S., Antonietti, J.-P., Dahourou, D., Adjahouisso, M., Ah-Kion, J., . . . Rossier, J. (2013). African cultures and the five-factor model of personality: Evidence for a specific pan-African structure and profile? *Journal of Cross-Cultural Psychology*, 44, 684-700. doi:10.1177/0022022112468943

Table 1

Means, Standard Deviations, and Internal Consistency Reliability for NEO Facet and Domain Scores

Facet	<i>M (SD)</i>		<i>p</i>	α	
	<u>EA</u>	<u>AA</u>		<u>EA</u>	<u>AA</u>
N1 Anxiety	3.16 (.58)	3.34 (.59)	< .001	.75	.67
N2 Angry Hostility	2.71 (.57)	2.87 (.55)	< .001	.73	.65
N3 Depression	2.87 (.66)	3.22 (.61)	< .001	.81	.71
N4 Self-Consciousness	2.99 (.54)	3.18 (.63)	< .001	.64	.72
N5 Impulsiveness	3.20 (.54)	3.13 (.54)	.09	.65	.61
N6 Vulnerability	2.59 (.53)	2.79 (.58)	< .001	.76	.72
E1 Warmth	3.92 (.51)	3.67 (.61)	< .001	.73	.78
E2 Gregariousness	3.55 (.68)	3.17 (.69)	< .001	.78	.79
E3 Assertiveness	3.08 (.59)	3.02 (.40)	.08	.76	.56
E4 Activity	3.23 (.45)	3.08 (.44)	< .001	.54	.55
E5 Excitement Seeking	3.80 (.55)	3.38 (.65)	< .001	.67	.71
E6 Positive Emotions	3.75 (.55)	3.38 (.58)	< .001	.73	.67
O1 Fantasy	3.41 (.60)	3.33 (.56)	.04	.74	.59
O2 Aesthetics	3.23 (.72)	3.31 (.70)	.13	.80	.77
O3 Feelings	3.69 (.48)	3.57 (.57)	.00	.64	.70
O4 Actions	2.89 (.42)	3.07 (.47)	< .001	.47	.53
O5 Ideas	3.46 (.68)	3.48 (.65)	.69	.79	.77
O6 Values	3.44 (.48)	3.51 (.52)	.06	.66	.63
A1 Trust	3.33 (.56)	3.12 (.50)	< .001	.78	.64
A2 Straightforwardness	3.33 (.60)	3.17 (.59)	< .001	.71	.66
A3 Altruism	3.95 (.48)	3.77 (.55)	< .001	.75	.77
A4 Compliance	3.10 (.58)	3.00 (.52)	.01	.68	.56
A5 Modesty	3.30 (.56)	3.24 (.62)	.14	.74	.76
A6 Tender-Mindedness	3.49 (.41)	3.58 (.51)	.008	.51	.63
C1 Competence	3.53 (.48)	3.30 (.51)	< .001	.65	.67
C2 Order	3.12 (.58)	3.07 (.53)	.21	.67	.63
C3 Dutifulness	3.56 (.50)	3.53 (.47)	.39	.60	.65
C4 Achievement Striving	3.32 (.52)	3.51 (.61)	< .001	.75	.75
C5 Self-Discipline	3.20 (.62)	3.11 (.63)	.04	.78	.77
C6 Deliberation	3.07 (.64)	3.12 (.55)	.27	.77	.71
Neuroticism	2.92 (.41)	3.09 (.43)	< .001	.80	.84
Extraversion	3.56 (.39)	3.28 (.38)	< .001	.79	.76
Openness	3.35 (.36)	3.38 (.38)	.31	.69	.73
Agreeableness	3.42 (.37)	3.31 (.36)	< .001	.78	.73
Conscientiousness	3.30 (.43)	3.27 (.41)	.33	.86	.83

Note. EA = Euro Americans ($N = 418$); AA = Asian Americans ($N = 429$)

Table 2

Summary of Model Fit Indices in Exploratory Factor Analyses within a Confirmatory Factor Analysis Framework (E-CFA)

Model	χ^2	df	CFI	TLI	RMSEA	[90% CI]	SRMR	Δ CFI	Δ RMSEA	Δ SRMR
<u>Overall Model</u>										
E-CFA with Full Sample	1090.32*	295	.914	.873	.056	[.053, .060]	.029			
E-CFA with Euro Americans	710.84*	295	.916	.876	.058	[.053, .064]	.030			
E-CFA with Asian Americans	790.80*	295	.893	.842	.063	[.057, .068]	.036			
<u>Invariance Model</u>										
1. Configural	1503.27*	590	.905	.859	.060	[.057, .064]	.033			
2. Metric/Weak	1871.19*	720	.880	.855	.061	[.058, .065]	.078	-.025	.001	.045
2a. Partial Metric/Weak	1715.03*	713	.895	.872	.058	[.054, .061]	.061	-.010	-.002	.028
3. Scalar/Strong	2044.04*	733	.863	.837	.065	[.062, .068]	.066	-.032	.007	.005
3a. Partial Scalar/Strong	1782.84*	727	.890	.868	.059	[.055, .062]	.059	-.005	.001	-.002

Note. CFI = comparative fit index, TLI = Tucker-Lewis index, RMSEA = root mean square of approximation, SRMR = standard root mean square residual. Δ CFI $\leq$.01, Δ RMSEA $\leq$.015, and Δ SRMR $\leq$.015 for weak invariance and .015 for strong invariance would indicate support for factorial invariance. Bold statistics indicate rejection of factorial invariance models.

* $p < .001$

Table 3

Summary of Standardized Factor Loadings and Intercepts in the Final Partial Scalar Invariance Model

	Loading										Intercept	
	F1: N		F2: E		F3: O		F4: A		F5: C		EA	AA
	EA	AA	EA	AA	EA	AA	EA	AA	EA	AA		
N1 Anxiety	.44	.44	.00	.00	.00	.00	.00	.00	.00	.00	3.19	3.19
N2 Angry Hostility	.21	.21	-.05	-.05	-.09	-.09	-.38	-.38	-.05	-.05	2.73	2.73
N3 Depression	.40	.40	-.11	-.11	.02	.02	-.11	-.11	-.19	-.01	2.95	2.95
N4 Self-Consciousness	.33	.33	-.07	-.17	-.03	-.03	-.03	-.03	-.06	-.06	2.98	2.98
N5 Impulsiveness	.12	.24	.16	.16	.02	.02	-.15	-.15	-.20	-.20	3.15	3.15
N6 Vulnerability	.31	.31	-.02	-.02	-.11	-.11	-.03	-.03	-.16	-.16	2.64	2.64
E1 Warmth	.10	.10	.47	.47	.16	.16	.12	.12	.06	.06	3.90	4.01
E2 Gregariousness	.00	.00	.49	.49	.00	.00	.00	.00	.00	.00	3.51	3.51
E3 Assertiveness	-.03	-.03	.27	.08	.17	-.02	-.19	-.19	.14	.14	3.06	3.06
E4 Activity	.08	.08	.28	.13	.09	.09	-.14	-.14	.14	.14	3.18	3.18
E5 Excitement Seeking	-.02	-.02	.32	.32	.08	.08	-.13	-.13	-.05	-.05	3.78	3.56
E6 Positive Emotions	.06	.06	.44	.44	.20	.05	.08	.08	.05	.05	3.69	3.69
O1 Fantasy	.04	.04	.12	.12	.30	.30	-.00	-.00	-.20	-.20	3.37	3.37
O2 Aesthetics	.17	.17	.12	.12	.48	.48	.06	.06	-.16	-.16	3.25	3.25
O3 Feelings	.26	.26	.29	.29	.27	.27	-.02	-.02	.04	.04	3.66	3.66
O4 Actions	-.05	-.05	.11	.11	.16	.16	.02	.02	-.13	-.13	2.88	3.13
O5 Ideas	.00	.00	.00	.00	.49	.49	.00	.00	.00	.00	3.44	3.44
O6 Values	.06	.06	.07	.07	.25	.25	.04	.04	-.10	-.10	3.47	3.47
A1 Trust	-.05	-.05	.23	.23	.03	.03	.29	.29	.03	.03	3.32	3.32
A2 Straightforwardness	.11	.11	.10	.10	-.01	-.01	.37	.37	.12	.12	3.29	3.29
A3 Altruism	.15	.15	.30	.30	.16	.16	.26	.26	.12	.12	3.93	3.93
A4 Compliance	.00	.00	.00	.00	.00	.00	.45	.45	.00	.00	3.08	3.08
A5 Modesty	.17	.17	.00	.00	.07	.07	.28	.28	-.08	-.08	3.27	3.27
A6 Tender-Mindedness	.18	.18	.15	.15	.15	.15	.17	.17	.03	.03	3.50	3.67
C1 Competence	-.02	-.02	.02	.02	.12	.12	-.04	-.04	.34	.34	3.51	3.34
C2 Order	.07	.07	-.02	-.02	-.05	-.05	-.01	-.01	.37	.37	3.09	3.09
C3 Dutifulness	.16	.16	.06	.06	.09	.09	.04	.04	.39	.39	3.55	3.55
C4 Achievement Striving	.19	.19	.13	.13	.11	.11	-.09	-.09	.47	.47	3.30	3.55
C5 Self-Discipline	.00	.00	.00	.00	.00	.00	.00	.00	.54	.54	3.17	3.17
C6 Deliberation	.07	.07	-.19	-.19	.03	.03	.13	.13	.38	.38	3.05	3.05

Note. EA = Euro Americans; AA = Asian Americans. Parameter estimates $\geq .40$ indicate salient loadings, and $\geq .20$ indicate modest loadings. Loadings and intercepts in bold indicate ethnoracial noninvariant parameters. Loadings in squares indicate facets that showed modest cross-loadings.