Assessing Invariance Across Sex and Race/Ethnicity in Measures of Youth Psychopathic Characteristics

Jacqueline M. Horan,
Fordham University

Joshua L. Brown,
Fordham University

Stephanie M. Jones, and
Harvard Graduate School of Education

J. Lawrence Aber
New York University

Abstract

The aim of this study was to assess the measurement invariance of 2 commonly used measures of youth psychopathic characteristics across sex and racial/ethnic groups. Among a community sample of Hispanic and Black adolescents (N = 355; 50.5% female; mean age = 15.09) and their parents, this study tested the configural and metric invariance of the Levenson Self-Report Psychopathy Scale (LSRP; Levenson, Fitzpatrick, & Kiehl, 1995) and the parent-report version of the Inventory of Callous-Unemotional Traits (Frick, 2004). Preliminary analyses indicated that the adolescents in the present study reported similar rates of psychopathic characteristics as those reported by other studies of adolescents and young adults. Results of the multigroup invariance analyses indicated that these measures are invariant across sex and between Hispanic and Black youth. In addition, further analyses assessing associations between these measures and a number of behavioral and emotional characteristics indicated that scores on the LSRP Scale and Callous-Unemotional Traits demonstrate good convergent and discriminant validity with few differences by sex or race/ethnicity. To date, research on psychopathy has focused predominantly on samples of White males. Therefore, it is important that research examines the equivalence of measures of psychopathic characteristics across different populations, so that accurate assessments can be made to inform intervention and treatment efforts.

Keywords

psychopathy; callous-unemotional traits; measurement invariance

Correspondence concerning this article should be addressed to Jacqueline M. Horan, Psychology Department, John Jay College of Criminal Justice, 524 West 59th Street, Room 10.63.05, New York, NY 10019. jahoran@jjay.cuny.edu.
Jacqueline M. Horan and Joshua L. Brown, Department of Psychology, Fordham University; Stephanie M. Jones, Harvard Graduate School of Education; J. Lawrence Aber, Steinhardt School of Culture, Education, and Human Development, New York University.
Jacqueline M. Horan is now at Psychology Department, John Jay College of Criminal Justice.

Over the past several decades, research interest in psychopathy has proliferated because of the immense toll that related behaviors exact on society, including violence, criminality, family dysfunction, and expenses for welfare and incarceration (Salekin, Rogers, & Machin, 2001). For this reason, the prevalence of psychopathy in childhood, adolescence, and adulthood, as well as its stability across these time periods, has been widely studied (e.g., Dolan, 2004; Frick, Kimonis, Dandreaux, & Farell, 2003; Levenson, Kiehl, & Fitzpatrick, 1995; Neumann, Schmitt, Carter, Embley, & Hare, 2012; Salihovic, Özdemir, & Kerr, 2014). Developmental research indicates that some characteristics of psychopathy can be identified in children as young as preschool age (Hemphälä & Tengström, 2010; Lynam, 1996) and are associated with a host of maladaptive outcomes, across emotional, behavioral, interpersonal, and academic domains (e.g., Blair, 2005; Hare, 1991). To date, however, research on psychopathic characteristics has focused predominantly on samples of White males (Skeem, Polaschek, Patrick, & Lilienfeld, 2011), and the generalizability of findings to other populations—including females and individuals from racially or ethnically diverse backgrounds—remains uncertain (Skeem, Edens, Camp, & Colwell, 2004; Verona, Sadeh, & Javdani, 2010). Therefore, the present study attempts to contribute to existing literature by assessing the measurement equivalence of psychopathy instruments among a community sample of non-White boys and girls to determine the utility of such measures in identifying predictors of maladaptive developmental outcomes among diverse youth.

Research on youth psychopathy is extensive, although there has been a recent push toward focusing on certain specific *characteristics* of psychopathy, rather than the construct as a whole, over concerns that some of these characteristics are considered to be developmentally normative among children and adolescents (e.g., irresponsibility, impulsivity; Edens, Skeem, Cruise, & Cauffman, 2001). In addition, focusing on characteristics avoids labeling youths with the often damaging label of "psychopath," which can lead to assumptions of a permanent condition not amenable to intervention or treatment (Lynam & Gudonis, 2005). One affective characteristic—callous-unemotional (CU) traits—has been found to be a particularly strong predictor of behavioral and interpersonal problems among children and adolescents (Frick & White, 2008) and has been identified in children as young as 4 years of age (Dadds, Fraser, Frost, & Hawes, 2005). Because both psychopathy, defined as a whole constellation of characteristics, and CU traits have been extensively studied in developmental research, the present study focuses on the measurement equivalence of two measures—one of psychopathy and one of CU traits—not to compare these measures, but to add to the literature on measurement equivalence across sex and racial/ethnic groups as comprehensively as possible, given that both constructs have been found to have serious, pervasive impacts on a wide range of outcomes.

CU traits are considered a hallmark component of primary psychopathy (e.g., Blair, 2005; Frick & White, 2008), which is thought to be caused by constitutional deficits that lead to a lack of negative affect (i.e., guilt, fear, or anxiety; Karpman, 1948; Newman, MacCoon, Vaughn, & Sadeh, 2005). In contrast, secondary psychopathy is thought to be caused by environmental factors—individuals high in this variant demonstrate higher trait anxiety than usual, which may be reflective of adaptation to contextual stressors, including parental rejection or harsh punishment. Both types of psychopathy, as well as CU traits, have been associated with problem behaviors among youths and adults, including aggression, violence,

and substance use and abuse (Frick & White, 2008). In addition, individuals with high levels of psychopathic characteristics tend to demonstrate interpersonal problems, including manipulative behavior, hostility toward others, and a general lack of empathy (e.g., Cleckley, 1976; Hare, 1991; McCord & McCord, 1964).

Previous Research Examining Measurement Invariance

Although extant research highlights the pervasive impacts of psychopathic characteristics on emotional, behavioral, and interpersonal functioning, little effort has been put forth to understand demographic differences in the manifestation of these characteristics, such as whether currently used assessment instruments are comparably effective with populations other than White males (Cale & Lilienfeld, 2002). Limited research has examined the factor structures of psychopathy measures with females or racially and ethnically diverse youth. In the adult literature, some research has found self-report psychopathy assessments to be reliable and valid for use with women (Vitale, Smith, Brinkley, & Newman, 2002), but others argue that further research is needed, with both adults and youths, before determining whether or not these measures are valid with diverse populations (Cooke, Michie, Hart, & Clark, 2005). Whereas findings consistently suggest that both adult and adolescent men demonstrate significantly higher mean levels of psychopathic characteristics than women (e.g., Cale & Lilienfeld, 2002; Essau, Sasagawa, & Frick, 2006), examinations into qualitative differences in these characteristics have been somewhat rare. Sex comparisons within the youth literature have documented inconsistencies—with some measures, such as the Psychopathy Checklist: Youth Version (PCL: YV; Forth, Kosson, & Hare, 2003), demonstrating consistent factor structures by sex (e.g., Schrum & Salekin, 2006), but others, such as the Antisocial Process Screening Device (APSD; Frick & Hare, 2001), showing less stability, with less scale differentiation for girls than boys (Frick, Bodin, & Barry, 2000). More research is needed to fully understand differences in the underlying trait structure of psychopathic characteristics in boys and girls (Verona et al., 2010).

Research with adults suggests that the most commonly used measures of psychopathy, such as Hare's (1991) Pyschopathy Checklist-Revised (PCL-R), are valid measures across White and Black adult samples, with similar factor structures supported (Cooke, Kosson, & Michie, 2001; Skeem et al., 2004). No research to date has focused on the effectiveness of generalizing these measures to other populations, such as Hispanic and Asian populations. Although little research has examined differences across race or ethnicity with youth samples, Jones, Cauffman, Miller, and Mulvey (2006) found that the three-factor model (i.e., Arrogant and Deceitful Interpersonal Style, Deficient Affective Experience, and Impulsive and Irresponsible Behavioral Style) and four-factor model (i.e., Arrogant and Deceitful Interpersonal Style, Deficient Affective Experience, Impulsive and Irresponsible Behavioral Style, and Antisocial) of the PCL: YV that have both been supported with white youth also fit well for Black youth, but not for Hispanic youth. This is currently the only published study to date that reports on the model fit with Hispanic youth; no published research has yet examined the measurement equivalence of psychopathy instruments with youth of other racial or ethnic backgrounds (Verona et al., 2010).

A number of studies have failed to find support for measurement invariance in psychopathy assessments across cultures when using various analytic techniques, including item multigroup confirmatory factor analysis and item response theory. These studies include comparisons of incarcerated American and German men on the PCL-R (Mokros, Neumann, Stadtland, Osterheider, Nedopil, & Hare, 2011), incarcerated men in America and the United Kingdom on the PCL-R (Bolt, Hare, & Neumann, 2007), incarcerated men and undergraduate college students on the two-factor Levenson Self-Report Psychopathy Scale (LSRP; Sellbom, 2011), and male and female undergraduates on the two-factor LSRP (Lynam, Whiteside, & Jones, 1999). Given these inconsistencies, calls for more research examining the invariance of specific assessments of psychopathic characteristics continue (e.g., Hauck-Filho & Teixeira, 2014), particularly in regard to cross-cultural differences.

Invariance across groups can be further supported by examining the concurrent validity of scores on instruments of psychopathy. Although previous research has shown general associations between psychopathic characteristics and a number of emotional and behavioral characteristics, including anxiety (Newman et al., 2005), emotional reactivity (Hicks, Markon, Patrick, Krueger, & Newman, 2004), impulsivity (Coldwell, Pike & Dunn, 2006), aggressive and antisocial behavior (Farrington & Loeber, 1998), and substance use problems (Walsh, Allen, & Kosson, 2007), relatively few studies have addressed differences in these associations by sex or race/ethnicity, particularly given the predominant focus on White male participants. Of those that have examined group differences, the majority focus on sex differences and results are largely inconsistent across studies (Rogstad & Rogers, 2008)—a finding that has raised additional questions by some researchers, regarding whether actual differences exist or whether these inconsistencies are a result of measurement bias (Nicholls & Petrila, 2005).

The Present Study

The utility of reliable and valid measures of psychopathic characteristics, particularly among youth, cannot be understated, given the association between these characteristics and maladaptive development across multiple domains. Therefore, it is important that scores on assessment instruments demonstrate equivalence across all youth populations to accurately identify those who may benefit from targeted intervention and treatment efforts. The aim of the present study, therefore, was to assess the measurement equivalence and concurrent validity of two instruments that measure different sets of psychopathic characteristics and are often used with community samples: the self-report LSRP Scale (Levenson et al., 1995), which measures primary and secondary psychopathy, and the parent-report version of the Inventory of Callous-Unemotional Traits (ICU; Frick, 2004), which measures callousness, carelessness, and lack of emotionality, among a community-based sample of racially and ethnically diverse adolescent boys and girls. These relatively brief (24–26 items) instruments are easy to administer and were designed for use with community samples.

Method

Participants

Participants in this study were drawn from a larger sample of youths who were followed longitudinally into high school after initially attending 1 of 18 New York City public elementary schools involved in a school-randomized trial of a social-emotional and literacy development program. This subsample was comprised of youths for whom both self-reported and parent-reported data were collected in the final wave of data collection, when they were in 9th or 10th grade. Like the larger sample of youths participating in the intervention, within the subsample of youths who had self-report and parent-report data at the final wave, over 90% were of Hispanic and Black backgrounds, with smaller proportions from non-Hispanic White and other (e.g., South and East Asian, Native American) backgrounds. Given the racial/ethnic distribution of the present sample, measurement invariance was only examined across Hispanic and Black participants, as the subsamples of non-Hispanic White youth and youth identifying as another race were too small to be included.[1] Thus, the final sample consisted of 355 youths (50.5% girls; mean age = 15.09, $SD = 0.69$; 49.3% Hispanic, 50.7% Black).

Procedures

Research staff contacted caregivers via telephone or mail to schedule interviews for the follow-up portion of the larger intervention study when youths were in 9th or 10th grade. Before completing these interviews, caregiver consent, and youth assent were obtained. For those families from whom consent was obtained, in-person, structured, computer-assisted interviews were conducted with youths, and parents by trained research assistants. These interviews took ~2 hr and were conducted either in participants' homes, at a mutually agreed upon public location, or in rare cases, over the telephone. Youth and parent interviews were conducted separately to ensure confidentiality. Before beginning the interview, participants were reminded that their responses were confidential and voluntary and that the study team was interested in learning about how the adolescent was doing in areas such as school, relationships with family and friends, and problem solving. Research staff read all interview questions aloud and asked participants to answer based on response options that were provided both aurally and in a printed response booklet that participants were encouraged use. This also allowed participants to point to their answers if they did not feel comfortable answering aloud. Answers were then entered into the computer. Parents and youths were each compensated $45 for the completion of interviews at each of these waves.

Measures

Primary and secondary psychopathy—Youths self-reported on psychopathic characteristics using the LSRP (Levenson et al., 1995). Youths were asked to rate themselves on 26 items pertaining to primary psychopathy (e.g., "success is based on survival of the fittest") and secondary psychopathy (e.g., "I find myself in the same kinds of trouble time after time") on a 4-point scale ranging from 1 (*disagree strongly*) to 4 (*agree strongly*). The LSRP was designed as an alternative to the PCL-R, which is widely considered to be the

---

[1]Confirmatory factor analysis requires a minimum of 100 participants per group (Hu & Bentler, 1998).

gold standard for clinician-administered assessments of psychopathy among clinical or forensic populations (Skeem et al., 2011). Unlike the PCL-R, however, the LSRP was created as a means of assessing community samples and for administration by nonclinicians.

Several studies have examined the reliability of test scores and the validity of interpretations of these scores on this measure among noninstitutionalized populations of adults (primarily undergraduates); however, the LSRP has not yet been examined among populations under age 18. Among undergraduate samples, the LSRP has demonstrated adequate internal consistency for both the total score and for the primary and secondary subscales, with moderate correlations between the subscales (Falkenbach et al., 2007; Lynam et al., 1999; Miller, Gaughan, & Pryor, 2008). Studies have provided support for this two-factor model among undergraduate samples, differentiating between primary and secondary psychopathy through both exploratory (Levenson et al., 1995) and confirmatory factor analyses (Lynam et al., 1999). However, these findings warrant replication among younger samples.

Callous-unemotional traits—Parents reported on adolescent CU characteristics during their 9th or 10th grade of high school using the parent-report version of the ICU (24 items; Frick, 2004). Parents were asked to rate youths' uncaring (e.g., "does things to make others feel good" [reverse scored]), callousness (e.g., "does not feel remorseful when he or she does something wrong"), and unemotional (e.g., "does not seem to know right from wrong") characteristics on a 4-point scale ranging from 0 (*not at all true*) to 3 (*definitely true*). This measure was designed as an alternative to the APSD, which is widely used to measure youth antisocial behavior, to address limitations of the original measure (i.e., low internal consistency because of the limited number of items, likelihood of response sets because of direction of wording; Frick & White, 2008; Poythress, Dembo, Wareham, & Greenbaum, 2006). As well as the parent version, youth self-report and teacher-report versions were also designed.

Studies with both community samples (Essau et al., 2006; Roose et al., 2010) and incarcerated samples (Kimonis et al., 2008) of adolescents have found that scores are generally normally distributed on all three versions of the ICU, with a slight skew toward the upper end of the scale (i.e., low CU traits). The total scale and subscales tend to demonstrate acceptable internal consistency and low-to-moderate positive correlations. This measure was originally designed as a unidimensional construct, although validity studies with several ethnically diverse samples of adolescents have since identified three separate factors as well as the overarching, general CU dimension for all three versions of the scale (e.g., Roose et al., 2010) even though the self-report version is the most commonly used.

Emotional and behavioral characteristics—A number of emotional and behavioral characteristics that have been previously associated with psychopathic characteristics were included in the present study. These characteristics were incorporated as a means of assessing the convergent and discriminant validity of the interpretation of scores from the LSRP and ICU and to examine whether these associations differed by sex or race/ethnicity.

The Behavioral Assessment System for Children (BASC; Reynolds & Kamphaus, 1998) was used to measure youth anxiety, aggression, and sensation-seeking. This instrument was

carefully developed based on theory within the fields of developmental psychopathology and personality development, as well as from clinical experience. It has been refined and shortened based on empirical data during its development and standardization (Sandoval & Echandia, 1994). In the self-reported anxiety module, youths were asked whether 13 specific statements pertaining to anxiety (e.g., "I worry about little things") were true or false descriptions of themselves within the past year. Scores were averaged across all items and ranged from 0 to 0.92 ($M = 0.31$, $SD = 0.23$, $\alpha = .80$). In the parent-reported aggression module, parents were asked to rate 13 statements pertaining to their child's aggressive behaviors (e.g., "Threatens to hurt others") on a 5-point scale ranging from 0 (*never*) to 4 (*almost always*) within the past year. These scores were also averaged across all items and ranged from 1.00 to 2.77 ($M = 1.44$, $SD = 0.37$, $\alpha = .83$). In the self-reported sensation seeking module, youths reported on whether 14 statements pertaining to sensation seeking behaviors (e.g., "I like it when my friends dare me to do something") applied to them or not. Scores were averaged and ranged from 0 to 1 ($M = 0.36$, $SD = 0.16$, $\alpha = .63$).

Youths reported on their own delinquent behaviors via six questions asking them to rate the frequency of specific delinquent behaviors on a 4-point scale ranging from 0 (*never*) to 3 (*many times*). Items in this section of the survey (e.g., "I was sent home from school for bad behavior") were compiled from a comprehensive review of studies focusing on predictors of youth delinquency and recidivism (Loeber & Dishion, 1983). Scores were averaged across all items and ranged from 0 to 1.17 ($M = 0.22$, $SD = 0.26$, $\alpha = .55$).

Hostile attribution bias was assessed via participant responses to six vignettes that were read aloud by the interviewers (Dodge, 1986). Participants chose from several response options that suggested one of four types of intent: (a) hostile—purposefully destructive behavior with malice, (b) accidental—unintentionally caused negative outcome (without malice), (c) prosocial—purposeful destruction of someone else's property but with the clear intent of helping another, or (d) ambiguous—unclear intent with contradictory cues. Responses were then recoded as 0 (*benign intent*) to 1 (*hostile intent*). Scores were averaged across all items and ranged from 0 to 1 ($M = 0.26$, $SD = 0.28$, $\alpha = .71$).

School behavioral engagement was assessed via 10 items that were designed to measure students' perceptions of their own effort, attention, and persistence during learning activities. Participants responded to each item on a 4-point scale ranging from 1 (*disagree a lot*) to 4 (*agree a lot*) (Furrer & Skinner, 2003). Five items on this scale assessed positive behavioral engagement (e.g., "I try hard to do well in school") and five items assessed negative behavioral engagement (e.g., "When I'm in class, I just pretend like I'm working"). Scores on this measure have been significantly associated with youths' relatedness to parents, teachers, and peers, as well as to behavioral problems and academic performance (Furrer & Skinner, 2003). Scores for each scale were averaged and ranged from 1.50–4.00 for positive engagement ($M = 3.35$, $SD = .47$, $\alpha = .74$) and from 1.00–3.80 for negative engagement ($M = 2.17$, $SD = .64$, $\alpha = .67$).

Youths reported on lifetime substance use with five items that asked whether they had ever smoked a cigarette, drank alcohol, gotten drunk on alcohol, used marijuana, or tried a more serious drug (Johnston, Bachman, & O'Malley, 1991). Response options included 1 (*no*), 2

(*once*), 3 (*2–5 times*), and 4 (*more than 5 times*). For the purposes of the present study, these responses were recoded to reflect incidence scores of 0 (*never engaged in use*) and 1 (*engaged at least once*) and were summed. Scores ranged from 0–4 ($M = 0.60$, $SD = 0.96$, α = .64).

Statistical Analysis

Invariance analyses were conducted via multigroup confirmatory factor analysis (CFA) in AMOS 16.0 (Arbuckle, 2003). Multi-Group CFA can be used to assess measurement invariance—the phenomenon whereby the relations among variables are not influenced by an individual's group membership (e.g., sex, race/ethnicity; Wu, Li, & Zumbo, 2007)—by using structural equation modeling to determine the extent to which relationships among variables and latent constructs are consistent across groups.

Two specific forms of measurement invariance—configural and metric invariance—were examined in this study. Configural invariance is established if the factor structure of a measure is consistent across groups, with the same set of items loading onto each factor for all groups, and is evaluated by examining the fit of the multigroup model. Metric invariance is established if the unstandardized factor loadings for all items are the same for all groups, providing evidence that the corresponding latent factors have the same meaning across groups and reflect the same shared variance among items. Both configural and metric invariance can be evaluated by constraining corresponding parameters to be equal across all groups and then comparing the fit of this fully constrained model to the model fit for the full sample. Measures that vary in their factor structure or loadings across groups can potentially result in inaccurate analyses and interpretation of constructs based on underlying differences in their structure or meaning across groups. For example, if the patterns of factor loadings differ across groups (e.g., sex, race/ethnicity), this can result in additional factors appearing when analyzing the combined group (Meredith & Teresi, 2006). In this study, the invariance analyses of the ICU and LSRP assessed whether primary and secondary psychopathy and CU traits represented the same theoretical constructs across youth sex and racial/ethnic subgroups.

As recommended by Hu and Bentler (1998), multiple fit indices were used to evaluate overall patterns of fit for each of these measures, including χ^2, critical ratio (χ^2/df), root mean square error of approximation (RMSEA), and the comparative fit index (CFI). Based on these indices, adequate fit is indicated by a critical ratio between 2 and 3, RMSEA of .10 or lower, and a CFI value of .90 or greater (Schermelleh-Engel, Moosbrugger, & Muller, 2003). These fit indices were chosen as they are derived from diverse concepts of model fit and have been used in comparable models in previous studies examining the LSRP (e.g., Lynam et al., 1999) and the ICU (e.g., Roose et al., 2010). To determine configural and metric invariance, differences in fit between models in χ^2 and CFI values were examined. According to Cheung and Rensvold (2002), if the change in CFI value is greater than .01, the invariance hypothesis should be rejected as this indicates a substantial difference between groups.

Then with invariance established, a series of linear regression analyses were conducted to examine the convergent and discriminant validity of the LSRP and ICU, controlling for sex

and race/ethnicity, with several key constructs that have previously been found to be differentially related to psychopathic characteristics. Finally, sex and race/ethnicity were examined as potential moderators in these relationships to further elucidate any differences across these demographic characteristics.

Results

Preliminary Analyses

Scores and subscale scores on the LSRP and ICU by sex, race/ethnicity, and for the total sample are shown in Table 1. There were no significant differences in total scores or subscale scores between boys and girls or between youth of Hispanic and Black backgrounds. Skewness and kurtosis values fell below the thresholds warranting consideration of data transformations to improve normality (DeCarlo, 1997; Tabachnick & Fidell, 2007), a finding that is not surprising given that even among community samples some level of psychopathic characteristics is normative (Seagrave & Grisso, 2002). Total scores and subscale scores on the LSRP were similar to those reported in community samples of college students (e.g., O'Leary, Loney, & Eckel, 2007). As previously mentioned the LSRP has not yet been used in published studies with samples under age 18. Total scores and subscale scores on the ICU were similar to those reported in community samples of predominantly White adolescents (e.g., Essau et al., 2006; Roose et al., 2010) and incarcerated samples of adolescents from White and Black backgrounds (e.g., Kimonis et al., 2008; Muñoz, Frick, Kimonis, & Aucoin, 2008).

Both the LSRP and ICU total scores demonstrated acceptable reliability (α = .76 and .87, respectively) as did all subscales for each measure (α = .72 and .63 for Primary and Secondary Psychopathy, respectively, and α = .80, .74, and .67 for Unemotional, Callousness, and Uncaring, respectively). These reliability scores were consistent with findings from previous literature for young adults with the LSRP (e.g., Levenson et al., 1995) and adolescents with the ICU (e.g., Essau et al., 2006; Kimonis et al., 2008). The LSRP and ICU were moderately, positively correlated, r = .30, p < .001, as were the correlations of the subscales between both measures (see Table 2), which is also consistent with previous studies (e.g., Vaughn Edens, Howard, & Smith, 2009).

Levenson Self-Report Psychopathy

Multigroup invariance—The first step in conducting an invariance analysis is to identify a baseline model that provides an acceptable fit to the data. Given that the LSRP has undergone exploratory and confirmatory factor analyses that have been well-supported, the factor structure identified by this previous work—a two-factor model identifying primary and secondary psychopathy as separate, moderately correlated factors—was used as the baseline model for this measure. The critical ratio and RMSEA indicated that this model fit the data from the total sample well, although the CFI was below the recommended cut-off (χ^2/df = 2.37; RMSEA = .06, CFI = .75). Previous studies have identified a mismatch between the CFI and other fit indices as a result of low correlations between some of the indicators in a measurement model (Muthén, 2012; Sellbom, 2011). In the present study, correlations between indicators within factors ranged from .01 to .52 (mean interitem

correlations were .12 for the LSRP and .20 for the ICU), suggesting that this may have been the case, despite acceptable factor loadings for all items. Given the findings of the other fit indices and the relatively narrow RMSEA confidence interval (CI = .05–.07), however, the fit of the model was determined to be acceptable for the purposes of the invariance analyses.

Once it was established that the two-factor model comprising primary and secondary psychopathy fit the data from the total sample reasonably well, invariance analyses were conducted across (a) boys and girls and (b) Hispanic and Black youth. Configural invariance by sex was evaluated by specifying the structure of the model to be the same across males and females. The fit was similar to that of the previous model examined using the total sample—both the critical ratio and RMSEA indicated a good fit, whereas the CFI again fell below the recommended cut-off (χ^2/df = 1.81, CFI = .71, RMSEA = .05). Next, metric invariance was evaluated by constraining the corresponding factor loadings to be equivalent across boys and girls and comparing the fit of the metric invariance model to the configural invariance model. With the present sample, the change in CFI was below the recommended guidelines proposed by Cheung and Rensvold (2002; CFI = .001), indicating that the metric invariance model fit similarly well, supporting the invariance hypothesis that item loadings were similar across sex. Based on these findings, the two-factor structure of the LSRP is supported within the present sample across both boys and girls.

Configural invariance by race/ethnicity was evaluated by specifying the structure of the model to be the same across Hispanic and Black youth. The fit was similar to that of the previous model examined using the total sample— both the critical ratio and RMSEA indicated a good fit, whereas the CFI again fell below the recommended cut-off for racial/ethnic invariance (χ^2/df = 1.77, CFI = .69, RMSEA = .05). Next, metric invariance was evaluated by constraining the corresponding factor loadings to be equivalent across Hispanic and Black youth and comparing the fit of the metric invariance model to the configural invariance model. With the present sample, the change in CFI was below the recommended guidelines proposed by Cheung and Rensvold (2002; CFI = .003), indicating that the metric invariance model fit similarly well, supporting the invariance hypothesis that item loadings were similar across race/ethnicity. Based on these findings, the two-factor structure of the LSRP is supported within the present sample across both Hispanic and Black youth. Results are presented in Table 3.

Convergent and discriminant validity—Emotional and behavioral correlates of the LSRP are presented in Table 4. Regression analyses indicated that total scores on the LSRP were significantly related to all of the emotional and behavioral characteristics in the expected directions. Psychopathy was related to higher anxiety, more hostile attributions, more behavioral problems, and higher sensation-seeking. When these associations were examined separately for primary and secondary psychopathy, differences were noted in anxiety—anxiety symptoms were significantly related to secondary psychopathy, with participants high in secondary psychopathic characteristics reporting high levels of anxiety. Primary psychopathy was not associated with anxiety characteristics.

Moderation analyses indicated that the LSRP total scale interacted with sex—although higher scores on the measure were associated with higher anxiety for both boys and girls,

the slope was steeper for girls. In fact, boys demonstrated very little change in anxiety based on their scores on the LSRP. When the primary and secondary subscales were examined separately, results of the moderation analyses indicated that primary psychopathy interacted with sex—higher primary psychopathy scores were in fact associated with higher anxiety for girls, but lower anxiety for boys, compared with lower primary psychopathy. Primary psychopathy also interacted with sex when examined in relation to hostile attribution bias— girls with lower primary psychopathy scores reported less hostile attribution bias than boys with low scores, whereas youths with higher primary psychopathy scores exhibited similarly hostile attributions, regardless of sex. Secondary psychopathy did not interact with sex. There were no interactions with race/ethnicity when the total scale or the subscales were examined in relation to these emotional and behavioral characteristics.

ICU Traits

Multigroup invariance—The ICU has also undergone exploratory and confirmatory factor analyses, which have consistently demonstrated that a three-factor bifactor model provides the best fit for the measure. In this model, factors load onto three, uncorrelated factors (i.e., callous, uncaring, and unemotional), but also onto one general CU factor. This model was replicated in the present study and was used as the baseline model for invariance analyses. For the total sample CFA, both the critical ratio and the RMSEA indicated that this model fit the data well, although the CFI was somewhat low (χ^2/df = 2.51; RMSEA = .06; CFI = .86)—a similar finding as the models with the LSRP, which is likely because of somewhat low correlations between items within factors. Because the CFI approached the recommended cut-off and the confidence interval for the RMSEA was relatively narrow (CI = .056–.069), this model was determined to be acceptable for the present invariance analyses.

To test for measurement invariance across sex, first configural invariance was evaluated and indicated a good fit for both boys and girls (χ^2/df = 1.82; RMSEA = .05; CFI = .85). The fit of this model was slightly better than the baseline model, indicating that the three-factor bifactor structure of the ICU provided a good fit across sex. Metric invariance was then examined and again supported invariance of item loadings across sex, as the change in CFI was less than the recommended cut-off (CFI = .001). Based on these findings, the three-factor bifactor structure of the ICU is supported within the present sample across boys and girls.

To test for measurement invariance across race/ethnicity, first configural invariance was evaluated and indicated a good fit for Hispanic and Black youth (χ^2/df = 1.75; RMSEA = .04; CFI = .85). The fit of this model was slightly better than the baseline model, indicating that the three-factor bifactor structure of the ICU provided a good fit across race/ethnicity. Metric invariance was then examined and again supported invariance of item loadings across racial/ethnic groups, as the change in CFI was less than the recommended cut-off (CFI = .007). Based on these findings, the three-factor bifactor structure of the ICU is supported within the present sample across Hispanic and Black youth. Results are presented in Table 5.

Convergent and discriminant validity—Emotional and behavioral correlates of the ICU are presented in Table 6. Total scores on the ICU were significantly related to all of the emotional and behavioral characteristics with the exception of anxiety symptoms. The uncaring subscale of the ICU was also significantly related to all of these constructs except for anxiety. The callous subscale was not associated with anxiety or sensation seeking, whereas the unemotional subscale was only associated with hostile attribution bias, positive behavioral engagement, and aggression.

The moderation analyses indicated that scores on the ICU interacted with sex when examined in relation to delinquency and risky substance abuse. Although there was very little difference in delinquent behavior or substance use for boys and girls with low levels of CU traits, boys with high levels of CU traits reported more delinquent behavior and substance use than girls with high levels of CU traits.

When the subscales were examined separately, the uncaring subscale did not interact with sex in relation to any of the behavioral and emotional characteristics. Interactions between sex and the callous and unemotional subscales mirrored the interaction for the total scale when examined in relation to delinquency and risky substance abuse. The callous subscale also interacted with sex in relation to hostile attribution bias—girls low in CU traits reported fewer hostile attributions compared with boys low in CU traits, but hostile attributions were similar for youths high in CU traits, regardless of sex. The unemotional subscale also interacted with sex in relation to positive behavioral engagement. Positive behavioral engagement scores did not differ based on CU traits for girls. For youths with low levels of CU traits, boys reported more positive engagement than girls, but for youths high in CU traits, girls reported more behavioral engagement than boys.

Scores on the ICU interacted with race/ethnicity when examined in relation to aggression and risky substance use. Black participants low in CU traits exhibited less aggression than Hispanic participants low in CU traits, but Black participants high in CU traits exhibited more aggression than Hispanic participants high in CU traits. This pattern was repeated when ICU scores were examined in relation to risky substance use.

When the subscales of the ICU were examined separately, there were significant interactions with race for the uncaring subscale in relation to delinquent behavior and risky substance use, again with Black participants low in CU traits exhibiting more delinquency and substance use than Hispanic participants low in CU traits. Again, rates of delinquency and substance use were higher for high-CU youths, with Hispanic participants reporting more of these problem behaviors than Blacks. On both the callous and uncaring subscales, there was a race interaction in relation to aggression, which mirrored the interaction that was found for the total scale.

Discussion

This study assessed the measurement invariance and concurrent validity across sex and racial/ethnic groups of two commonly used measures of psychopathic characteristics. Previously, only limited research examined the factor structures and loadings of psychopathy

measures across diverse populations, and among those studies that exist, inconsistent findings have been documented (Cooke et al., 2005). In the present study, findings suggest that the two-factor structure of the LSRP and the three-factor bifactor structure of the ICU are invariant across sex and across Hispanic and Black youths. This finding provides support for the use of these measures across racially and ethnically diverse community samples of adolescents. While several other publications examining measurement invariance of instruments designed to assess psychopathic characteristics point out the necessity of understanding the validity of scores on such measures (e.g., Cooke et al., 2001; Cooke & Michie, 1999), this study represents the first attempt to assess invariance among a community sample of Hispanic and Black boys and girls.

This study represents an important contribution to the literature on psychopathy. Given that psychopathic characteristics have been associated with a host of maladaptive outcomes in various domains (e.g., emotional, behavioral, interpersonal, and academic), early identification of risk is essential for effective intervention and treatment. Our findings suggest that these measures may be effectively utilized in identification of psychopathic characteristics with young, non-White, community samples, although the somewhat poor CFIs indicate that although these measures may be invariant across Hispanic and Black adolescents, they may not provide the most accurate assessment of youth psychopathic characteristics among these populations. Given that this study represents the first attempt to examine the validity of scores on the LSRP among adolescents from any racial/ethnic background and the first to examine the validity of scores on the ICU among racially and ethnically diverse samples, the analyses warrant replication before any firm conclusions can be drawn regarding the utility of these measures for assessment purposes.

Convergent and discriminant validity analyses provided partial support for the validity of scores on both the LSRP and ICU, given the differential associations when primary psychopathy, secondary psychopathy, and CU traits were examined in relation to behavioral characteristics that have previously been linked to psychopathic characteristics. Higher levels of psychopathic characteristics were associated with more behavioral problems, including aggression and delinquency, as well as sensation seeking—a finding that is robustly supported by previous research (e.g., Blair, 2005; Frick & White, 2008). However, the cross-sectional design for these tests of convergent and discriminant validity may limit the meaningfulness of these associations and future research should prospectively and longitudinally examine these associations to provide stronger support.

Only partial support was found for associations with emotional characteristics, however. Higher levels of secondary psychopathy was associated with increased anxiety, as expected based on previous research (Karpman, 1948; Newman et al., 2005), but the lack of negative association with primary psychopathy or CU traits was surprising. Previous research suggests that individuals with high levels of primary psychopathy or CU traits often demonstrate anxiety levels that are unusually low, which perhaps explains these individuals' inability to learn from experience or feel emotions such as guilt or remorse (Cleckley, 1976; Hare, 1991). Given that significant research on psychopathy has utilized clinical or forensic samples, the lack of association in the present study may be indicative of range restriction

for psychopathy or anxiety when these characteristics are examined in a community sample. Further research is needed to fully understand the relationship between these constructs.

The numerous interactions identified between psychopathic characteristics and sex and race/ethnicity suggest that despite the measurement invariance of the LSRP and ICU, some associated characteristics differ across demographic groups. The majority of these relationships remained in the expected directions despite the significant interaction effects, with the exception of primary psychopathy and anxiety. When probed, this moderation analysis revealed that for boys, primary psychopathy was associated with *lower* levels of anxiety, but for girls, primary psychopathy was associated with *higher* levels of anxiety. Thus, when examined separately by sex, results with boys in the sample replicated previous literature suggesting that primary psychopathy is associated with lower anxiety than usual (Karpman, 1948; Newman et al., 2005), but the surprising finding for girls suggests that more research is needed to fully understand the manifestation of psychopathy among adolescent girls.

One particularly promising finding from these results suggests that the LSRP does not interact with race/ethnicity when examined in relation to these emotional and behavioral characteristics. Thus, for Hispanic and Black youths, scores on this measure may reliably predict areas that may be important targets for intervention or treatment. In addition, given that these associations are similar to those found with previous research, which has focused primarily on White samples; this finding suggests that score interpretations on the LSRP may be similarly valid across all three racial/ethnic groups.

Despite these important findings, several limitations must be noted. First, this study sample did not allow for a comparison of measurement invariance between White, Hispanic, and Black youth, because of the small number of White youth in the sample for the larger study. As mentioned previously, the majority of research examining the validity of scores on the LSRP and the ICU was conducted with predominantly White samples. In the present study, whereas findings suggest that these measures demonstrate configural and metric invariance among Hispanic and Black youth, we cannot determine whether they are also invariant across the White participants in the sample. Thus, these findings regarding measurement invariance of the LSRP and ICU cannot be assumed to be generalizable to White samples of youth.

Second, this study utilized a community sample to examine a clinical outcome. The present sample provided scores that were relatively normally distributed across the two measures used to assess youth psychopathic characteristics, indicating that youths within this sample varied in their levels of primary and secondary psychopathy and CU traits. It is not clear, however, whether any of these participants reached clinical levels of psychopathy, given that these measures were designed for use with community samples and are not intended for use with clinical or incarcerated populations (Frick, 2004; Levenson et al., 1995). Therefore, the present study does not provide support for the use of the LSRP or ICU among girls or racially/ethnically diverse youth within clinical or incarcerated settings.

Third, although the measures included in the present study addressed the measurement invariance across a number of psychopathic characteristics, the LSRP and ICU neglect to address characteristics that some researchers consider to be important components to a complete conceptualization of psychopathy, including fearlessness-dominance and boldness (Patrick, Fowles, & Krueger, 2009). Although beyond the scope of this article, the debate over how psychopathy is defined warrants noting, given its relevance to assessment criteria. Given the relatively limited scope of the LSRP and ICU, focusing only on these measures may represent a weakness for studies attempting to assess the full constellation of features of psychopathy. Regardless, the present study suggests that these measures may still be useful in identifying additional risk among youth with emotional or behavioral problems that have previously been related to psychopathic characteristics. The inclusion of a measure of CU traits, which have consistently been identified as the most important characteristic for designating individuals with particularly severe and violent antisocial behavior (Hemphill, 2007; Christian, Frick, Hill, Tyler, & Frazer, 1997; Frick & White, 2008), allows for a focus on a feature of psychopathy that is particularly relevant to intervention and treatment planning.

Finally, this study utilized data that were part of the last wave of a prospective, longitudinal study, meaning that participants were only those who could be traced and were willing to be interviewed 7 years after participating in the initial intervention. These participants may be in some way unique from participants who attributed in previous data collection waves of the study. Although attrition analyses demonstrated that the proportion of males and females and of Hispanic and Black youth in the present sample did not differ significantly from that of the overall sample who enrolled in the study at the first wave, it may be that these youth differed in ways that would affect their scores on measures such as the LSRP or ICU. If sampling bias did occur because of participants with more psychopathic characteristics dropping out of the study, this might have resulted in a restricted range of responses on these measures, which may have impacted the distribution of data and, therefore, the conclusions from the invariance analyses and examinations of convergent and discriminant validity. In addition, the aural administration of the items on these paper-and-pencil measures may have further contributed to range restriction if participants were at all driven by social desirability.

Replication of the multigroup invariance analyses and analyses of convergent and discriminant validity is needed with clinical and forensic samples, in addition to other community samples, to address the limitations within this study. Another approach to testing measurement invariance across groups involves the use of item response theory (IRT) techniques to examine the extent to which measurement items respond similarly across groups. IRT posits more stringent constraints than CFA when examining measurement equivalence across multiple groups by focusing on additional parameters (Reise, Widaman, & Pugh, 1993) and should be considered in future research that seeks to further examine the validity of measures such as the LSRP and ICU. In the present study, however, IRT techniques were not utilized because of the relatively small sample size (IRT requires ~500–1,000 participants per group, although estimations vary; Gao & Chen, 2005) and the Likert-type response scales of the LSRP and ICU would require a more complex, polytomous model (Penfield, 2014) further emphasizing the need for a larger sample size (Bond & Fox, 2007; Morizot, Ainsworth, & Reise, 2007). Regardless, findings from the present study

provide important information regarding the validity of scores on the LSRP and ICU with diverse community samples of adolescents and may be useful in identification of youths who can benefit from treatment. Future research may also consider examining the invariance of such measures longitudinally across the life span so that early interventions may be developed to address developmental trajectories for at-risk youth.

References

Arbuckle, JL. Amos 5.0. Chicago, IL: SPSS; 2003.

Blair RJR. Applying a cognitive neuroscience perspective to the disorder of psychopathy. Development and Psychopathology. 2005; 17:865–891. http://dx.doi.org/10.1017/S0954579405050418. [PubMed: 16262996]

Bolt DM, Hare RD, Neumann CS. Score metric equivalence of the Psychopathy Checklist–Revised (PCL-R) across criminal offenders in North America and the United Kingdom: A critique of Cooke, Michie, Hart, and Clark (2005), and new analyses. Assessment. 2007; 14:44–56. http://dx.doi.org/10.1177/1073191106293505. [PubMed: 17314179]

Bond, TG., Fox, CM. Applying the Rasch model: Fundamental measurement in the human sciences. 2. Mahwah, NJ: Erlbaum; 2007.

Cale EM, Lilienfeld SO. Sex differences in psychopathy and antisocial personality disorder. A review and integration. Clinical Psychology Review. 2002; 22:1179–1207. http://dx.doi.org/10.1016/S0272-7358(01)00125-8. [PubMed: 12436810]

Cheung GW, Rensvold RB. Evaluating goodness-of-fit indexes for testing measurement invariance. Structural Equation Modeling. 2002; 9:233–255. http://dx.doi.org/10.1207/S15328007SEM0902_5.

Christian RE, Frick PJ, Hill NL, Tyler L, Frazer DR. Psychopathy and conduct problems in children: II. Implications for subtyping children with conduct problems. Journal of the American Academy of Child & Adolescent Psychiatry. 1997; 36:233–241. http://dx.doi.org/10.1097/00004583-199702000-00014. [PubMed: 9031576]

Cleckley, H. The mask of sanity. 5. St. Louis, MO: Mosby; 1976.

Coldwell J, Pike A, Dunn J. Household chaos: Links with parenting and child behaviour. Journal of Child Psychology and Psychiatry. 2006; 47:1116–1122. http://dx.doi.org/10.1111/j.1469-7610.2006.01655.x. [PubMed: 17076750]

Cooke DJ, Kosson DS, Michie C. Psychopathy and ethnicity: Structural, item, and test generalizability of the Psychopathy Checklist-Revised (PCL-R) in Caucasian and African American Participants. Psychological Assessment. 2001; 13:531–542. http://dx.doi.org/10.1037/1040-3590.13.4.531. [PubMed: 11793896]

Cooke DJ, Michie C. Psychopathy across cultures: North America and Scotland compared. Journal of Abnormal Psychology. 1999; 108:58–68. http://dx.doi.org/10.1037/0021-843X.108.1.58. [PubMed: 10066993]

Cooke DJ, Michie C, Hart SD, Clark D. Assessing psychopathy in the UK: Concerns about cross-cultural generalisability. The British Journal of Psychiatry. 2005; 186:335–341. http://dx.doi.org/10.1192/bjp.186.4.335. [PubMed: 15802692]

Dadds MR, Fraser J, Frost A, Hawes DJ. Disentangling the underlying dimensions of psychopathy and conduct problems in childhood: A community study. Journal of Consulting and Clinical Psychology. 2005; 73:400–410. http://dx.doi.org/10.1037/0022-006X.73.3.400. [PubMed: 15982138]

DeCarlo LT. On the meaning and use of kurtosis. Psychological Methods. 1997; 2:292–307. http://dx.doi.org/10.1037/1082-989X.2.3.292.

Dodge KA. A social information processing model of social competence in children. Minnesota Symposia on Child Psychology. 1986; 18:77–125.

Dolan M. Psychopathic personality in young people. Advances in Psychiatric Treatment. 2004; 10:466–473. http://dx.doi.org/10.1192/apt.10.6.466.

Horan et al.

Page 17

Edens JF, Skeem JL, Cruise KR, Cauffman E. Assessment of "juvenile psychopathy" and its association with violence: A critical review. Behavioral Sciences & the Law. 2001; 19:53–80. http://dx.doi.org/10.1002/bsl.425. [PubMed: 11241681]

Essau CA, Sasagawa S, Frick PJ. Callous-unemotional traits in a community sample of adolescents. Assessment. 2006; 13:454–469. http://dx.doi.org/10.1177/1073191106287354. [PubMed: 17050915]

Falkenbach D, Poythress N, Falki M, Manchak S. Reliability and validity of two self-report measures of psychopathy. Assessment. 2007; 14:341–350. http://dx.doi.org/10.1177/1073191107305612. [PubMed: 17986652]

Farrington, DP., Loeber, R. Transatlantic replicability of risk factors in the development of delinquency. In: Cohen, P.Slomkowski, C., Robins, LI., editors. Historical and geographical influences on psychopathology. Mahwah, NJ: Erlbaum; 1998. p. 299-329.

Forth, AE., Kosson, DS., Hare, RD. Hare Psychopathy Checklist: Youth Version (PCL: YV). Toronto, ON: Multi-Health Systems; 2003.

Frick, PJ. Unpublished rating scale. The University of New Orleans; New Orleans, LA: 2004. The inventory of callous-unemotional traits.

Frick PJ, Bodin SD, Barry CT. Psychopathic traits and conduct problems in community and clinic-referred samples of children: Further development of the psychopathy screening device. Psychological Assessment. 2000; 12:382–393. http://dx.doi.org/10.1037/1040-3590.12.4.382. [PubMed: 11147105]

Frick, PJ., Hare, RD. Antisocial process screening device: APSD. Toronto: Multi-Health Systems; 2001.

Frick PJ, Kimonis ER, Dandreaux DM, Farell JM. The 4 year stability of psychopathic traits in non-referred youth. Behavioral Sciences & the Law. 2003; 21:713–736. http://dx.doi.org/10.1002/bsl.568. [PubMed: 14696028]

Frick PJ, White SF. Research review: The importance of callous-unemotional traits for developmental models of aggressive and antisocial behavior. Journal of Child Psychology and Psychiatry. 2008; 49:359–375. http://dx.doi.org/10.1111/j.1469-7610.2007.01862.x. [PubMed: 18221345]

Furrer C, Skinner E. Sense of relatedness as a factor in children's academic engagement and performance. Journal of Educational Psychology. 2003; 95:148–162. http://dx.doi.org/10.1037/0022-0663.95.1.148.

Gao F, Chen L. Bayesian or non-Bayesian: A comparison study of item parameter estimation in the three-parameter logistic model. Applied Measurement in Education. 2005; 18:351–380. http://dx.doi.org/10.1207/s15324818ame1804_2.

Hare, RD. The Hare Psychopathy Checklist-Revised. Toronto: Multi-health Systems. Multi-Health Systems; 1991.

Hauck-Filho N, Teixeira MAP. Revisiting the psychometric properties of the Levenson self-report psychopathy scale. Journal of Personality Assessment. 2014; 96:459–464. http://dx.doi.org/10.1080/00223891.2013.865196. [PubMed: 24341676]

Hemphälä M, Tengström A. Associations between psychopathic traits and mental disorders among adolescents with substance use problems. British Journal of Clinical Psychology. 2010; 49:109–122. http://dx.doi.org/10.1348/014466509X439216. [PubMed: 19457274]

Hemphill, JF. The Hare Psychopathy Checklist and recidivism: Methodological issues and critically evaluating empirical evidence. In: Herve, H., Yuille, JC., editors. The psychopath: Theory, research, and practice. Mahwah, NJ: Erlbaum; 2007. p. 141-170.

Hicks BM, Markon KE, Patrick CJ, Krueger RF, Newman JP. Identifying psychopathy subtypes on the basis of personality structure. Psychological Assessment. 2004; 16:276–288. http://dx.doi.org/10.1037/1040-3590.16.3.276. [PubMed: 15456383]

Hu L, Bentler PM. Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. Psychological Methods. 1998; 3:424–453. http://dx.doi.org/10.1037/1082-989X.3.4.424.

Johnston, LD., Bachman, JG., O'Malley, PM. Monitoring the future project. University of Michigan; 1991. Unpublished data

Jones S, Cauffman E, Miller JD, Mulvey E. Investigating different factor structures of the psychopathy checklist: Youth version: Confirmatory factor analytic findings. Psychological Assessment. 2006; 18:33–48. http://dx.doi.org/10.1037/1040-3590.18.1.33. [PubMed: 16594810]

Karpman B. Conscience in the psychopath; another version. American Journal of Orthopsychiatry. 1948; 18:455–491. http://dx.doi.org/10.1111/j.1939-0025.1948.tb05109.x. [PubMed: 18872375]

Kimonis ER, Frick PJ, Skeem JL, Marsee MA, Cruise K, Munoz LC, … Morris AS. Assessing callous-unemotional traits in adolescent offenders: Validation of the Inventory of Callous-Unemotional Traits. International Journal of Law and Psychiatry. 2008; 31:241–252. http://dx.doi.org/10.1016/j.ijlp.2008.04.002. [PubMed: 18514315]

Levenson MR, Kiehl KA, Fitzpatrick CM. Assessing psychopathic attributes in a noninstitutionalized population. Journal of Personality and Social Psychology. 1995; 68:151–158. http://dx.doi.org/10.1037/0022-3514.68.1.151. [PubMed: 7861311]

Loeber R, Dishion T. Early predictors of male delinquency: A review. Psychological Bulletin. 1983; 94:68–99. http://dx.doi.org/10.1037/0033-2909.94.1.68. [PubMed: 6353467]

Lynam DR. Early identification of chronic offenders: Who is the fledgling psychopath? Psychological Bulletin. 1996; 120:209–234. [PubMed: 8831297]

Lynam DR, Gudonis L. The development of psychopathy. Annual Review of Clinical Psychology. 2005; 1:381–407. http://dx.doi.org/10.1146/annurev.clinpsy.1.102803.144019.

Lynam DR, Whiteside S, Jones S. Self-reported psychopathy: A validation study. Journal of Personality Assessment. 1999; 73:110–132. http://dx.doi.org/10.1207/S15327752JPA730108. [PubMed: 10497804]

McCord, W., McCord, J. The psychopath: An essay on the criminal mind. Princeton, NJ: Van Nostrand; 1964.

Meredith W, Teresi JA. An essay on measurement and factorial invariance. Medical Care. 2006; 44(Suppl 3):S69–S77. http://dx.doi.org/10.1097/01.mlr.0000245438.73837.89. [PubMed: 17060838]

Miller JD, Gaughan ET, Pryor LR. The Levenson Self-Report Psychopathy scale: An examination of the personality traits and disorders associated with the LSRP factors. Assessment. 2008; 15:450–463. http://dx.doi.org/10.1177/1073191108316888. [PubMed: 18480502]

Mokros A, Neumann CS, Stadtland C, Osterheider M, Nedopil N, Hare RD. Assessing measurement invariance of PCL-R assessments from file reviews of North American and German offenders. International Journal of Law and Psychiatry. 2011; 34:56–63. http://dx.doi.org/10.1016/j.ijlp.2010.11.009. [PubMed: 21122915]

Morizot, J., Ainsworth, AT., Reise, SP. Toward modern psychometrics: Application of item response theory models in personality research. In: Robins, RW.Fraley, RC., Krueger, RF., editors. Handbook of research methods in personality psychology. New York, NY: Guilford Press; 2007. p. 407-423.

Muñoz LC, Frick PJ, Kimonis ER, Aucoin KJ. Types of aggression, responsiveness to provocation, and callous-unemotional traits in detained adolescents. Journal of Abnormal Child Psychology. 2008; 36:15–28. http://dx.doi.org/10.1007/s10802-007-9137-0. [PubMed: 17882544]

Muthén, LK. Confirmatory factor analysis [Msg 2]. 2012 Jun 18. Message posted to www.statmodel.com/discussion/messages/9/9960.htlm?1340029367

Neumann CS, Schmitt DS, Carter R, Embley I, Hare RD. Psychopathic traits in females and males across the globe. Behavioral Sciences & the Law. 2012; 30:557–574. http://dx.doi.org/10.1002/bsl.2038. [PubMed: 22996170]

Newman JP, MacCoon DG, Vaughn LJ, Sadeh N. Validating a distinction between primary and secondary psychopathy with measures of Gray's BIS and BAS constructs. Journal of Abnormal Psychology. 2005; 114:319–323. http://dx.doi.org/10.1037/0021-843X.114.2.319. [PubMed: 15869363]

Nicholls TL, Petrila J. Gender and psychopathy: An overview of important issues and introduction to the special issue. Behavioral Sciences & the Law. 2005; 23:729–741. http://dx.doi.org/10.1002/bsl.677. [PubMed: 16333811]

O'Leary MM, Loney BR, Eckel LA. Gender differences in the association between psychopathic personality traits and cortisol response to induced stress. Psychoneuroendocrinology. 2007; 32:183–191. http://dx.doi.org/10.1016/j.psyneuen.2006.12.004. [PubMed: 17289279]

Patrick CJ, Fowles DC, Krueger RF. Triarchic conceptualization of psychopathy: Developmental origins of disinhibition, boldness, and meanness. Development and Psychopathology. 2009; 21:913–938. http://dx.doi.org/10.1017/S0954579409000492. [PubMed: 19583890]

Penfield RD. An NCME instructional module on polytomous item response theory models. Educational Measurement: Issues and Practice. 2014; 33:36–48.

Poythress NG, Dembo R, Wareham J, Greenbaum PE. Construct validity of the Youth Psychopathic Traits Inventory (YPI) and the Antisocial Process Screening Device (APSD) with justice-involved adolescents. Criminal Justice and Behavior. 2006; 33:26–55. http://dx.doi.org/10.1177/0093854805282518.

Reise SP, Widaman KF, Pugh RH. Confirmatory factor analysis and item response theory: Two approaches for exploring measurement invariance. Psychological Bulletin. 1993; 114:552–566. http://dx.doi.org/10.1037/0033-2909.114.3.552. [PubMed: 8272470]

Reynolds, CR., Kamphaus, RW. Behavioral assessment system for children. Circle Pines, MN: American Guidance Service Inc; 1998.

Rogstad JE, Rogers R. Gender differences in contributions of emotion to psychopathy and antisocial personality disorder. Clinical Psychology Review. 2008; 28:1472–1484. http://dx.doi.org/10.1016/j.cpr.2008.09.004. [PubMed: 18945529]

Roose A, Bijttebier P, Decoene S, Claes L, Frick PJ. Assessing the affective features of psychopathy in adolescence: A further validation of the inventory of callous and unemotional traits. Assessment. 2010; 17:44–57. http://dx.doi.org/10.1177/1073191109344153. [PubMed: 19797326]

Salekin RT, Rogers R, Machin D. Psychopathy in youth: Pursuing diagnostic clarity. Journal of Youth and Adolescence. 2001; 30:173–195. http://dx.doi.org/10.1023/A:1010393708227.

Salihovic S, Özdemir M, Kerr M. Trajectories of adolescent psychopathic traits. Journal of Psychopathology and Behavioral Assessment. 2014; 36:47–59.

Sandoval J, Echandia A. Behavior assessment system for children. Journal of School Psychology. 1994; 32:419–425. http://dx.doi.org/10.1016/0022-4405(94)90037-X.

Schermelleh-Engel K, Moosbrugger H, Muller H. Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. Methods of Psychological Research. 2003; 8:23–74.

Schrum CL, Salekin RT. Psychopathy in adolescent female offenders: An item response theory analysis of the psychopathy checklist: Youth version. Behavioral Sciences & the Law. 2006; 24:39–63. http://dx.doi.org/10.1002/bsl.679. [PubMed: 16491478]

Seagrave D, Grisso T. Adolescent development and the measurement of juvenile psychopathy. Law and Human Behavior. 2002; 26:219–239. http://dx.doi.org/10.1023/A:1014696110850. [PubMed: 11985299]

Sellbom M. Elaborating on the construct validity of the Levenson self-report psychopathy scale in incarcerated and non-incarcerated samples. Law and Human Behavior. 2011; 35:440–451. http://dx.doi.org/10.1007/s10979-010-9249-x. [PubMed: 20953972]

Skeem JL, Edens JF, Camp J, Colwell LH. Are there ethnic differences in levels of psychopathy? A meta-analysis. Law and Human Behavior. 2004; 28:505–527. http://dx.doi.org/10.1023/B:LAHU.0000046431.93095.d8. [PubMed: 15638207]

Skeem JL, Polaschek DL, Patrick CJ, Lilienfeld SO. Psychopathic personality: Bridging the gap between scientific evidence and public policy. Psychological Science in the Public Interest. 2011; 12:95–162. http://dx.doi.org/10.1177/1529100611426706. [PubMed: 26167886]

Tabachnick, BG., Fidell, LS. Using multivariate statistics. 5. Boston, MA: Pearson Education, Inc; 2007.

Vaughn MG, Edens JF, Howard MO, Smith ST. An investigation of primary and secondary psychopathy in a statewide sample of incarcerated youth. Youth Violence and Juvenile Justice. 2009; 7:172–188. http://dx.doi.org/10.1177/1541204009333792.

Verona, E., Sadeh, N., Javdani, S. The influences of gender and culture on child and adolescent psychopathy. In: Salekin, RT., Lynam, DR., editors. Handbook of child and adolescent psychopathy. New York, NY: Guilford Press; 2010. p. 202-230.

Vitale JE, Smith SS, Brinkley CA, Newman JP. The reliability and validity of the Psychopathy Checklist-Revised in a sample of female offenders. Criminal Justice and Behavior. 2002; 29:202–231. http://dx.doi.org/10.1177/0093854802029002005.

Walsh Z, Allen LC, Kosson DS. Beyond social deviance: Substance use disorders and the dimensions of psychopathy. Journal of Personality Disorders. 2007; 21:273–288. http://dx.doi.org/10.1521/pedi.2007.21.3.273. [PubMed: 17536940]

Wu AD, Li Z, Zumbo BD. Decoding the meaning of factorial invariance and updating the practice of multi-group confirmatory factor analysis: A demonstration with TIMSS data. Practical Assessment, Research & Evaluation. 2007; 12:1–26.

Table 1

Scale/Subscale Means and Standard Deviations (SDs)L by Sex, Race/Ethnicity, and for the Total Sample

	Sex		Race/ethnicity			Total sample
	Female	Male	Hispanic	Black		
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*		*M (SD)*
N	175	180	175	180		355
Age	15.10 (0.71)	15.10 (0.67)	15.05 (0.73)	15.15 (0.65)		15.09 (0.69)
LSRP total score	54.82 (9.17)	55.52 (10.28)	55.14 (10.24)	55.21 (9.26)		54.85 (9.78)
Primary psychopathy	32.51 (6.57)	33.80 (7.07)	33.07 (6.93)	33.25 (6.80)		32.92 (6.92)
Secondary psychopathy	22.30 (4.60)	21.69 (4.93)	22.03 (4.90)	21.96 (4.66)		21.91 (4.77)
ICU total score	22.14 (7.56)	23.50 (7.93)	22.51 (7.49)	23.13 (8.03)		22.56 (7.62)
Unemotional	5.36 (2.10)	5.83 (2.27)	5.50 (2.27)	5.70 (2.13)		5.60 (2.20)
Callousness	5.27 (3.94)	5.36 (3.88)	5.45 (3.89)	5.18 (3.93)		5.21 (3.82)
Uncaring	11.50 (3.06)	12.17 (3.19)	11.48 (2.95)	12.18 (3.28)		11.67 (3.10)

Note. LSRP = Levenson Self-Report Psychopathy Scale; ICU = Inventory of Callous-Unemotional Traits. There were no significant differences by sex or race/ethnicity in age or scores on the LSRP or ICU.

Table 2

Correlations Between the LSRP and ICU Scales and Subscales

	1	2	3	4	5	6	7
1. LSRP total score							
2. Primary psychopathy	.891 ***						
3. Secondary psychopathy	.759 ***	.380 ***					
4. ICU total score	.304 ***	.248 ***	.262 ***				
5. Unemotional	.156 **	.144 **	.107 *	.771 ***			
6. Callousness	.285 ***	.210 ***	.276 ***	.883 ***	.554 ***		
7. Uncaring	.285 ***	.249 ***	.224 ***	.828 ***	.510 ***	.550 ***	

Note. LSRP = Levenson Self-Report Psychopathy Scale; ICU = Inventory of Callous-Unemotional Traits.

*
  $p < .05$.

**
  $p < .01$.

***
  $p < .001$.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 3

Goodness-of-Fit Indices for the Sex and Racial/Ethnic Configural and Metric Invariance Models for the Two-Factor LSRP

	χ^2	df	χ^2/df	CFI	RMSEA [90% CI]	χ^2	df	p < .01	CFI
Total sample CFA	707.26	298	2.37	.749	.059 [.054, .065]	—	—	—	—
Sex invariance									
Model 1: Configural invariance	1077.51	596	1.81	.714	.046 [.041, .050]	—	—	—	—
Model 2: Metric invariance	1102.95	620	1.78	.713	.045 [.040, .049]	25.44	24	No	.001
Racial/ethnic invariance									
Model 1: Configural invariance	1056.55	596	1.77	.693	.047 [.042, .051]	—	—	—	—
Model 2: Metric invariance	1075.72	620	1.74	.696	.046 [.041, .050]	19.17	24	No	.003

Note. LSRP = Levenson Self-Report Psychopathy Scale; CFI = comparative fit index; CI = confidence interval; CFA = confirmatory factor analysis.

Table 4

Main and Interaction Effects of the Levenson Self-Report Psychopathy Scale (LSRP) on Emotional and Behavioral Characteristics

	Total scale			Primary			Secondary		
	Main effect β	Sex interaction β	Race/ethnicity interaction β	Main effect β	Sex interaction β	Race/ethnicity interaction β	Main effect β	Sex interaction β	Race/ethnicity interaction β
Anxiety symptoms	.22***	.76*	−.20	.05	.67**	−.08	.37***	.24	−.14
Hostile attribution bias	.30***	.44	.31	.31***	.52*	.19	.17**	−.11	.02
Behavioral engagement									
Positive	−.45***	−.16	.11	−.35***	−.01	.16	−.43***	−.05	.33
Negative	.43***	−.14	.38	.30***	−.18	.12	.45***	−.21	.27
Aggression	.15**	−.32	−.01	.12*	.03	−.13	.14*	−.65	.04
Delinquency	.34***	−.03	.13	.24***	−.01	.07	.36***	−.20	−.12
Risky substance use	.19***	−.36	−.09	.09	−.28	−.07	.26***	−.31	−.20
Sensation seeking	.26***	−.15	−.22	.16**	−.22	−.16	.31***	−.08	−.35

*
  $p < .05$.

**
  $p < .01$.

***
  $p < .001$.

Table 5

Goodness-of-Fit Indices for the Sex and Racial/Ethnic Configural and Metric Invariance Models for the Three-Factor Bifactor ICU

	χ^2	df	χ^2/df	CFI	RMSEA [90% CI]	χ^2	df	p < .01	CFI
Total sample CFA	572.83	228	2.51	.857	.062 [.056, .069]	—	—	—	—
Sex invariance									
Model 1: Configural invariance	829.08	456	1.82	.848	.046 [.041, .051]	—	—	—	—
Model 2: Metric invariance	875.74	500	1.75	.847	.044 [.039, .049]	46.66	44	No	.001
Racial/ethnic invariance									
Model 1: Configural invariance	907.21	456	1.99	.818	.053 [.048, .058]	—	—	—	—
Model 2: Metric invariance	968.31	500	1.94	.811	.052 [.047, .056]	61.10	44	No	.007

Note. ICU = Inventory of Callous-Unemotional Traits; CFI = comparative fit index; CFA = confirmatory factor analysis.

Table 6

Main and Interaction Effects of the Inventory of Callous–Unemotional Traits (ICU) on Emotional and Behavioral Characteristics

	Total scale			Uncaring			Callous			Unemotional		
	Main effect β	Sex int β	R/eth int β	Main effect β	Sex int β	R/eth int β	Main effect β	Sex int β	R/eth int β	Main effect β	Sex int β	R/eth int β
Anxiety symptoms	-.01	-.16	.06	-.03	-.18	.05	.02	-.13	.13	-.03	.01	-.14
Hostile attributions bias	.24 ***	.33	.04	.18 **	.37	.06	.23 ***	.22 *	.03	.19 **	.10	.20
Behavioral engagement												
Positive	-.26 ***	.30	.15	-.26 ***	.21	.30	-.24 ***	.18	.13	-.14 *	.31 *	-.16
Negative	.13 *	-.25	-.20	.11	-.19	-.52	.16 **	-.14	-.14	.03	-.24	.24
Aggression	.52 ***	-.13	.45 *	.53 ***	.09	.33	.44 ***	-.16	.48 **	.34 ***	.15	.49 *
Delinquency	.24 ***	-.41 *	-.27	.22 ***	-.27	-.71 *	.25 ***	-.26 *	-.07	.10	-.39 *	.08
Risky substance use	.21 ***	-.44 **	-.50 *	.21 ***	-.31	-.78 **	.22 ***	-.30 **	-.27	.07	-.36 *	-.17
Sensation seeking	.11 *	-.10	-.29	.18 **	-.13	-.52	.08	-.03	-.23	.00	-.12	.06

Note. Int = interaction; r/eth = race/ethnicity.

*
$p < .05$.

**
$p < .01$.

***
$p < .001$.