A Multicultural Assessment of Adolescent Connectedness:

Testing Theoretical Factor Models for Invariance across Gender and Ethnicity

10/03/08

Michael J. Karcher

Daniel Sass

University of Texas at San Antonio

Revision submitted to the Journal of Counseling Psychology 10/10/08

Abstract

Counselors, psychologists, and evaluators of intervention programs for youth increasingly view the promotion of connectedness as an important goal of intervention. Yet identifying clients and assessing intervention outcomes both necessitate the availability of culturally invariant and theory-tested assessments of connectedness. This study examines the validity evidence for the ten-scale *Hemingway: Measure of Adolescent Connectedness* and tests its invariance across gender and ethnicity among 3927 predominately Midwestern African-American, Caucasian, and Latina/o middle school-aged adolescents. Factor models based on attachment and problem-behavior theories, which propose different underlying factor structures for adolescent connectedness, also were tested for goodness of model fit and were examined for factor structure equivalence across gender or ethnicity. Confirmatory factor analyses were used to (a) assess the construct validity of the separate scales using a first-order factor model (reflecting the ten scales separately); (b) compare the fit of the two second-order theoretical models (which organized scales under either two or four higher-order factors); and (c) evaluate each model's statistical invariance across gender and ethnicity. Results suggest all three models fit the data well and were statistically invariant across gender and ethnicity. This suggests that African American, Caucasian, and Latina/o boys and girls interpret the *Hemingway* scales similarly.

Keywords: Factor Analysis, Invariance, School Connectedness, Adolescence, Cross-cultural

A Multicultural Assessment of Adolescent Connectedness:

Testing Theoretical Factor Models for Invariance across Gender and Ethnicity

"As important as it is to reduce or eliminate problems among children and adolescents, it is just as important to help them thrive and form positive connections to the larger world" (Evans et al., 2005, p. 498). Promoting adolescents' connectedness to school, their families, and their futures have become the key targets of both school-based prevention programs and positive youth development programs (Grossman & Bulle, 2006; Roth & Brooks-Gunn, 2003). Yet rarely have program evaluators considered the possibility of important cultural variations or gender differences in the meaning of connectedness when evaluating these programs.

Townsend and McWhirter (2005) reviewed 288 articles and chapters on connectedness and concluded that the most parsimonious definition of connectedness is "when a person is actively involved with another person, object, group, or environment, and that involvement promotes a sense of comfort, well-being, and anxiety reduction" (p. 193). In the adolescence literature, connectedness is differentiated into domains including connectedness to school, family, and peers or friends (i.e., social connectedness), and is characterized as "being close to people" and "feeling a part of" specific contexts and relationships (Resnick et al., 1997, p. 825). Yet there appears to be confusion about whether adolescent connectedness (a) is unidimensional, (b) is multidimensional and better represented by separate, unrelated domains of connectedness (relationships and contexts), or (c) whether connectedness to school, family and friends are higher order constructs.

The goals of this study are to (a) test the construct validity of one assessment of adolescent connectedness, (b) compare two competing theoretical models of adolescent connectedness, and (c) examine model fit and estimate differences in both latent factor and observed scale score means among African American, Caucasian, and Latina/o boys and girls.

Variations in the Meaning and Measure of Adolescent Connectedness

It is important for counselors and program developers to be attentive to cultural variations in the manifestation of adolescent connectedness because, by and large, youth programs and related counseling services provided to ethnic minority youth often target problems and promote developmental competencies derived from research on ethnic majority youth (Garcia Coll et al., 1996). Gender differences in the importance of relatedness and connection in adolescent development are also likely to have implications for the design and assessment of programs targeting connectedness (McNeely, Nonnemaker, & Blum, 2002; Townsend & McWhirter, 2005). The lack of attention to cultural and gender differences in program development and evaluation suggests that many counseling researchers and practitioners assume "connectedness" means the same thing for adolescents across gender and ethnic groups—i.e., shares a common underlying factor structure; however, this empirical question has received little attention to date.

Ethnic Differences. There is considerable evidence that minority and majority youth experience different levels of social support from their families, schools, and peer groups. If connectedness is a response to experiences of social support, including both early attachment and subsequent experiences of relatedness and belonging (Karcher, Holcomb, & Zambrano, 2008), then this may explain differences in connectedness found across ethnic groups (Resnick, Harris, & Blum, 1993). For example, experiences of discrimination that are somewhat unique to racial and ethnic minority youth (e.g., African-American, Latina/o) may affect the generalizability of minority youths' primary attachments with family ("working models") to their peers and teachers at school thereby resulting in different manifestations of connectedness in these relationships than for Caucasian youth (Garcia Coll et al., 1996). Perhaps this is why lower levels of connectedness to school have been reported by African-American and Latina/o youth (Bonny et al., 2002; McNeely et al., 2002). For ethnic minority youth, family connections also have been described as being more important than for Caucasian youth, who often place a relatively higher emphasis on peer connectedness (Cernkovich & Giordana, 1992). Specifically, youth from traditional Latina/o families report greater differentiation between their family and school lives—a construct called familism (Ramirez, 1991; Sanchez & Colon, 2005). This very brief review of some of the multicultural variations in adolescents' academic, familial, and social connectedness suggest that there may be important underlying differences in the meaning of adolescent connectedness for culturally different youth.

Gender Differences. Similarly, research reveals different mean levels of connectedness to family, school and peers for boys and girls (Resnick et al., 1993). Girls have reported higher levels of social connectedness but lower levels of school connectedness than boys (Resnick et al., 1997; Karcher & Lee, 2002). But the meaning boys and girls make of connectedness—the role it plays in their lives—also may differ (Jordan et al., 2000; Resnick et al., 1993; Harter et al., 1997). For example, Jacobson and Rowe (1999) found the association between both family and school connectedness and depression is twice as large for boys as for girls.

However, reports of observed mean differences in connectedness between boys and girls and across ethnic groups may be dubious because measurement invariance across groups on virtually all existing measures of adolescent connectedness has not yet been established. The phenomena assessed by measures of connectedness may have very different meanings for boys and girls, and for youth from different ethnic backgrounds. Thus, two groups could have similar (or different) observed mean scores on connectedness to school, but if the latent or observed scores are not created in a similar fashion (i.e., the scales are not invariant) these findings would be uninterpretable. If the measures are not invariant, then the meaning made by girls and boys are different, because the item weights (i.e., factor loadings) and scale (i.e., intercepts) used to create the overall score are not the same. Each group's score would be created in a different manner meaning the measure is interpreted slightly differently across these groups.

Until the assumption of equivalent factor structures for a given measure of adolescent connectedness has been confirmed, using these measures for identifying youth in need of services or for measuring the effects of counseling and programmatic interventions will generate results of questionable value. One measure of adolescent connectedness, for example, the *Hemingway: Measure of Adolescent Connectedness* (Karcher, 2007), may provide a useful measure with which to examine gender and ethnic differences in adolescent connectedness. It is the only adolescent connectedness measure to include multiple connectedness subscales for the connectedness to school, family, and friend variables on which mean differences across gender and ethnicity have been reported in the literature and which are most commonly targeted by youth programs. Furthermore, studies reveal negative relationships between several of the *Hemingway*'s connectedness scales and adolescent risk-taking behavior (Karcher, 2002; Karcher & Finn, 2005) suggesting that promoting connectedness (as measured by these scales) is an appropriate target for intervention programs. Yet, the use of the *Hemingway* subscales in two large-scale intervention studies (Herrera et al., 2007; Karcher, 2008) has revealed that the effect of mentoring on participating Latina/o youths' connectedness to school, teachers, and peers differed for boys and girls. These findings underscore the need to determine whether the scales are interpreted similarly by boys and girls—that is, whether the underlying factor structure is invariant across gender and ethnicity.

The first step in testing for measurement invariance is to assess the model fit for the combined samples—i.e. fit of the "configural model"—using a factor model that has demonstrated evidence of construct validity. For example, it must first be determined whether not the construct being measured is unidimensional or multidimensional. This requires clarifying the definition of the construct and testing plausible alternative theory-based factor structures.

Toward a Definition of Adolescent Connectedness

The general definition of adolescent connectedness reflected in the *Hemingway* is of connectedness as the degree of *activity* and positive *affect* youth report that they direct toward people, places and things. This definition was developed empirically, rather than theoretically, yet it is consistent with the definition provided by Townsend and McWhirter (2005) above. The Hemingway's definition of connectedness emerged as the result of an iterative process of scale development that enlisted focus groups of adolescents, followed by a series of exploratory and confirmatory factor analyses, which resulted in the creation of ten separate scales for the *Hemingway: Measure of Adolescent Connectedness* (Karcher, 2003). Regarding "people," the *Hemingway* includes connectedness to parents, siblings, peers, friends, and teachers subscales. Regarding "places," the *Hemingway* includes connectedness to school and neighborhood subscales. Regarding "things," the *Hemingway* includes connectedness to reading, self-in-the-present, and self-in-the future subscales.

What is not clear, either from the measurement development study (Karcher, 2003) or from subsequent validation (Karcher & Lee, 2002) and research studies (Karcher, 2002), is whether these subscales should be grouped into higher order factors. In a study with Taiwanese high school students, Karcher and Lee (2002) reported a factor model in which the separate subscales were indicators of three higher order factors (i.e., academic, familial, and social connectedness). With a multiethnic U.S. sample including both adjudicated youth and preparatory school students, Karcher (2003) found that the best fitting model included a subset of the connectedness scales under two higher order factors, one reflecting peer connectedness and one reflecting adult connectedness. Yet, research on adults describes social connectedness as unidimensional (Lee & Robbins, 1998).

Identifying the Best Model: Testing for Construct Multi- and Unidimensionality

Hoyt, Warbasse, and Chu (2006) suggest the lack of adequate theory-based measures in counseling psychology is problematic. That problem is made worse when purportedly multidimensional scales demonstrate no evidence of subscale discriminant validity. Hoyt et al. argue that even theory-based measures may suffer from "construct underrepresentation" when theoretical constructs measured in a multidimensional scale lack sufficient evidence of discriminant validity. They suggest "one should not consider subscale scores as indicators of distinct constructs unless there is evidence of discriminant validity among subscales" (p. 783).

Most other measures of adolescent connectedness have yet to be tested empirically to determine if the underlying structure of adolescent connectedness is unidimensional or multidimensional. For the *Hemingway*, it is unclear whether its ten separate subscales are truly distinct (i.e., evidence of discriminant validity) or whether these ten separate subscales more appropriately should be pooled into one overall connectedness construct (e.g., like Lee and Robbin's adult social connectedness scale). In addition, there are two theories that suggest there are two or four higher order connectedness constructs under which all ten of the *Hemingway* subscales should be collapsed. These are attachment theory and problem-behavior theory.

Attachment theory: Connectedness as affectional bonds in activity contexts. The Hemingway's empirically based definition of adolescent connectedness as affect and action was not derived specifically to conform with attachment theory, but it is consistent with the two main elements of the attachment behavioral system: proximity seeking and experiencing pleasure and security in specific relationships and contexts. The person- and place-specific nature of the

Hemingway adolescent connectedness scales also is consistent with the proposition that “attachment tendencies” become more differentiated between childhood and adolescence (Ainsworth, 1989). It is generally assumed that by the elementary school years the family is no longer the youth’s only source of reference or “home base.” Middle school aged youth form “affectional bonds” to other places and relationships that take on these functions (Ainsworth, 1989; Allen, & Land, 1999). Attachment theorists and adolescence researchers commonly characterize this differentiation of childhood attachment tendencies into somewhat distinct forms of familial, academic, and social affectional bonds or connections (Ainsworth, 1989; Allen & Land, 1999; Bretherton & Mulholland, 1999; Cooper, 1999). This ecological differentiation is consistent with the fact that Armsden and Greenberg (1987), after years of research on adolescents (Greenberg, Siegel & Leitch, 1983), chose to measure adolescent attachment in specific relationships (mother, father, peers) rather than as one unitary classification.

A view of connectedness as affectional bonds that differentiate into consistent modes of relating to others in the contexts of home, school, and peer/social worlds provides a theoretical model for testing a higher order structure for adolescent connectedness. This theory suggests the presence of four higher order factors of academic, familial, social and self connectedness. Each connectedness subscale serves as an indicator of one of these factors. From this theoretical perspective, the *Hemingway’s* Connectedness to Parents and Peers scales would load on one higher order family connectedness factor. The Connectedness to Peers, Teachers, and School scales would load on a second higher-order academic connectedness factor. Connectedness to Neighborhood and Friends scales would load on a third social connectedness higher-order factor.

In addition to these three higher order factors representing interpersonal connectedness, the *Hemingway* includes two intrapersonal connectedness-to-self scales that would load onto a fourth higher order factor. These connectedness-to-self scales are quite consistent with Bowlby's belief that working models of the self are inseparable from working models for others (for discussion of working models of the self, see Bretherton & Munholland, 1999, p. 102-103; Bowlby, 1973, p. 203; Bowlby, 1969/1982, pp. 710-713). Given this proposition, the two connectedness to self-in-the-present and self-in-the-future scales should load on a higher order connectedness to self factor that represents Bowlby's working models of the self.

Yet, this conceptualization may not prove to be the most useful way to organize the adolescent connectedness constructs for the purpose of developing and evaluating intervention programs. An alternate conceptualization of adolescent employs problem-behavior theory.

Problem-behavior theory: Connectedness as conventional or unconventional behavior. Because improvements in connectedness often are targets of prevention and counseling efforts, the use of problem-behavior theory to explain patterns of connectedness also holds promise. Problem-behavior theory (Jessor & Jessor, 1977) draws upon research on factors that contribute to delinquency (Hirschi, 1969). It proposes that there are two primary forms of interpersonal and ecological engagement during adolescence: conventional and unconventional.

> "Conventional behavior [e.g., church attendance or working hard in school] is behavior that is socially approved, normatively expected, and codified and institutionalized as appropriate for adolescents and youth" (Jessor & Jessor, 1980, p. 107).

Conventional connections, then, are those behaviors that are condoned and governed by adults and mainstream society. *Hemingway* scales that reflect conventional connections are the Connectedness to Parents, School, Teachers, and Self-in-the-Future scales. One study found that most positive youth development programs were designed explicitly to facilitate these forms of conventional connections (Roth & Brooks-Gunn, 1998). This is because conventional connectedness predicts abstinence, prosocial behavior, and other developmental assets (Blum, 2003; Karcher, 2002; Scales, 2005) thereby making their promotion an important intervention goal. Yet the positive effects of adult-driven conventional connectedness may actually derive from the way conventional connectedness limits the influence of youth-driven unconventional connectedness.

Unconventional connections are those emotional and physical engagements that are promoted and structured primarily by youth themselves (Karcher et al., 2008). Jessor and Jessor (1980) suggest that, at their extreme, unconventional behaviors are problem behaviors whose

> "function may be to express opposition to conventional society… Its meaning may lie in defining, for self and others, important attributes of personal identity…It can also function to establish solidary [sic] relations with peers, or to enable access to youth subgroups, or to permit identification with the youth subculture" (p. 107).

Given this definition, an unconventional connectedness higher order factor should include the *Hemingway* Connectedness to Peers, Friends, Neighborhood and Self-in-the-Present scales.

Unconventional connections are not always problematic and are, arguably, necessary from a developmental point of view. Time spent by youth with friends in their neighborhoods does not necessarily lead to misbehavior; however, problem behaviors, risk taking and deviancy do tend to increase when unconventional connectedness is not reigned in by a sufficient degree of conventional connectedness to adult-governed worlds. Disproportionately high levels of unconventional connectedness relative to conventional connectedness have been found to predict higher levels of substance use, violence, dropout and substance issues (Jessor, 1993; Karcher, 2002; Karcher & Finn, 2005). For this reason, Jessor and Jessor (1980) suggest that "a single summarizing dimension underlying the differences between [adolescent drug] users and nonusers might be termed conventionality-unconventionality."

In summary, attachment theory and problem-behavior theory propose different structural models of adolescent connectedness. Attachment theory supports the idea that internal working models and working models of the self interact with subsequent experiences in specific contexts and result in four distinct factors reflecting familial, academic, and social connectedness, with self connectedness as a separate but related factor (see Figure 2, right side). More parsimonious, however, would be to characterize adolescent connectedness along the conventionality-unconventionality continuum using two (not four) higher-order factors reflecting conventional and unconventional connectedness (see Figure 2 on the left side).

Analysis Plan

The present study addressed the following research questions. First, does the *Hemingway* measure possess strong construct validity? Second, is this first-order factor model invariant across different genders and ethnic groups for adolescents? Third, assuming measurement invariance, will the factor mean scores differ across genders and ethnic groups? Fourth, does either of the two second-order models (i.e., attachment theory and problem-behavior theory) provide a more parsimonious explanation of the covariance between the first-order factors? Fifth, are these second-order models invariant across gender and ethnicity and, if so, do the second-order factor means differ between these groups? To answer these questions we first evaluated the first-order construct validity of the *Hemingway* subscales using confirmatory factor analysis (CFA), and then conducted tests for factor structure invariance and equality in factor mean scores. Following these analyses, we tested the feasibility of two alternative second-order theoretical models of adolescent connectedness, as well as tested for second-order factor mean differences.

Method

Sample

Data were collected from 4263 students attending all six of the middle schools in one Midwestern city of approximately 90,000. The US Census data for 2000 reveals the citizens of this city were 79% Caucasian, 8% African American, 10% Latina/o, and 3% ”other race”; and had a median family income of $41,900. The data were collected by a school district that regularly uses this survey to track school climate. Nearly 90% of the 4741 students enrolled in the six middle schools in this city participated. The data were collected by the director of the Office of K-12 Instruction in October using a university approved passive consent approach which explained that children could choose not to participate, that the data would be anonymous, and data would subsequently be provided to the authors for the purpose of conducting these data analyses.

Of the 4263 sampled, 189 subjects were removed due to missing data on gender and another 147 subjects were removed due to missing ethnicity data, thus resulting in a usable sample size of 3927. This sample consisted of 71.0% Caucasian, 10.2% African American, 10.4% Latina/o, 1.6% Asian, 4.6% Biracial, and 2.2% classified as other, with 47.9% and 52.1% being male and female, respectfully. Therefore the sample is comparable to the Census population data for this city.

In addition, a relatively equal numbers of students were sampled from the 6th (31.2%), 7th (34.0%), and 8th (31.0%) grades, with 3.8% of students not providing their current grade level. Table 1 provides the sample demographics by grade, gender, and ethnicity for those 3927 students used in the analyses. Only 3598 students were African American, Caucasian, or Latino; in the between ethic group comparisons, all others were excluded. The majority of subjects lived with both parents (n = 2393, 63.5%), with the remainder of the sample living with either their mother only (n = 994, 25.3%), father only (n = 181, 4.6%), or an alternative living situation (e.g., foster care, grandparents, etc.) (n = 201, 5.1%). Four percent (n = 158) did not reported their living arrangements.

Missing Data

Missing data at the item level were treated using Full Information Maximum Likelihood (FIML) estimation and multiple imputations (MI) via the EM algorithm (see Schafer, 1997) with 500 iterations for comparative purposes, thus two sets of model fit and parameter estimates were obtained. The justification for this process was that commonly reported fit indices (e.g., NFI, NNFI, CFI, GFI, etc.) are unavailable within LISREL when executing FIML given that the χ^2 test statistic for the Independence Model is unavailable in closed form. Since the FIML χ^2 and RMSEA fit statistics are available with FIML, these model fit statistics were compared to the MI results, which do provide all the commonly reported fit indices for invariance (i.e., CFI, RMSEA, & SRMR). Within this study, the parameter estimates and model fit statistics were nearly identical across both missing data treatment methods. This result might be anticipated given that only 2.34% of total observations were missing at the item level. Due to the importance of evaluating model fit for testing for factor structure invariance, all results reported were from the MI procedure.

Measures

The Hemingway: Measure of Adolescent Connectedness (short version 5.5, Karcher, 2007). This self-report survey consists of 57 items designed to measure adolescents' degree of caring for and involvement in specific relationships, contexts and activities. There are ten 4- to 6-item subscales. All use a 1-5 response range from "not at all true" to "very true". Eight of the 10 subscales include a reverse worded item in. After reverse coding the negatively worded item responses, raw scores can be averaged to create the subscale score, or factor analysis may be used to create a factor score. For this study, factor scores were used created within LISREL (see Jöreskog & Sörbom, 1996, pp. 171-173). (Note, item 55 was excluded due to poor construct and discriminate validity evidence [see Karcher, 2003].) When participants had no sibling (n = 164) and skipped these items, the values were treated as missing data and evaluated using either FIML or MI. The advantage of this procedure is that all subjects, with and without siblings, are included in the analysis.

Initially, this survey instrument was developed by asking adolescents in focus groups to explain what they thought it meant to be “connected”, which resulted in the creation of the ten scales of connectedness examined in the present study (Karcher, 2003). These scales and their respective items are listed in the Appendix and Figure 1. The items reflect action, affect, or both in a given domain. For example, the *Connectedness to School* scale focuses on the importance youth place on school and how actively they try to be successful in school. *Connectedness to Teachers* assesses effort made to get along with teachers and concerns about earning teachers' respect and trust. *Connectedness to Peers* assesses feelings about peers and about working with classmates on projects and school-related tasks. In addition, two scales assess present and future-oriented self-esteem. *Self-in-the-Present* assesses feelings about current relationships, continuity in behavior across contexts, and an awareness of skills and interests that make them liked by others. *Self-in-the-Future* asks about the behaviors and qualities of youth that will help them have a positive future.

These scales have demonstrated a distinct factor structure, evidence of convergent and discriminant validity, and good one-month test-retest reliability. Karcher (2003) reports a series of five studies that included construct, item, and scale development. In addition, Karcher (2003) also used exploratory factor analyses (EFA) and confirmatory factor analyses (CFA) across separate samples to evaluate construct validity, as well as to compare observed mean differences across several groups (i.e., genders, teens vs. pre-teens, and delinquent vs. non-delinquent youth). This study also found evidence of discriminant and convergent validity using other scales of connectedness, conventional activities, self-esteem, and future orientation. Karcher (2003) and Karcher and Lee (2002) reported validity evidence for the second-order factors using exploratory factor analysis with the 10 subscales as measured variables. Karcher and colleagues also provided stability estimates using test-retest reliability over a one-month period, with coefficients ranging from $r = .68$ (Self-in-the-Future) to $r = .91$ (Connectedness to Siblings).

Statistical Analysis Procedure

Analysis of invariance. Although various approaches have been proposed to test for invariance, this study followed the procedures of Brown (2006) and Chen, Sousa, and West (2005) for comparing the first- and second-order factor solutions, respectively. Thus, invariance was assessed for the following model components: (a) factor loadings, (b) intercepts, (c) factor loading residuals, and (d) the variance/covariance matrix of the latent trait factors.

To date, a mandatory sequential order to test for first-order factor structure invariance does not exist (e.g., Byrne, 1998; Chen et al., 2005; Ployhart & Oswald, 2004). However, agreement does exist with regard to testing latent variable mean equivalence across different groups of subjects. As described below, testing the equality of latent variable or observed score means should not be conducted if the unit of measurement (i.e., unstandardized factor loadings) and scale origin (i.e., intercepts) differ between groups (see Brown, 2006); thus these parameter estimates should be invariant across groups prior to testing for mean differences.

For second-order models, evidence of first-order invariance must be met before second-order factor invariance models are tested. Thus, second-order latent variable means should only be compared after establishing first- and second-order factor loading invariance and measured (i.e., item) and first-order factor intercept invariance (see Chen et al., 2005, for more detail). When these conditions of invariance are met, the second-order factor means may be compared. Although a full exposition of the mechanics involved for testing factor structure invariance is beyond the scope of this article, a procedural description of the methodology for testing first- and second-order invariance is provided below. Readers are encouraged to read the work of Brown (2006), Byrne (1998), and Chen et al. (2005) for a more detailed explanation.

Testing first-order models for invariance. The test of first-order factor model invariance started with an examination of model fit for each group (e.g., males and females) separately. If adequate model fit was obtained for each group, a test of configural invariance (weighted combination of both samples) was acquired to provide the baseline model to subsequently compare the more restrictive invariance models (e.g., factor loadings and intercepts). The next two models, which test for first-order factor loading and intercept invariance, determined whether the preconditions were necessary to allow for first-order latent variable means comparisons. These comparisons were critical to assess whether the latent trait (i.e., factor) scores were created in an identical fashion, as the unstandardized factor loadings and intercepts were used to create the factor scores (see Jöreskog & Sörbom, 1996, pp. 171-173). The final two first-order analyses evaluated whether the measured variables' (i.e., items') residuals and the variance/covariance matrix of the factors were equal. As indicated by Brown (2006), these comparisons are optional and often of less theoretical interest as they are not required to evaluate latent trait equivalence. Instead, these models simply test whether the other measurement model components were equal. It is important to recognize that invariance was tested cumulatively, meaning that the higher-order (e.g., intercept) invariance was only tested if the lower-order (e.g., first-order factor loadings) invariance was met. The second-order models also followed this sequential approach.

Comparing second-order models for invariance. Similar to the first-order models, analyses were conducted for each group separately first. These models were followed by tests of the configural invariance, first-order factor loading invariance, second-order factor loading invariance, intercept invariance of the measured variables, intercept invariance of the first-order factors, invariance of the first-order factor disturbances, residual invariance of the measured variables, and, lastly, the variance/covariance invariance of the second-order factors.

Model identification. Data analysis was conducted with LISREL 8.80 (Jöreskog & Sörbom, 1996) using the covariance matrix with a maximum likelihood estimation procedure.
When evaluating the models several parameters were fixed at 1.0 (denoted in figures by bolded arrows and grayed coefficients in Figure 1) for the purposes of latent variable scaling and statistical identification. In other words, within the measurement model a single factor loading, called the reference indicator, on each factor was set to one to identify the model and set the metric of the factor. This was particularly important as the unstandardized solution was compared rather than the completely standardized solution.[1] Each freed (i.e., estimated) factor loading and corresponding residual is provided in Figure 1, whereas the other paths or factor loadings were fixed at zero (i.e., not estimated). Although not depicted in Figure 1, all relationships (ϕ) between the first-order factors were also freed or estimated. For the second-order factor analyses, Figure 1 and 2 were combined: the first-order factors loaded on corresponding items (see Figure 1) and the second-order factors loaded on the paralleling first-order factors represented in Figure 2 (although the items, seen in Figure 1, were omitted from Figure 2 for the purpose of visual simplicity).

Overall model fit criteria. The statistics employed to evaluate model fit for each gender and ethnicity sample were the minimum fit function χ^2, Comparative Fit Index (CFI), Root Mean Square Residuals (RMSEA), and Standardized Root Mean Square Residual (SRMR). Descriptions of these model fit statistics can be obtained from Bollen (1989), Hoyle (1995), MacCallum, Browne, and Sugawara (1996), and Hu and Bentler (1999). CFI statistics greater than .90 are often considered acceptable, although values greater than .95 are preferable to minimize Type I and Type II errors

[1] Selecting the factor loadings fixed at 1.0 should not and did not substantially influence the model fit, standardized parameter estimates, or the latent variable mean results.

(see Hu & Bentler, 1999). Fit indexes for RMSEA and SRMR are often judged acceptable for values less than .08 and .06, respectively.

Invariance model fit criteria. The problems associated with evaluating model fit when testing for model invariance are well documented (see Chen, 2007; Chen et al., 2005). Although a χ^2 difference test (i.e., likelihood ratio test) allows a statistical comparison between nested models, this test presents several statistical problems (Chen, 2007; Marsh & Hocevar, 1985): (1) the χ^2 statistic is sensitive to departures from multivariate normality and (2) with complex models and/or large samples the χ^2 (or $\Delta\chi^2$) statistic is nearly always large and statistically significant. As seen in the Results section, the χ^2 values were always large due to the model's complexity and large sample size. For these reasons, χ^2 statistics were not discussed in considerable detail, but instead greater emphasis was placed on those fit indices that supplement the χ^2 statistics.

The three model fit statistics that are less sensitive to model complexity and sample size were emphasized. Following Chen's (2007) recommendations based on simulation studies, model fit merit was based on the CFI (an Incremental Fit Index), RMSEA (an Absolute Fit Index), and SRMR (an Absolute Fit Index). Following the recommendations of Chen (2007), ΔCFI $\leq$ .01, ΔRMSEA $\leq$ .015, and ΔSRMR $\leq$ .03 for tests of factor loading invariance and ΔCFI $\leq$ .01, ΔRMSEA $\leq$ .015, and ΔSRMR $\leq$ .01 for tests of intercept invariance and residual variance were considered acceptable to indicate that the models were invariant.

Results

Construct Validity

Prior to assessing model invariance, the present study evaluated the *Hemingway* measure's construct validity using CFA for the entire sample. The model estimation procedures carried out were identical to the invariance tests (see *Model identification* section above), with the exception that the completely standardized solutions, rather than unstandardized solutions, were evaluated. These results revealed excellent construct validity, as all the items had large estimated factor loadings on their corresponding factors. The completely standardized parameter estimates for the entire sample are provided in Figure 1, which display an overall excellent model fit, χ^2 (*df* = 1439) = 13665.71, $p < .05$, CFI = .964, RMSEA = .051, SRMR = .049. The model fit and modification indices, which indicated minimal cross loadings, suggest each subscale factor was unidimensional.

The disattenuated interfactor correlations, meaning the correlations between the factors corrected for measurement error (Bedeian, Day, & Kelloway, 1997), are provided in Table 2 to complement the factor loadings. This table also provides convergent and discriminate validity evidence, as it shows that the factors that should be correlated are in reality correlated. Moreover, each subscale is able to discriminate between others. Perhaps the only exception was the relationship between teachers and school factors, which was highly ($\phi = .86$) correlated. Due to space limitations, the estimated factor loadings and interfactor correlations for each subsample analysis were not provided (these results may be obtained from the corresponding author). However, the model fit for each gender and ethnic subsample analysis can be found in Tables 3 and 5, respectfully. The model fit results are identical. As seen in Tables 3 and 5, the model fit was always adequate or better for each subgroup based on the aforementioned fit indices criteria. The model fit was slightly lower for the African American and Latina/o samples, but still within the acceptable range.

Reliability Analyses

Reliability analyses were conducted for all students and each subgroup separately. Internal consistency coefficients revealed good to excellent internal consistency using the entire sample, as well as at the subgroup level for the different gender and ethnic groups[2]. For the first-order subscales, internal consistency coefficients ranged from .61 to .94, with a mean of .79 (*sd* = .09). In general, the lowest internal consistency coefficients were on the Peers subscale for those groups labeled as Other ($\alpha = .61$), Latina/o ($\alpha = .62$), and African American ($\alpha = .65$). The only other internal consistency coefficients below .70 were the Self-in-the-Present ($\alpha = .65$) and Self-in-the-Future ($\alpha = .68$) subscales for the African American samples. All other internal consistency coefficients were greater than .70 across the other subscales and subsamples.

For attachment theory and problem-behavior theory factors the α coefficients ranged from .77 to .94, with a mean of .85 (*sd* = .03), and .83 to .93, with a mean of .89 (*sd* = .03), respectfully. A comparison between male and female groups revealed nearly identical ($\Delta\,\alpha \leq .03$) internal consistency coefficients for the first- and second-order factors. Larger differences ($\Delta\,\alpha \leq .13$) existed between the different ethnic groups, with the subscales being more reliable for Caucasian subjects. These differences may partially be due to the smaller sample size for some ethnic groups (e.g., $n = 61$ for Asian subjects); however, this speculation requires further investigation.

Tests for Gender Invariance on the First-order Factor Model

Prior to conducting tests for invariance, the theoretical factor models were fit for each gender separately[3]. Results revealed an excellent model fit for both genders, with relatively equal model fit statistics (see Table 3). The configural invariance model (including all youth) was assessed next to establish a baseline for the more restricted invariant models. The configural model provided an excellent model fit based on the RMSE, SRMR, and CFI (see Table 3).

---

[2] A table of internal consistency coefficients for the entire sample and each subgroup may be obtained from the corresponding author for both the first- and second-order subscales.
[3] Due to space limitations, the unstandardized parameter estimates for each analysis (both individual subsamples and invariance models) may be obtained from the corresponding author.

The next sets of models tested whether the first-order factor loadings and intercepts were equal or invariant across males and females. Results revealed the ΔRMSEA, ΔSRMR, and ΔCFI were less than .01 in all cases, which indicates that the factor scores are created in a nearly identical fashion across genders (see Table 3). More specifically, this implies that the linear equation (which consists of intercepts and slopes for each item-factor relationship) used to create one's factor scores are nearly equivalent across genders. In addition, testing for gender invariance of the item residuals (θ_δ) and the variance/covariance matrix (ϕ) of the latent variables revealed the ΔRMSEA, ΔSRMR, and ΔCFI were also consistently small, suggesting that item residuals and the variance/covariance matrix are largely invariant across genders.

Table 4 provides the first-order factor (latent variable) gender mean differences for each of the ten first-order factors, along with the associated effect size (Cohen's d). Effect sizes were based on the standards suggested by Cohen (1988), with the effect size standards listed as follows: small ($|d|$ = .20), medium ($|d|$ = .50), and large ($|d|$ = .80). We considered absolute z-values greater than 3.30 (corrected for Type I error, .05/40 ≈ .001) as statistically significant. Latent variable mean differences were not statistically different between male and female subjects on three latent factors: Self-in-the-Present, Connectedness to Parents, and Self-in-the-Future. However, males scored significantly higher than females on the Connectedness to Neighborhood factor, whereas females scored significantly higher than males on the Connectedness to Friends, Siblings, School, Peers, Teachers, and Reading factors. It is important to note that despite the statistical significance between male and female participants on these factor scores, most differences were relatively small for practical purposes. Only the difference on the Connectedness to Friends and Reading scales, which favored females, reflected medium-size effects as indicated by the Cohen's *d* values in Table 4. The actual, observed (not latent) means scale scores are shown in Table 6 for comparison purposes.

Tests for Ethnicity Invariance on the First-order Model

Ethnicity analyses for the first-order solution indicated that the model fit well for the Caucasian group. The model fit statistics were not as good for the African American and Latina/o groups (see Table 5), although the fit indices met the acceptable standards for good model fit based on the RMSEA, SRMR, and CFI provided above. Given the good model fit for each group, the configural model was evaluated and demonstrated an excellent baseline model fit.

Setting the first-order factor loadings and intercepts invariant to test for latent variable mean differences revealed that the model fit did not differ between the different ethnic groups, thus implying that a comparison of latent variable means is justified. This provided evidence that factors scores are created similarly across ethnic groups, and that subscale or factor scores are unbiased. In addition to the factor loading and intercepts, the item residuals were also invariant as indicated by the small change in RMSEA, SRMR, and CFI. However, the latent variables' variance/covariance produced a slight concern relate to invariance, as the ΔSRMR was slightly elevated, but still in the acceptable range (see Table 5). From a measurement perceptive this slight inequality of covariance between factors is of limited concern, and, as noted later, this covariance between factors is represented in the subsequent second-order factors.

Comparisons of the latent variable mean differences are provided in Table 4. Recall that the mean difference (*MDiff*) always favors the reference group. Therefore, the latent mean difference of .314 between Caucasians and African Americans on the connectedness to Neighborhood factor indicates the mean score was .314 units higher for Caucasians for African Americans. The analyses revealed that Caucasians were higher on the connectedness to Neighborhood and to Friends, but lower on the Self-in-the-Present, Self-in-the-Future, and Siblings factors means, than African Americans. Caucasians also were higher on the Connectedness to the Neighborhood, Friends, and

Reading factors than Latina/os, but lower on the Siblings factor means. With the exception of the Self-in-the-Present and Self-in-the-Future factors, on which African Americans scored higher than Latina/os, no statistically significant differences were revealed between these two groups at $\alpha = .001$. Several interesting findings that were statistically significant at $\alpha = .05$ are worth noting. In particular, Caucasians scored higher on the Connectedness to Teachers factor than African Americans and higher than Latina/o on the Self-in-the-Present and Self-in-the-Future factors. Lastly, African Americans were more connected to reading than Latina/os, which may be interesting from an educational standpoint. Despite this statistical significance, practically speaking (based on the effect sizes, *d*) the differences between the three ethnic groups was relatively small. In fact, the largest effect size was only $d = .227$, representing the difference between Caucasian and Latina/o subjects on the Connectedness to Neighborhood factor. Although the above tests are of latent mean differences, the observed mean differences also were significant, are illustrated in Table 6.

Tests for Second-order Factor Models: Problem-behavior Theory

Model comparison. The problem-behavior theory model, from which the Unconventional and Conventional second-order factors were derived, explored whether these second-order factors produced a more parsimonious explanation of the covariance between the first-order factors. The second-order model fit the data well for each gender and ethnic group separately (see footnote 5), as well as each configural model across gender, χ^2 ($df = 2528$) = 15539.91, $p < .05$, CFI = .957, RMSEA = .056, SRMR = .063, and ethnicity, χ^2 ($df = 3777$) = 15886.49, $p < .05$, CFI = .957, RMSEA = .057, SRMR = .067, based on the RMSEA, SRMR, and CFI. These results indicate that the first-order (see Tables 3 & 5) and second-order model (problem-behavior theory) fit the data equally well, thus the second-order factor model provides a more parsimonious and interpretable model than using the first-order factors alone. In other words, the second-order models estimated fewer parameters, as the first-order interfactor covariances were replaced with the second-order factor loadings, thereby reducing model complexity given that fewer parameters were estimated in the model. However, one concern for this second-order model was the large correlation ($\phi = .82$) between the Conventional and Unconventional factors, which suggests it is difficult to discriminate between these factors. Moreover, including both variables in a statistical model would be problematic due to the high amount of collinearity between factors.

Gender invariance. As just noted, the model fit for each gender on the problem-behavior theory's Unconventional and Conventional second-order factor model indicated an excellent model fit. Evaluating the eight invariance models (i.e., first-order factor loadings, second-order factor loadings, measured variable (or item) intercepts, first-order factor intercepts, first-order factor disturbances, item residual, and variance/covariance for the second-order factors) revealed the ΔRMSEA, ΔSRMR, and ΔCFI were well below the standards set forth by Chen (2007) to signify model invariance. These results were expected based on the first-order results[4].

Given that the factor loadings (both first- and second-order) and intercepts (measured variables and first-order factors) were invariant, second-order factor mean differences were tested. Using an α of .025 (.05/2, z = 2.24), results revealed that males scored significantly lower than females on the Unconventional and Conventional second-order factors, with mean differences of -.111, $t(3925) = 5.623$, $p < .025$, $d = -.204$, and -.164, $t(3925) = 7.686$, $p < .025$, $d = -.279$, respectively. However, the effect sizes (d) suggest only small to moderate gender differences.

[4] Tabulated model fit results for the second-order factors maybe obtained from the corresponding author. These results are not provided due to space limitations and because the results were nearly identical to the first-order invariance results. These findings were expected given that the second-order model was simply an extension of the first-order model (see Marsh & Hocevar, 1985). In other words, the primary difference between the models was the removal of the relationships between the first-order factors (i.e., ϕ), which was represented by the second-order factor loadings (i.e., γ) and the addition of the association between the second-order factors (i.e., ϕ).

Ethnicity invariance. As indicated above, analyses for the configural model, as well as each ethnic group separately, using the Unconventional and Conventional second-order factors showed an excellent model fit for the Caucasian sample, but a slightly poorer model fit for the African American and Latina/o samples. Again, these results replicated the first-order findings. Given that all three ethnicity samples, along with the configural model, met a commonly accepted minimum fit standard for the RMSEA (good models $\leq$ .06), SRMR (good models $\leq$ .08), and CFI (acceptable models $\geq$ .90), the invariance models were assessed. An evaluation of the invariance models indicated the ΔRMSEA, ΔSRMR, and ΔCFI remained less than .01 across each invariance condition, suggesting the models are invariant across these ethnic groups. An analysis of the latent variable means differences indicated that there are no statistically or practically significant differences between the ethnic groups on the Unconventional and Conventional second-order factors. It is possible this was due to the combination of positive, negative, and zero mean differences on the first-order factors across the different ethnic groups in the second-order factors.

Tests for Attachment Theory

Model comparison. The attachment theory second-order model, which included the Academic, Familial, Social Connectedness and the Connectedness-to-Self second-order factors, fit the data as well as the first-order configural model (see Tables 3 & 5) and the second-order problem-behavior theory configural models (see Model comparison under *Tests for Second-order Factor Models: Problem-behavior Theory*). The attachment theory configural model results for gender and ethnicity were χ^2 (df = 2518) = 15049.52, p < .05, CFI = .959, RMSEA = .055, SRMR = .060 and χ^2 (df = 3792) = 16248.09, p < .05, CFI = .956, RMSEA = .057, SRMR = .073, respectfully. The absence of differences on the model fit indices (i.e., ΔRMSEA, ΔSRMR, & ΔCFI) between the first- and second-order models provides evidence that this second-order model provided a more parsimonious explanation of the data than the first-order model. This was further supported by large estimated factor loadings between the first- and second-order factors (see Figure 2). Similar to the problem-behavior theory, these second-order factors often displayed large interfactor (ϕ) correlations (see Figure 2), with Connectedness-to-Self and Academic Connectedness being the most highly correlated. Therefore, using these four factors as separate subscales may present a concern related to discriminate validity.

Gender invariance. Results indicate an excellent model fit for each gender group separately, as well as an excellent fit for the configural model. The ΔRMSEA, ΔSRMR, and ΔCFI did not change by values greater than those recommended by Chen (2007) for any of the invariance models compared (i.e., first-order factor loadings, second-order factor loadings, measured variable (item) intercepts, first-order factor intercepts, first-order factor disturbances, item residual, and variance/covariance for second-order factor loadings), suggesting that this second-order model was invariant across all model characteristics. Given this level of invariance, tests of the second-order factor (latent variable) mean differences were conducted. Using an α of .0125 (.05/4, z = 2.50; to account for the four factor comparisons by gender), the results indicated that males scored significantly lower than females on the Social Connectedness, (M_{Diff} = -.282), $t(3925) = 10.522$, $p < .0125$, $d = -.382$, and Academic Connectedness, (M_{Diff} = -.245), $t(3925) = 10.297$, $p < .0125$, $d = -.374$, factors. No differences existed on the Familial Connectedness, (M_{Diff} = -.022), $t(3925) = -.730$, $p > .05$, $d = -.026$, or Self, (M_{Diff} = -.037), $t(3925) = 1.500$, $p > .05$, $d = -.054$, factors. Despite the statistically significant differences, the effect sizes remained only moderate in magnitude.

Ethnicity invariance. Similar to the model fit across genders on the attachment theory model, model fit statistics showed an excellent model fit for the Caucasian sample, but a slightly poorer fit for the African American and Latina/o samples. Again, these results correspond to the first-order factor results. Nevertheless, all three ethnicity samples met the acceptable model fit standards for the RMSEA, SRMR, and CFI, which allowed for the analysis of the configural and invariance models. The ΔRMSEA, ΔSRMR, and ΔCFI provided evidence that both the first- and second-order factor loadings and intercepts were invariant across the different ethnic groups, thereby allowing for a comparison of the second-order factor (latent variable) means. As expected from the first-order results, model fit statistics from the last three invariance models (first-order factor disturbances, item residual, & variance/covariance for latent traits) also provided evidence of invariance based on the ΔRMSEA, ΔSRMR, and ΔCFI.

An analysis of the second-order factor (latent variable) mean differences (see Table 4) revealed several statistically significant differences between the ethnic groups at $\alpha = .004$ (.05/12, z = 2.87). Caucasians scored significantly higher on the Social Connectedness factor than African American subjects, ($M_{Diff} = .335$), $t(3186) = 6.126$, $p < .05$, $d = .222$, and Latina/os, ($M_{Diff} = .427$), $t(3176) = 7.617$, $p < .004$, $d = .276$, respectively. Although not statistically significant at .004, Caucasians scored lower than African American, ($M_{Diff} = -.142$), $t(3186) = 2.842$, $p > .004$, $d = -.103$, and Latina/o, ($M_{Diff} = -.099$), $t(3176) = 2.319$, $p > .004$, $d = -.084$, subjects on the Familial Connectedness factor, which is consistent with the familism hypothesis (Sanchez & Colon, 2005). The only other difference between groups was between African American and Latina/o subjects on the Connectedness-to-Self factor, with African Americans scoring higher than Latina/os, ($M_{Diff} = .347$), $t(808) = 6.62$, $p < .004$, $d = .240$. However, all of these statistically significant differences were relatively small from a practical standpoint ($|d| < .30$).

Impact of Sample Size

The small number of statistically significant differences between African American and Latina/o subjects was not a direct effect of sample size. Instead, the lack of statistical significance was due to the small effect sizes for between-group differences on the first- and second-order factors. Probabilistically speaking, even with a sample size comparable to the Caucasian analyses these small differences (i.e., effect sizes) would not be statistically significant. Notice that even the largest effect size between African American and Latina/o subjects (d = .071) would not be statistically significant based on smallest sample size used for the Caucasian and Latina/o analyses (e.g., see d = .092 in Table 4). This was further substantiated by our power analysis.

Discussion

The primary function of this study was to assess factor model invariance across gender and ethnicity for a measure of adolescent connectedness, thereby allowing counselors and researchers to estimate mean differences in adolescent connectedness with greater confidence. Given that there are at least two competing theories describing the underlying structure of adolescent connectedness, the first step toward making between-group mean comparisons was to identify the appropriateness of these second-order factor models and then to establish model invariance between groups. The results from this study revealed that both theoretical models are plausible and invariant across gender and ethnicity. So too were the ten subscales organized as separate factors invariant across gender and ethnicity. This means that counselors and researchers can feel confident that the ten subscales and the second-order composite scales are measuring the same constructs across these groups.

Latent Variable Comparison

Determining whether an assessment tool can be used to make accurate comparisons across genders and ethnicity provides numerous benefits to counselors, researchers, and evaluators. The utility of an assessment is generally enhanced when the same factor structure can be maintained or replicated across differ populations. In addition to the measurement advantages afforded when different samples possess factor invariance on an instrument, these conditions are essential for comparing mean differences (observed or latent) between groups. Commonly in research and evaluation, researchers seem to assume that the groups being compared possess an identical factor structure for the constructs of interest on a given assessment. This must be so, because were the construct's latent factor solution *not* equivalent across the different groups, then making mean comparisons between the groups on this construct would be of dubious value. If factor structures do vary across groups then it is likely that the items are measuring somewhat different constructs for each group or that the respondents are interpreting the items differently across groups. When the assumption of measurement invariance is violated it is difficult to ascertain whether mean differences are due to the treatment or a consequence of the construct in question being interpreted differently between the groups. Although observed (e.g., raw score) mean comparisons and standard statistical procedures assume measurement invariance, latent variable mean analysis allows researchers to test this assumption prior to conducting a mean comparison (Byrne, 1998). The current study is critical as it should increase researchers' and practitioners' confidence that the mean differences are in fact due to differences in connectedness and not measurement artifacts.

An Argument for Using the Individual Factor Scales Rather than Second-order Factor Scales

Despite the appropriateness of using the second-order factor scores as revealed by the positive tests of invariance across both first- and second-order theoretical models, there are reasons to argue that these second-order composite scores may be better utilized from a theoretical standpoint than used in most statistical analyses for practical purposes. One reason for this is that the first-order factors will purportedly provide more specific information independently than will the second-order factors. This is partly because although two variables (or factors) might be highly correlated, and thus create a higher-order factor, it does not necessarily imply that the higher-order factor is unidimensional and should be used as such in statistical analyses. More often using the first-order factor scales will maintain the purity of the measure and interpretation of the results.

A second reason for using the first-order factor scales is the evidence of discriminant validity between the subscales. Hoyt et al. (2006) emphasized that too often in counseling research there is insufficient evidence of construct multidimensionality to justify the use of separate subscales. This concern is assuaged by ample evidence that the first-order connectedness subscales are conceptually and statistically distinct. This differs from the work of Lee and Robbins (1998) with adults that suggests adult social connectedness is a unidimensional construct. With perhaps the only exception being the first-order factors related to the Familial and Academic Connectedness second-order factors, the first-order factors were not highly correlated (see Table 2 and Figure 2). This indicates the first-order factors provide unique information on connectedness. Only three of first-order interfactor correlations were greater than .70. By contrast, the second-order factors often lacked discriminant validity (as indicated by high interfactor correlations). More importantly, the second-order factors tended to mask mean differences between genders and ethnic groups on the first order factors. More information was learned by comparing means between groups on the Connectedness to Siblings and Parents' first-order scales than by comparing groups on the second-order Familial Connectedness factor. The Familial Connectedness second-order factor masked that it was sibling connectedness that accounted for most of the between group difference. This finding might lead future researchers to pay more attention to the role of sibling connectedness when studying *familism*.

One limitation of the study may be the potential for construct underrepresentation at both the subscale and second-order scale level. Some subscales (such as Connectedness to Reading) were reliable and demonstrated very good construct validity (i.e., standardized item factor loadings), but utilized only a few items, raising the risk for construct underrepresentation. Yet shorter scales are quite useful for both applied and research purposes, so there is always a trade off. The risk about which Hoyt et al. (2006) warn—that scales may underrepresent the constructs they are intended to measure—appears greater for the composite scales. For example, familial connectedness may include more than just connectedness to parents and siblings, especially in family constellations wherein grandparents are the primary caretakers or where close extended family (e.g., uncles, aunts, and cousins) play a large role in the day-to-day family life. Based on this concern, the second-order Familial Connectedness factor may underrepresent this construct.

The risk for construct underrepresentation appears smallest for the Academic Connectedness second-order factor scale, which includes a diverse group of subscales (academic constructs) and is highly reliable (more so across gender and ethnicity than the separate subscales), suggesting it represents this construct quite well. Yet, as noted above, there is little evidence that even this second-order factor composite scale provides a superior interpretation of the data than do the first-order subscales used separately. The difference between African American and Caucasian youth on Academic Connectedness masks the finding from the first-order factor comparisons that it was only on Connectedness to Teachers that these two ethnic groups differed.

However, it remains for future research to estimate the predictive validity of the different scale scoring approaches. It may be that one of the higher order factors (e.g., Unconventional Connectedness) is the best single predictor of adolescent risk-taking. Or, having established measurement invariance, future research might examine the differential predictive validity by ethnicity and gender of each of the first- and second-order factor scales.

Implications for Multicultural and Cross-Gender Research

Ultimately, an assessment's utility lies in its use in client diagnosis (identification and referral), program evaluation, and basic research. Evidence of true mean differences between ethnic groups and genders on several subscales of adolescent connectedness implies that in some cases it may be useful to account for these differences. This may be especially true when using these means for diagnostic purposes or when comparing means in treatment or program studies. The largest ethnic group difference was between Caucasians and the ethnic minority youth on connectedness to Neighborhood, Friends, and Self-in-the-Present, but reflect relatively small effect sizes and may not be practically important. In contrast, the differences in means between boys and girls on Connectedness to Friends, School, Teachers and Reading scales reflected a much larger effect size.

One way to account for gender differences in connectedness would be to include gender as a moderator or quasi-experimental independent variable in analyses to test for interactions between treatment and gender on specific scales—most importantly the Connectedness to Friends, School, Teachers, and Reading scales. Sampling strategies also could be undertaken to stratify samples by gender (and ethnicity) so that these interaction tests would be as powerful as possible.

One final limitation of this study was the lack of information on socioeconomic status, older adolescents, and other ethnic groups. For example, the small ethnic group mean differences might have been absent altogether had socioeconomics been accounted for. Or it may be that the factor structures are not as invariant across other ethnic groups or for older adolescent respondents. These factors should be considered in future use of the scale in research and in practice.

But overall there is strong evidence that, when assessed using the *Hemingway: Measure of Adolescent Connectedness*, adolescent connectedness is multidimensional, capturing an ecology of adolescent connectedness that reflects ten unidimensional factors and two sets of second-order factors, both of which can be measured consistently across gender and ethnicity among younger adolescents. Therefore, this assessment is promising and it should prove to be a useful scale for the purposes of assessment and evaluation.

Reference

Ainsworth, M. S. (1989). Attachments beyond infancy. *American Psychologist, 44*, 709-716.

Allen, J. A. & Land, D. (1999). Attachment in adolescence. In J. Cassidy & P. R. Shaver (Eds.) *Handbook of attachment: Theory, research, and clinical applications* (pp. 319-335). New York: Guilford Press.

Armsden, G. C., & Greenberg, M. T. (1987). The Inventory of Parent and Peer Attachment: Individual-differences and their relationship to psychological well-being in adolescence. *Journal of Youth and Adolescence, 16*(5), 427-454.

Bedeian, A. G., Day, D. V., & Kelloway, E. K. (1997). Correcting for measurement error attenuation in structural equation models: Some important reminders. *Educational and Psychological Measurement, 57,* 785-799.

Blum, R. W. (2003). Positive youth development: A strategy for improving adolescent health. In F. Jacobs, D. Wertlieb, & R. M. Lerner (Eds.). *Handbook of Applied Developmental Science* (Vol. 2)(pp. 237-251). Thousand Oaks, CA: Sage Publications.

Bollen, K. A. (1989). *Structural equations with latent variable*s. New York, NY: Wiley.

Bonny, A. E., Britto, M. T., Klostermann, B. K., Hornung, R. W., & Slap, G. B. (2000). School disconnectedness: Identifying adolescents at risk. *Pediatrics, 106*, 1017-1021.

Bowlby, J. (1969). *Attachment and loss: Vol 1. Attachment*. New York: Basic Books

Bowlby, J. (1973) *Attachment and loss: Vol 2. Separation*. New York: Basic Books.

Bretherton, I. & Munholland, K. A. (1999). Internal working models in attachment relationships: A construct revisited. In J. Cassidy & P. R. Shaver (Eds.) *Handbook of attachment: Theory, research, and clinical applications* (pp. 89-111). New York: Guilford Press.

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

Byrne, B.M. (1998). *Structural equation modeling with LISREL, PRELIS, and SIMPLIS.* Hillsdale, NJ: Lawrence Erlbaum.

Chen, F. F. (2007). Sensitivity of goodness of fit indices to lack of measurement invariance. *Structural Equation Modeling*, *14*, 464-504.

Chen, F. F., Sousa, K. H., & West, S. G. (2005). Testing measurement invariance of second-order factor models. *Structural Equation Modeling, 12,* 471-492.

Cernkovich, S. A., & Giordana, P. C. (1992). School bonding, race, and delinquency. *Criminology, 31*, 261-291.

Cohen, P. A. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale: Erlbaum.

Cooper, C. R. (1999). Multiple selves, multiple worlds: Cultural perspectives on individuality and connectedness in adolescent development. In A. S. Masten (Ed) (1999). *Cultural processes in child development* (pp. 25-57). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Evans, D. L., Foa, E. B., Gur, R. E., Hendin, H., O'Brien, C. P., Seligman, M. E. P., et al. (Eds.). (2005). *Treating and preventing adolescent mental health disorders: What we know and what we don't know: A research agenda for improving the mental health of our youth.* New York, NY: Oxford University Press.

Garcia Coll, C., Lamberty, G., Jenkins, R., Wasik, B. H., McAdoo, H. P. & Crnic, K., et al. (1996). An integrative model for the study of developmental competencies in minority children. *Child Development*, 67, 1891-1914.

Greenberg, M. T., Siegel, J. M., & Leitch, C. J. (1983). The nature and importance of attachment relationships to parents and peers during adolescence. *Journal of Youth and Adolescence, 12*(5), 373-386.

Grossman, J. B., & Bulle, M. J. (2006). Review of what youth programs do to increase the connectedness of youth with adults. *Journal of Adolescent Health*, 39, 788-799.

Harter, S., Waters, P. L., Pettitt, N. W., Kofkin, J., & Jordan, J. (1997). Autonomy and connectedness dimensions of relationship styles in men and women. *Journal of Social and Personal Relationships, 14*, 147-164.

Herrera, C., Grossman, J. B., Kauh, T. J., Feldman, A. F., & McMaken, J., (2007). *Big Brothers Big Sisters school-based mentoring impact study.* Philadelphia: Public/ Private Ventures.

Hirschi, T. (1969). *Causes of delinquency*. Berkeley: University of California Press.

Hoyle, R. H. (1995). *Structural equation modeling: Concepts, issues, and applications.* Thousand Oaks, CA: Sage Publications

Hoyt, W. T., Warbasse, R. E., & Chu, E. Y. (2006). Construct validation in counseling psychology research. *Counseling Psychologist*, 34, 769-805.

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.

Jacobson, K. C., & Rowe, D. C. (1999). Genetic and environmental influences on the relationships between family connectedness, school connectedness, and adolescent depressed mood: Sex differences. *Developmental Psychology, 35*, 926-939.

Jessor, R. (1993). Successful adolescent development among youth in high-risk settings. *American Psychologist, 48*, 117-126.

Jessor, R., & Jessor, S. L. (1977). *Problem behavior and psychological development: A longitudinal study of youth*. New York: Academic Press.

Jessor, R. & Jessor, S. L. (1980). A social-psychological framework for studying drug use. In D. J. Lettieri, M. Sayers, & H. W. Pearson (Eds.), *Theories on drug use: Selected contemporary perspectives* (NIDA Research Monograph 30, pp. 102-109). Rockville, Maryland: National Institute on Drug Abuse, Department of Health and Human Services.

Jordan, J. V. (2000). The role of mutual empathy in relational/cultural therapy. *Journal of Clinical Psychology, 56*(8), 1005-1016.

Jöreskog, K. G., & Sörbom, D. (1996). *LISREL 8: User's Reference Guide*. Chicago: Scientific Software International.

Karcher, M. J. (2002). The cycle of violence and disconnection among rural middle school students: Teacher disconnection as a consequence of violence. *The Journal of School Violence, 1*(1), 35-51.

Karcher, M. J. (2003). The Hemingway: Measure of Adolescent Connectedness: Validation studies. *ERIC* no. ED477969; Retrieved September 10, 2008 from http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1b/2c/dd.pdf

Karcher, M. J. (2007). *The Hemingway—Measure of Adolescent Connectedness: A manual for interpretation and scoring.* Unpublished manuscript, University of Texas at San Antonio. Retrieved June 12, 2007 from www.adolescentconnectedness.com

Karcher, M. J. (2008). The Study of Mentoring in the Learning Environment (SMILE): A randomized study of the effectiveness of school-based mentoring. *Prevention Science*, 9*(2),* 99-113.

Karcher, M. J. & Finn, L. (2005). How connectedness contributes to experimental smoking among rural youth: Developmental and ecological analyses. *Journal of Primary Prevention,* 26*, 25-36.*

Karcher, M. J., Holcomb, M. & Zambrano, E. (2008). Measuring adolescent connectedness: A guide for school-based assessment and program evaluation. In H. L. K. Coleman & C. Yeh (Eds.), *Handbook of School Counseling* (pp. 649-669). Mahwah: Lawrence Erlbaum.

Karcher, M. J, & Lee, Y. (2002). Connectedness among Taiwanese middle school students: A validation study of the Hemingway Measure of Adolescent Connectedness. *Asia Pacific Education Review, 3*(1), 95-114.

Lee, R. M., & Robbins, S. B. (1998). The relationship between social connectedness and anxiety, self-esteem, and social identity. *Journal of Counseling Psychology, 45, 338-345.*

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1,* 130-149.

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

McNeely, C. A., Nonnemaker, J. M. & Blum, R. W. (2002). Promoting school connectedness: Evidence from the National Longitudinal Study of Adolescent Health. *Journal of School Health, 72*(4), 138-146.

Ployhart, R. E., & Oswald, F. L. (2004). Applications of mean and covariance structure analysis: Integrating correlational and experimental approaches. *Organizational Research Methods, 7,* 27-65.

Ramirez, M. (1991). *Psychotherapy and counseling with minorities: A cognitive approach to individual and cultural differences*. New York: Pergamon Press.

Resnick, M. D., Bearman, P. S., Blum, R. W., Bauman, K. E., Harris, K. M., Jones, J., et al. (1997). Protecting adolescents from harm: Findings from the National Longitudinal Study on Adolescent Health. *JAMA: Journal of the American Medical Association*, *278*(10), 823-832.

Resnick, M. D., Harris, L. J., & Blum, R. W. (1993). The impact of caring and connectedness on adolescent health and well-being. *Journal of Paediatrics & Child Health, 29*, S3-S9.

Reuterberg, S. E., & Gustafsson, J. E. (1992). Confirmatory factor analysis and reliability: Testing measurement model assumptions. *Educational and Psychological Measurement, 52,* 795–811.

Roth, J. L. & Brooks-Gunn, J. (2003). What is a youth development program? Identification of defining principles. In F. Jacobs, D. Wertlieb, & R. M. Lerner (Eds.) *Handbook of applied developmental science: Vol. 2*. *Enhancing the life chances of youth and families* (pp. 197-223). Thousand Oaks, CA: Sage publications.

Sanchez, B., & Colon, Y. (2005). Race, ethnicity, and culture in mentoring relationships. In DuBois, D. L. & M. J. Karcher (Eds.). *Handbook of youth mentoring.* (pp. 191-204). Thousand Oaks, CA: Sage

Scales, P. C. (2005). Developmental assets and the middle school counselor. *Professional School Counseling,* December, 104-111.

Schafer, J. L. (1997) *Analysis of incomplete multivariate data*. Chapman & Hall, London.

Townsend, K. C. & McWhirter, B. T. (2005). Connectedness: A review of the literature with implications for counseling, assessment, and research. *Journal of Counseling and Development, 83*, 91-201.

Appendix One: Hemingway—Measure of Adolescent Connectedness.

Instructions: Please use this survey to tell us about yourself. Read each statement. CIRCLE the number that best describes how true that statement is for you or how much you agree with it. If a statement is unclear to you, ask for an explanation. If it still unclear, put a " ?".

“**How TRUE about you** is each sentence?" Not at all=1 Not really=2 Sort of true=3 True=4 Very true=5

	Not at all	Not really	Sort of	True	Very true
(1) I like hanging out around where I live (like my neighborhood).	1	2	3	4	5
(2) Spending time with friends is not so important to me.	1	2	3	4	5
(3) I can name 5 things that my friends like about me.	1	2	3	4	5
(4) My family has fun together.	1	2	3	4	5
(5) I have a lot of fun with my brother(s) or sister(s). (skip if you have none.)	1	2	3	4	5
(6) I work hard at school.	1	2	3	4	5
(7) My classmates often bother me.	1	2	3	4	5
(8) I care what my teachers think of me.	1	2	3	4	5
(9) I will have a good future.	1	2	3	4	5
(10) I enjoy spending time by myself reading.	1	2	3	4	5
(11) I spend a lot of time with kids around where I live.	1	2	3	4	5
(12) I have friends I'm really close to and trust completely.	1	2	3	4	5
(13) There is not much that is unique or special about me.	1	2	3	4	5
(14) It is important that my parents trust me.	1	2	3	4	5
(15) I feel close to my brother(s) or sister(s).(leave blank if you have none.)	1	2	3	4	5
(16) I enjoy being at school.	1	2	3	4	5
(17) I like pretty much all of the other kids in my grade.	1	2	3	4	5
(18) I do not get along with some of my teachers.	1	2	3	4	5
(19) Doing well in school will help me in the future.	1	2	3	4	5
(20) I like to read.	1	2	3	4	5
(21) I get along with the kids in my neighborhood.	1	2	3	4	5
(22) Spending time with my friends is a big part of my life.	1	2	3	4	5
(23) I can name 3 things that other kids like about me.	1	2	3	4	5
(24) I enjoy spending time with my parents.	1	2	3	4	5
(25) I enjoy spending time with my brothers/sisters. (skip if you have none.)	1	2	3	4	5
(26) I get bored in school a lot.	1	2	3	4	5

(27) I like working with my classmates.	1	2	3	4	5
(28) I want to be respected by my teachers.	1	2	3	4	5
(29) I do things outside of school to prepare for my future.	1	2	3	4	5
(30) I never read books in my free time.	1	2	3	4	5
(31) I often spend time playing or doing things in my neighborhood.	1	2	3	4	5
(32) My friends and I talk openly with each other about personal things.	1	2	3	4	5
(33) I really like who I am.	1	2	3	4	5
(34) My parents and I disagree about many things.	1	2	3	4	5
(35) I try to spend time with my brothers/sisters when I can. (skip if none)	1	2	3	4	5
(36) I do well in school.	1	2	3	4	5
(37) I get along well with the other students in my classes.	1	2	3	4	5
(38) I try to get along with my teachers.	1	2	3	4	5
(39) I do lots of things in school to prepare for my future.	1	2	3	4	5
(40) I often read when I have free time.	1	2	3	4	5
(41) I hang out a lot with kids in my neighborhood.	1	2	3	4	5
(42) I spend as much time as I can with my friends.	1	2	3	4	5
(43) I have special hobbies, skills, or talents.	1	2	3	4	5
(44) My parents and I get along well.	1	2	3	4	5
(45) I try to avoid being around my brother/sister(s).(skip if you have none.)	1	2	3	4	5
(46) I feel good about myself when I am at school.	1	2	3	4	5
(47) I am liked by my classmates.	1	2	3	4	5
(48) I always try hard to earn my teachers' trust.	1	2	3	4	5
(49) I think about my future often.	1	2	3	4	5
(50) I usually like my teachers.	1	2	3	4	5
(51) My neighborhood is boring.	1	2	3	4	5
(52) My friends and I spend a lot of time talking about things.	1	2	3	4	5
(53) I have unique interests or skills that make me interesting.	1	2	3	4	5
(54) I care about my parents very much.	1	2	3	4	5
(55) What I do now will not affect my future.	1	2	3	4	5
(56) Doing well in school is important to me.	1	2	3	4	5
(57) I rarely fight or argue with the other kids at school.	1	2	3	4	5

Table 1

Observed Frequencies of Participants by Grade, Gender, and Ethnic/Racial Group

	Caucasian	African American	Latina/o	Asian	Bi-racial	Other
6th Grade						
Male	481	86	68	8	31	14
Female	406	70	63	6	21	13
7th Grade						
Male	461	64	70	16	33	26
Female	486	67	64	13	47	9
8th Grade						
Male	482	60	77	6	23	10
Female	443	45	65	10	21	14
Missing data						
Male	19	6	2	1	1	2
Female	10	2	1	1	2	1
Total	2788	400	410	61	179	89

Table 2

Disattenuated Interfactor Correlations (ϕ) for the First-order Factors using the Complete Sample.

Connectedness Factor	Neighborhood	Friends	Self-in-the-Present	Parents	Siblings	School	Peers	Teachers	Self-in-the-Future	Reading
Neighborhood	—									
Friends	.33	—								
Self-in-the-Present	.36	.45	—							
Parents	.30	.19	.53	—						
Siblings	.27	.20	.38	.61	—					
School	.24	.27	.60	.63	.40	—				
Peers	.42	.47	.65	.50	.40	.66	—			
Teachers	.25	.29	.50	.61	.40	.86	.60	—		
Self-in-the-Future	.31	.30	.71	.58	.44	.73	.55	.68	—	
Reading	.06	.12	.23	.24	.19	.43	.18	.36	.35	—

Note. These interfactor correlations complement the standardized factor loadings in Figure 1. Disattenuated interfactor correlations are corrected for measurement error (Bedeian, Day, & Kelloway, 1997).

Table 3

Model Fit Statistics for the First-order Models Across Gender

	χ^2	*df*	$\Delta\chi^2$	Δdf	RMSEA	ΔRMSE	SRMR	ΔSRMR	CFI	ΔCFI
Fit for Males	7755.24	1439			0.051		0.049		0.963	
Fit for Females	7644.56	1439			0.052		0.051		0.962	
Configural = All	15399.79	2878			0.051		0.051		0.962	
Factor Loadings	15628.68	2924	228.89	46	0.052	0.001	0.051	0.000	0.962	0.000
Item Intercepts	16430.11	2970	801.43	46	0.053	0.001	0.052	0.000	0.960	-0.002
Item Residuals	17211.08	3026	780.97	56	0.053	0.001	0.053	0.001	0.957	-0.003
Variance/Covariance	17340.47	3081	129.39	55	0.054	0.001	0.053	0.002	0.957	0.000

Note. Sample sizes for males, females, and combined were 2047, 1880, and 3927, respectively. All χ^2 and $\Delta\chi^2$ values were statistically significant at .001.

Table 4

First-order Latent Variable Mean Differences and T-statistics Between Genders and Ethnic Groups

	Neighborhood	Friends	Self-in-the-Present	Parents	Siblings	School	Peers	Teachers	Self-in-the-Future	Reading
					Male [R] vs. Female					
M_{Diff}	0.187**	-0.453**	-0.036	0.049	-0.117**	-0.256**	-0.138**	-0.319**	-0.049	-0.573**
$t-statistic$	4.719	-16.321	-1.229	1.638	-3.347	-10.018	-5.292	-9.547	-1.463	-13.362
d	0.171	-0.592	-0.045	0.059	-0.121	-0.363	-0.192	-0.346	-0.053	-0.485
					Caucasian [R] vs. African American					
M_{Diff}	0.314**	0.255**	-0.221**	-0.066	-0.325**	0.021	0.046	0.146*	-0.343**	-0.008
$t-statistic$	4.731	5.157	-4.800	-1.292	-5.777	0.502	1.012	2.609	-6.428	-0.117
d	0.172	0.187	-0.174	-0.047	-0.210	0.018	0.037	0.095	-0.233	-0.004
					Caucasian [R] vs. Latina/o					
M_{Diff}	0.483**	0.226**	0.116*	-0.068	-0.239**	0.069	-0.032	0.038	0.137*	0.260**
$t-statistic$	7.642	4.540	2.544	-1.567	-4.526	1.815	-0.818	0.760	2.590	4.041
d	0.277	0.165	0.092	-0.057	-0.164	0.066	-0.030	0.028	0.094	0.147
					African American [R] vs. Latina/o					
M_{Diff}	0.163	-0.064	0.327**	0.003	0.092	0.073	-0.096	-0.116	0.473**	0.272*
$t-statistic$	1.950	-0.959	5.485	0.054	1.255	1.413	-1.630	-1.589	6.562	3.059
d	0.071	0.035	0.199	0.002	0.046	0.051	0.059	0.058	0.238	0.111

Note. Mean differences marked with an * and ** were statistically significant at .05 and .001, respectively. The group marked with an "R" acted as the reference group.

Table 5

Model Fit Statistics for the First-order Factor Model Across the Different Ethnic/Racial Groups

	χ^2	*df*	$\Delta \chi^2$	Δ *df*	RMSEA	ΔRMSE	SRMR	ΔSRMR	CFI	ΔCFI
Fit for Caucasian	10520.32	1439			0.052		0.052		0.966	
Fit for African	2975.51	1439			0.053		0.060		0.940	
Fit for Latina/o	2960.53	1439			0.053		0.061		0.932	
Configural = All	16456.35	4317			0.053		0.061		0.961	
Factor Loadings	16709.64	4409	253.288	92	0.053	0.000	0.064	0.003	0.960	-
Item Intercepts	17115.06	4455	405.419	46	0.053	0.000	0.064	0.000	0.959	-
Item Residuals	18707.92	4567	1592.864	112	0.059	0.006	0.065	0.001	0.955	-
Variance/Covariance	18969.68	4677	261.757	110	0.059	0.006	0.093	0.028	0.954	-

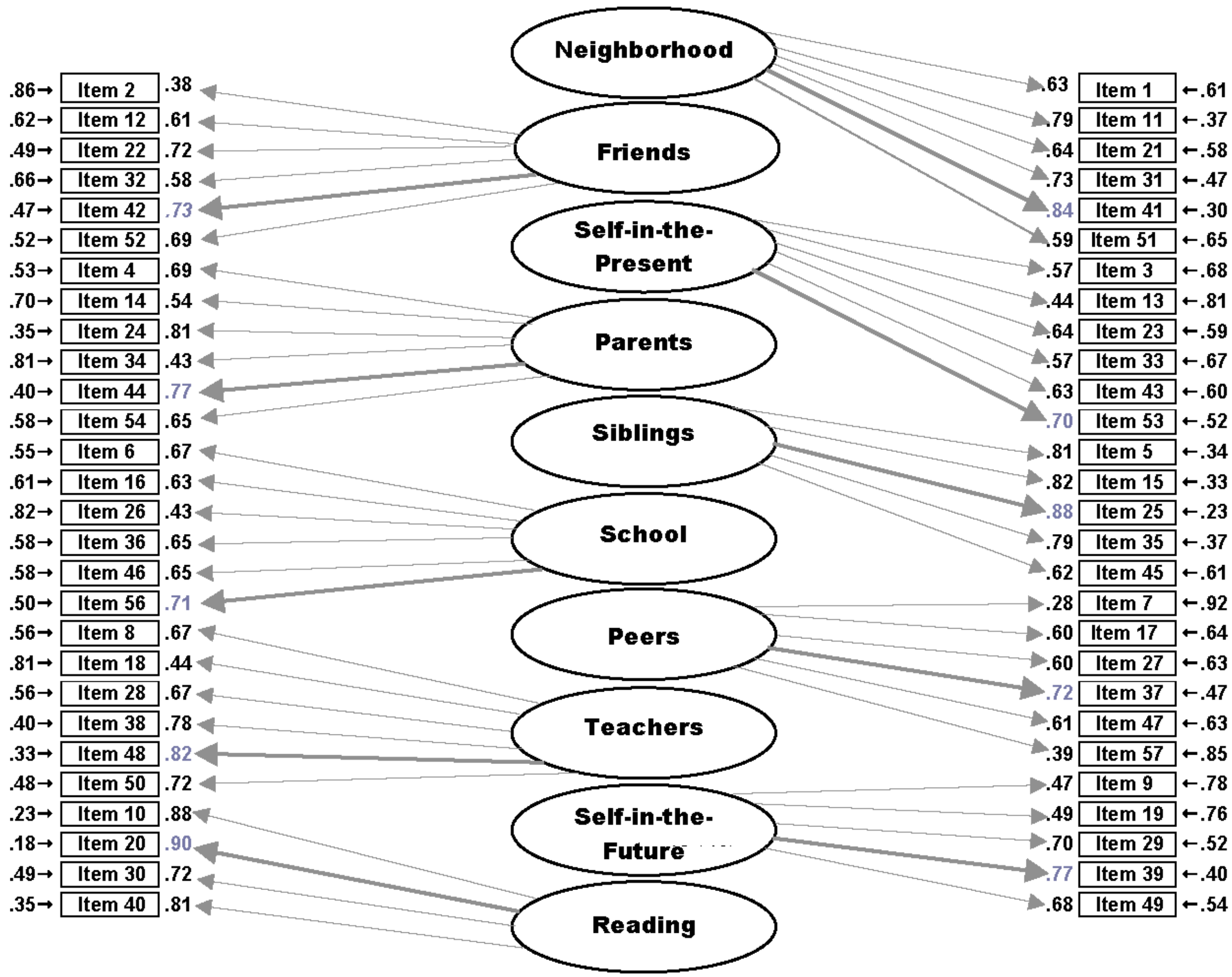
Note. Sample sizes for Caucasians, African Americans, Latina/os, and combined were 2788, 400, 410, and 3598, respectively. All χ^2 and $\Delta \chi^2$ values were statistically significant at .001.

Table 6

Connectedness Observed Score Scale Means and Standard Deviations By For Each Gender and Ethnic Group

	Neighborhood	Friends	Self-in-the-Present	Parents	Siblings	School	Peers	Teachers	Self-in-the-Future	Reading
					Female vs. Male					
Female	3.20(1.02)	3.80(.65)	3.95(.76)	3.91(.77)	3.61(1.00)	3.60(.75)	3.55(.71)	3.85(.84)	3.93(.76)	3.22(1.24)
Male	3.32(1.00)	3.40(.71)	3.92(.76)	3.95(.74)	3.49(1.00)	3.34(.80)	3.43(.70)	3.57(.88)	3.88(.81)	2.68(1.18)
					African American					
All	3.07(1.00)	3.44(.78)	4.09(.70)	3.93(.76)	3.76(.95)	3.47(.76)	3.42(.73)	3.56(.87)	4.10(.74)	2.96(1.14)
Female	2.85(1.00)	3.53(.75)	4.05(.72)	3.91(.74)	3.75(.99)	3.60(.72)	3.41(.77)	3.66(.87)	4.08(.72)	3.19(1.20)
Male	3.26(.96)	3.36(.80)	4.12(.68)	3.95(.78)	3.78(.91)	3.36(.78)	3.42(.70)	3.47(.86)	4.13(.76)	2.77(1.04)
					Caucasian					
All	3.34(1.01)	3.63(.69)	3.93(.77)	3.93(.77)	3.49(1.02)	3.47(.80)	3.49(.71)	3.73(.89)	3.90(.79)	2.97(1.28)
Female	3.31(1.01)	3.87(.60)	3.96(.76)	3.91(.78)	3.57(1.01)	3.62(.75)	3.58(.70)	3.87(.85)	3.94(.76)	3.26(1.26)
Male	3.36(1.01)	3.41(.69)	3.89(.78)	3.93(.75)	3.43(1.02)	3.34(.82)	3.41(.71)	3.60(.91)	3.86(.82)	2.70(1.23)
					Latina/o					
All	2.95(.96)	3.48(.77)	3.82(.70)	3.96(.64)	3.72(.91)	3.43(.71)	3.52(.63)	3.70(.77)	3.79(.75)	2.74(1.06)
Female	2.80(.95)	3.60(.77)	3.75(.74)	3.88(.70)	3.78(.97)	3.50(.72)	3.48(.69)	3.88(.76)	3.75(.74)	3.04(1.08)
Male	3.08(.95)	3.36(.76)	3.89(.66)	4.03(.58)	3.67(.85)	3.36(.69)	3.56(.58)	3.53(.75)	3.82(.75)	2.48(.98)

Note. These are the observed means, not the latent means compared in Table 4. These are provided to given information about the variability of observed scale scores.


Neighborhood
Friends
Self-in-the-Present
Parents
Siblings
School
Peers
Teachers
Self-in-the-Future
Reading
.86 Item 2 .38
.62 Item 12 .61
.49 Item 22 .72
.66 Item 32 .58
.47 Item 42 .73
.52 Item 52 .69
.53 Item 4 .69
.70 Item 14 .54
.35 Item 24 .81
.81 Item 34 .43
.40 Item 44 .77
.58 Item 54 .65
.55 Item 6 .67
.61 Item 16 .63
.82 Item 26 .43
.58 Item 36 .65
.58 Item 46 .65
.50 Item 56 .71
.56 Item 8 .67
.81 Item 18 .44
.56 Item 28 .67
.40 Item 38 .78
.33 Item 48 .82
.48 Item 50 .72
.23 Item 10 .88
.18 Item 20 .90
.49 Item 30 .72
.35 Item 40 .81
.63 Item 1 .61
.79 Item 11 .37
.64 Item 21 .58
.73 Item 31 .47
.84 Item 41 .30
.59 Item 51 .65
.57 Item 3 .68
.44 Item 13 .81
.64 Item 23 .59
.57 Item 33 .67
.63 Item 43 .60
.70 Item 53 .52
.81 Item 5 .34
.82 Item 15 .33
.88 Item 25 .23
.79 Item 35 .37
.62 Item 45 .61
.28 Item 7 .92
.60 Item 17 .64
.60 Item 27 .63
.72 Item 37 .47
.61 Item 47 .63
.39 Item 57 .85
.47 Item 9 .78
.49 Item 19 .76
.70 Item 29 .52
.77 Item 39 .40
.68 Item 49 .54

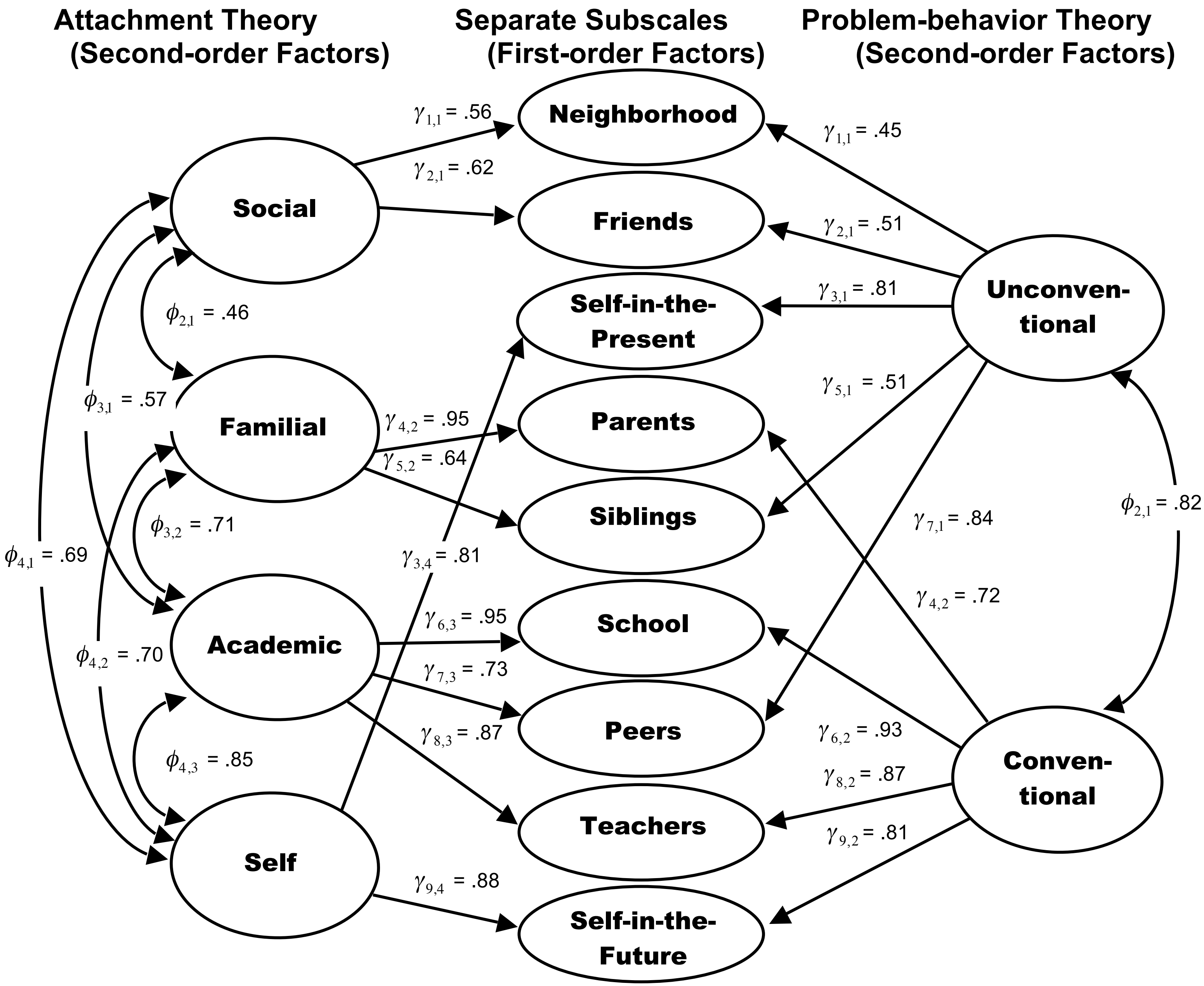

Attachment Theory
(Second-order Factors)
Separate Subscales
(First-order Factors)
Problem-behavior Theory
(Second-order Factors)
Social
Familial
Academic
Self
Neighborhood
Friends
Self-in-the-Present
Parents
Siblings
School
Peers
Teachers
Self-in-the-Future
Unconven-tional
Conven-tional
$\gamma_{1,1}$ = .56
$\gamma_{2,1}$ = .62
$\gamma_{4,2}$ = .95
$\gamma_{5,2}$ = .64
$\gamma_{3,4}$ = .81
$\gamma_{6,3}$ = .95
$\gamma_{7,3}$ = .73
$\gamma_{8,3}$ = .87
$\gamma_{9,4}$ = .88
$\phi_{2,1}$ = .46
$\phi_{3,1}$ = .57
$\phi_{3,2}$ = .71
$\phi_{4,1}$ = .69
$\phi_{4,2}$ = .70
$\phi_{4,3}$ = .85
$\gamma_{1,1}$ = .45
$\gamma_{2,1}$ = .51
$\gamma_{3,1}$ = .81
$\gamma_{5,1}$ = .51
$\gamma_{7,1}$ = .84
$\gamma_{4,2}$ = .72
$\gamma_{6,2}$ = .93
$\gamma_{8,2}$ = .87
$\gamma_{9,2}$ = .81
$\phi_{2,1}$ = .82

Table 7 (Tables 7-12 are for the Reviewers' and Editor's benefit only, not for inclusion in paper)
Connectedness Second-Order Observed Scale Means and Standard Deviations By Genders and Ethnic Groups

	Attachment Theory Factors				Problem-Behavior Theory Factors	
	Social	Familial	Academic	Self	Conventional	Unconventional
				Gender		
Female	3.50(.68)	3.77(.76)	3.67(.64)	3.94(.66)	3.62(.54)	3.82(.64)
Male	3.36(.70)	3.74(.74)	3.45(.66)	3.90(.69)	3.51(.56)	3.68(.66)
				African American		
All	3.25(.71)	3.85(.74)	3.48(.65)	4.10(.62)	3.55(.56)	3.75(.62)
Female	3.19(.68)	3.84(.74)	3.55(.65)	4.06(.60)	3.51(.56)	3.80(.60)
Male	3.31(.73)	3.87(.74)	3.42(.64)	4.12(.64)	3.58(.56)	3.71(.63)
				Caucasian		
All	3.48(.68)	3.73(.76)	3.56(.67)	3.91(.69)	3.58(.56)	3.75(.67)
Female	3.59(.65)	3.76(.77)	3.69(.65)	3.95(.67)	3.66(.54)	3.83(.65)
Male	3.39(.70)	3.71(.76)	3.45(.68)	3.88(.70)	3.50(.57)	3.68(.68)
				Latina/o		
All	3.21(.70)	3.85(.66)	3.55(.57)	3.81(.63)	3.49(.48)	3.72(.56)
Female	3.20(.70)	3.83(.71)	3.62(.60)	3.75(.65)	3.47(.50)	3.76(.58)
Male	3.22(.69)	3.86(.61)	3.48(.54)	3.86(.60)	3.51(.47)	3.68(.55)

Note. These are the observed means, not the latent means described in the text.
These are provided to give information about the variability of observed scale scores.

Table 8(Tables 7-12 are for the Reviewers' and Editor's benefit only, not for inclusion in paper)

Model Fit Statistics for the Second-order (Problem-behavior Theory) Factor across Genders

	χ^2	*df*	$\Delta\chi^2$	Δ *df*	RMSEA	ΔRMSE	SRMR	ΔSRMR	CFI	ΔCFI
Fit for Males	7737.66	1264			0.055		0.060		0.959	
Fit for Females	7802.25	1264			0.057		0.063		0.956	
Configural: Full	15539.91	2528			0.056		0.063		0.957	
Factor Loadings (First-order)	15774.76	2571	234.85	43	0.056	0.000	0.063	0.000	0.957	-0.001
Factor Loadings (Second-	15799.97	2578	25.20	7	0.056	0.000	0.066	0.003	0.957	0.000
Item Intercepts	16580.93	2621	780.96	43	0.057	0.001	0.067	0.000	0.954	-0.003
First-order Factor Intercepts	17089.70	2628	508.77	7	0.058	0.001	0.068	0.002	0.953	-0.002
First-order Factor Disturbances	17112.10	2637	22.40 NS	9	0.058	0.000	0.068	0.000	0.953	0.000
Item Residual	17815.59	2689	703.49	52	0.059	0.001	0.067	-0.001	0.950	-0.002
Variance/Covariance	17828.39	2692	12.80 NS	3	0.059	0.000	0.067	0.000	0.950	0.000

Note. Sample sizes for males, females, and combined were 2047, 1880, and 3927, respectively. All χ^2 and $\Delta\chi^2$ values were statistically significant at .001, except the χ^2 values marked with an NS which were non-significant at an alpha of .05.

Table 9 *(Tables 7-12 are for the Reviewers' and Editor's benefit only, not for inclusion in paper)*

Model Fit Statistics for the Second-order (Problem-behavior Theory) Factor across the Different Ethnic Groups

	χ^2	*df*	$\Delta\chi^2$	Δ *df*	RMSEA	ΔRMSE	SRMR	ΔSRMR	CFI	ΔCFI
Fit for Caucasian	10648.03	1264			0.057		0.062		0.961	
Fit for African American	2775.33	1264			0.056		0.065		0.936	
Fit for Latino	2824.73	1264			0.058		0.073		0.923	
Configural: Full	16248.09	3792			0.057		0.073		0.956	
Factor Loadings (First-order)	16464.51	3878	216.425	86	0.057	0.000	0.076	0.003	0.956	0.000
Factor Loadings (Second-order)	16502.49	3892	37.983	14	0.057	0.000	0.078	0.002	0.955	0.000
Item Intercepts	17174.96	3978	672.466	86	0.058	-0.001	0.078	0.000	0.953	-0.002
First-order Factor Intercepts	17532.41	3992	357.450	14	0.059	-0.001	0.083	0.004	0.952	-0.001
First-order Factor Disturbances	17591.50	4010	59.092	18	0.059	0.000	0.085	0.003	0.952	0.000
Item Residual	18966.27	4114	1374.765	104	0.063	-0.005	0.088	0.003	0.948	-0.004
Variance/Covariance	18999.07	4120	32.802	6	0.063	0.000	0.104	0.016	0.947	0.000

Note. Sample sizes for Caucasians, African Americans, Latinos, and combined were 2788, 400, 410, and 3598, respectively. All χ^2 and $\Delta\chi^2$ values were statistically significant at .001.

Table 10 (Tables 7-12 are for the Reviewers' and Editor's benefit only, not for inclusion in paper)

Model Fit Statistics for the Second-order (Attachment Theory) Factor Model across Genders

	χ^2	*df*	$\Delta\chi^2$	Δ *df*	RMSEA	ΔRMSE	SRMR	ΔSRMR	CFI	ΔCFI
Fit for Males	7536.07	1259			0.054		0.057		0.960	
Fit for Females	7513.46	1259			0.056		0.060		0.958	
Configural: Full	15049.52	2518			0.055		0.060		0.959	
Factor Loadings (First-order)	15278.05	2561	228.52	43	0.055	0.000	0.060	-0.001	0.958	-0.001
Factor Loadings (Second-order)	15281.56	2566	3.51 NS	5	0.055	0.000	0.061	0.001	0.958	0.000
Item Intercepts	16069.73	2609	788.17	43	0.057	0.001	0.061	0.000	0.956	-0.002
First-order Factor Intercepts	16374.09	2614	304.35	5	0.057	0.001	0.066	0.005	0.955	-0.001
First-order Factor Disturbances	16388.48	2623	14.40 NS	9	0.057	0.000	0.067	0.001	0.955	0.000
Item Residual	17096.42	2675	707.93	52	0.058	0.001	0.066	-0.001	0.953	-0.002
Variance/Covariance	17135.38	2685	38.97	10	0.058	0.000	0.065	-0.002	0.953	0.000

Note. Sample sizes for males, females, and combined were 2047, 1880, and 3927, respectively. All χ^2 and $\Delta\chi^2$ values were statistically significant at .001, except the χ^2 values marked with an NS which were non-significant at an alpha of .05.

Table 11 *(Tables 7-12 are for the Reviewers' and Editor's benefit only, not for inclusion in paper)*

Model fit Statistics for the Second-order (Attachment Theory) Factor Model Across the Different Ethnic/Racial Groups

	χ^2	*df*	$\Delta\chi^2$	Δ*df*	RMSEA	ΔRMSE	SRMR	ΔSRMR	CFI	ΔCFI
Fit for Caucasian	10453.85	1259			.057		.061		.962	
Fit for African American	2729.31	1259			.055		.063		.938	
Fit for Latino	2703.33	1259			.056		.067		.929	
Configural: Full	15886.49	3777			.057		.067		.957	
Factor Loadings (First-order)	16109.93	3863	223.44	86	.056	.001	.070	.003	.957	.000
Factor Loadings (Second-order)	16134.56	3873	24.64 NS	10	.056	.000	.070	.000	.957	.000
Item Intercepts	16446.73	3907	312.16	34	.057	.001	.070	.000	.956	-.001
First-order Factor Intercepts	16472.12	3921	25.39 NS	14	.057	.000	.071	.001	.956	.000
First-order Factor Disturbances	16535.50	3939	63.38	18	.057	.000	.072	.001	.955	-.001
Item Residual	17853.76	4047	1318.27	108	.061	.004	.075	.003	.951	-.004
Variance/Covariance	17934.55	4067	80.79	20	.061	.000	.098	.023	.951	.000

Note. Sample sizes for Caucasians, African Americans, Latinos, and combined were 2788, 400, 410, and 3598, respectively. All χ^2 and $\Delta\chi^2$ values were statistically significant at .001, except the χ^2 values marked with an NS which were non-significant at an alpha of .05.

Table 12 (Tables 7-12 are for the Reviewers' and Editor's benefit only, not for inclusion in paper)

Internal Consistency (α) Coefficients for Scales Across the Three Models For Both Genders, All Ethnic Groups, and Total Sample

	Overall	Male	Female	Caucasian	African American	Latino	Asian	Bi-racial	Other
				First-order Factors					
Neighborhood	.86	.85	.86	.86	.80	.83	.87	.83	.84
Friends	.78	.76	.79	.79	.73	.81	.78	.80	.80
Self-in-the-Present	.76	.76	.77	.78	.65	.70	.80	.76	.73
Parents	.81	.80	.82	.82	.75	.74	.84	.79	.78
Siblings	.90	.88	.90	.90	.82	.85	.86	.90	.87
School	.79	.78	.80	.81	.74	.75	.81	.81	.70
Peers	.70	.68	.72	.72	.65	.62	.75	.71	.61
Teachers	.84	.83	.84	.85	.77	.78	.85	.84	.73
Self-in-the-Future	.75	.76	.74	.76	.68	.71	.78	.78	.74
Reading	.90	.88	.91	.91	.79	.84	.94	.89	.86
				Second-order factors: Attachment (Cultural) Theory					
Social	.82	.83	.82	.82	.77	.82	.84	.83	.84
Familial	.88	.87	.88	.88	.84	.84	.89	.88	.87
Academic	.89	.88	.89	.89	.85	.85	.92	.89	.83
Self	.83	.83	.83	.84	.77	.79	.83	.85	.84
				Second-order factors: Problem-behavior Theory					
Unconventional	.88	.88	.88	.89	.86	.83	.88	.88	.89
Conventional	.91	.91	.92	.92	.88	.89	.93	.92	.88
Sample size	3598	2047	1880	2788	400	410	61	179	89