

# Assessment of the Affective Dimensions of Psychopathy with the Danish version of the Inventory of Callous-Unemotional Traits among Incarcerated Boys: A study of Reliability, Criterion Validity, and Construct Validity

Mickey T. Kongerslev<sup>1\*</sup>, Sune Bo<sup>1</sup>, Adelle E. Forth<sup>2</sup>, Erik Simonsen<sup>1,3</sup>

<sup>1</sup>Psychiatric Research Unit, Region Zealand, Denmark

<sup>2</sup>Department of Psychology, Carleton University, Ottawa, ON, Canada

<sup>3</sup>Institute of Clinical Medicine, Faculty of Health and Medical Sciences, University of Copenhagen, Denmark

\*Corresponding author: [psymtk@mc.com](mailto:psymtk@mc.com)

## Abstract

**Background:** Callous-unemotional (CU) traits have been found to index an important subgroup of antisocial youth who are at high risk for developing psychopathic personality pathology, and for becoming severe and persistent offenders. On the basis of such research findings, the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*, have included a “with limited prosocial emotions” specifier in the diagnostic criteria for conduct disorder to designate a subtype with high levels of CU traits. This creates the need for psychometrically sound measures for the assessment of these traits. The self-report questionnaire Inventory of Callous-Unemotional Traits (ICU) was designed to provide an efficient, reliable, and valid measure of CU traits among youth populations.

**Method:** Eighty Danish adolescent boys between the ages of 15 to 18 years in secure institutions were assessed concurrently with the ICU, the Psychopathy Checklist: Youth Version (PCL:YV), self-report measures of aggression and empathy, and ratings of psychosocial problems. Approximately nine days later, the ICU was readministered in a subset of the sample ( $n = 40$ ) to examine test-retest reliability.

**Results:** Internal consistency was satisfactory, and test-retest reliability was excellent. Concurrent validity associations with the PCL:YV ranged from moderate to high. The ICU displayed excellent discriminative validity for identifying persons who displayed high levels of psychopathic traits. CU traits were also found to be associated with psychosocial impairments, aggression, and reduced empathy.

**Conclusions:** Overall, these findings support the reliability; construct validity, and criterion validity of the ICU.

**Keywords:** callous-unemotional traits; psychometric; psychopathy; PCL:YV; conduct disorder; with limited prosocial emotions, personality disorder

## Introduction

### Background

A growing research base supports the notion that the presence of callous-unemotional (CU) traits (e.g., lack of remorse, guilt, or empathy; lack of concern about performance; shallow or deficient affect) is a promising construct for designating a distinct subgroup of conduct-disordered youth who tend to show the most severe, aggressive, and stable patterns of antisocial behaviors (1-4). Available

longitudinal follow-up studies indicate that CU traits are relatively stable during childhood (5,6) and from childhood into early adolescence (7,8) and that they are predictive of later antisocial behavior (2), clinical severity (9), and future psychiatric difficulties (10). Studies furthermore suggest that high levels of CU traits during adolescence are associated with psychopathy in adulthood (11-13). Together these findings also support the notion that CU traits

constitute the core affective features of the psychopathy (14-18).

Current empirical evidence suggests that CU traits are highly heritable (19) and associated with deficits in emotional empathy in boys (20), processing of negative emotional stimuli (21-23), a proclivity for proactive and instrumental aggression (24), low levels of anxiety and fearful inhibition (25,26), and decreased sensitivity to punishment cues and reward-oriented response styles (27,28); these findings are consistent with research on psychopathy in adulthood. Furthermore, studies suggest that high-levels of CU traits are associated with differential and oftentimes poorer responses to typical parenting practices (29-33) and psychotherapeutic treatments (34,35).

On the basis of this research, the construct of CU traits is important to the legal and mental health systems, because it seems to help with the identification of a subgroup of severely antisocial and conduct-disordered youth who are at heightened risk of developing psychopathic personality pathology in adulthood, who are more likely to reoffend, and who have unique treatment requirements (36,37). Moreover, from a theoretical and research perspective, CU traits are valuable for understanding the developmental psychopathology of antisocial behaviors and psychopathy, including early precursor signs and symptoms, course, stability and malleability, risk and protective factors (38,39), links with research on conscience development and temperament (40), and social cognition (41-44).

### ***Psychopathy and Callous-Unemotional Traits***

The relationship between CU traits and psychopathy is not surprising, considering that the concept of CU traits historically emerged from research into the latent factor structure of psychopathy (45-47) and the downward extension of this construct to include children and adolescents in an effort to investigate the developmental origins of adult psychopathy (27,48). Although the number and content of latent dimensions underlying the construct of psychopathy are still debated (17,49), CU traits have consistently emerged as an underlying factor across studies, samples, and measures and as distinct from other factors (e.g., impulsivity, antisocial behavior, narcissism) of psychopathy (16,47,48,50-52). Indeed, in latent variable analyses of the Psychopathy Checklist: Youth Version (PCL:YV) (53) and the Psychopathy Checklist-Revised (PCL-R) (54), the affective factor, which specifically measures CU traits, has, on average, the strongest set of factor loadings, thereby highlighting the prominence of these traits in the overall conceptualization of psychopathy (46).

### ***Callous-Unemotional Traits in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition***

Given the strong evidence in support of the clinical importance of CU traits, this construct has recently been included in the current edition of the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5) (55) as a specifier to allow for subtyping of the conduct disorder diagnosis on the basis of the presence of CU traits. Specifically, individuals who meet the full diagnostic criteria for a conduct disorder diagnosis and who also meet two or more of four characteristics of CU traits can be designated with the specifier “with limited prosocial emotions.” The four CU characteristics that are evaluated are as follows: 1) lack of remorse or guilt; 2) callous lack of empathy; 3) unconcerned about performance in important activities; and 4) shallow or deficient affect. With the inclusion of CU traits within the official diagnostic system, it can be expected that there will be a rise in the assessment of CU traits in both research and applied settings. Hence, the development and psychometric evaluation of assessment instruments of CU traits becomes all the more important.

### ***Assessment of Callous-Unemotional Traits***

With the inclusion of CU traits in the DSM-5 and given the evidence regarding the salience of CU traits for indexing psychopathy and understanding delinquent youth, there is a need for efficient, comprehensive, reliable, and valid measures of these traits that are suitable for use with both offender and community samples of youth. Although a number of measures for the assessment of psychopathy in children and adolescents are available (51,56,57), with respect to the assessment of CU traits, most of these measures include only a limited number of items, that specifically assess these traits, and have limited response options. Perhaps, this contributes to some of the psychometric shortcomings of some of these scales, such as relatively modest internal consistency (58) and restricted range of measurement (50). Furthermore, some of these measures are primarily suitable for use in offender samples; some are quite time-consuming and require specialist training to obtain reliable ratings (57). To overcome these challenges, the 24-item self-report Inventory of Callous-Unemotional Traits (ICU) (59) was developed to specifically assess CU traits in youth across offender, clinical, and community samples.

Studies of the factor structure of the ICU generally suggest that a bifactor structure fits the data best, with a general CU factor (the total scale) accounting for covariance among all items, and three subfactors (uncaring, callousness, and

unemotional) capturing unique patterns of covariance among subsets of the items (50,60-62). However, a recent study by Feilhauer and colleagues (63) failed to replicate this factor structure. Alpha coefficients for the ICU scales in past research have generally ranged from .77 to .89, thereby indicating acceptable reliability. In addition, the studies have provided evidence in support of the ICU's construct validity by demonstrating associations with delinquency, aggression, reduced empathy, various personality dimensions, and psychophysiological measures of emotional reactivity. These studies have also demonstrated differential associations between the ICU's three subscales and important external criteria, thereby elucidating how the different dimensions of CU traits are related to various aspects of personality functioning, psychopathology, and aggression (50,60-67). Overall, the ICU seems to have overcome some of the psychometric limitations of previous scales.

However, only a few studies have examined the criterion-related validity of the ICU as compared with established rater-based assessment instruments of psychopathy, which rely on semi-structured interviews in combination with collateral information (e.g., from parents, staff, and files). Although semi-structured interviews can be time-consuming and costly and may require the specialized training of interviewers, for the assessment of psychopathy, they are potentially important; they can be presumed to be less susceptible to malingering and impression management as compared with self-report questionnaires. That said, other researchers have argued in favor of self-report instruments for the assessment of psychopathic traits, considering that these are subjective traits and processes to which the individual might have better access. Yet, skepticism about the feasibility of self-report measures to assess psychopathic traits—especially among offender populations—is perhaps warranted and to some extent supported by research findings regarding their criterion-related validity. Correlations of self-report measures with interview-based measures such as the PCL:YV and the PCL-R, often lie within low to moderate range, and they have a tendency toward correlating more highly with the behavioral (impulsive and antisocial) features of psychopathy than with the interpersonal and affective (i.e., CU) features (51,57,68). Although it is still unclear whether such findings suggest that one method is more valid than the other or whether this is primarily the result of method variance or other unestablished variables, these results do highlight the need for further studies of the criterion-related validity of the ICU as compared

with established rater-based assessments of psychopathy.

Within both applied and research settings, the PCL:YV (53) has become one of the most commonly used measure of psychopathic traits among delinquent adolescents (69,70). This instrument combines a semi-structured interview with the integration of collateral information (from files and other relevant sources) to allow the administrator to rate the presence of psychopathic traits. From a theoretical perspective, one should expect the ICU to show good convergent and discriminative validity when using the PCL:YV as reference standard. However, to the best of our knowledge, currently only two studies have examined the validity of the ICU against the PCL:YV. The study by Fink and colleagues (70) investigated the validity associations of the ICU with the PCL:YV in a sample of incarcerated adolescent American boys and girls and found the scales to be only somewhat weakly correlated and to have no significant discriminative validity in terms of differentiating between high and low psychopathy groups as identified by the PCL:YV. The study by Feilhauer and colleagues (63) examined the relationship between the two instruments in a sample comprised of Dutch detained adolescents. In this study, the researchers reported very weak and non-significant associations between the ICU and the PCL:YV total scale.

### The Current Study

The current study was designed to examine the psychometric properties of the Danish ICU in a sample of incarcerated adolescent boys. To this end, the study had several specific aims. First, the reliability of the ICU was investigated in terms of internal consistency indices and test-retest reliability.

Second, because of the discrepancies in the results demonstrating weak to non-significant associations between the ICU and PCL:YV, the criterion-related validity of the ICU remains in question, especially for use with offender populations, where the labeling of young offenders as psychopathic could have negative consequences (71,72). Hence, we sought to further investigate the convergent validity of the ICU with the PCL:YV by examining correlations between the two instruments. We also examined the robustness of the potential relationship between the ICU and PCL:YV after controlling for other potential predictors of psychopathy, which have been described in the literature (53,62,66,73-75). In addition, we aimed to assess the discriminative validity of the ICU for identifying high versus low psychopathy groups as determined by the PCL:YV. On the basis of theoretical considerations and previous research, we

expected the ICU to show moderate convergent and discriminative validity for psychopathy in general and for the affective dimension in particular when using the PCL:YV as a reference standard.

Third, to assess construct validity, we examined associations between the ICU, self-reported measures of aggression and empathy, and expert ratings of psychosocial impairment. On the basis of previous research, we expected the ICU to be positively associated with aggression and psychosocial impairment and negatively with empathy.

Finally, because prior studies have had a tendency to confirm the three-factor structure of the ICU, we also examine and report the associations of these factors with the PCL:YV and other construct validity measures to identify potential differential associations.

## Method

### Participants

Participants were recruited consecutively from three secure institutions and a prison section for juvenile offenders in Denmark. Participants were considered eligible for the study if they were male, between 15 and 18 years old, remanded or sentenced, sufficiently fluent in Danish, and willing and able to give informed consent. Exclusion criteria included profound mental retardation, alcohol and substance intoxication or withdrawal symptoms on days of assessment, or productively psychotic on days of assessment. Staff approached eligible participants during times when the first author was visiting the sites. All participants were given verbal and written information regarding study aims and procedures, and informed consent was obtained in writing.

From August 2010 to November 2011, 127 young people were assessed for eligibility: 15 did not fulfill inclusion criteria, 5 met exclusion criteria, and 27 refused to participate. The final sample was comprised of 80 adolescent boys, as detailed elsewhere (76). The mean age of the sample was 16.5 years ( $SD = 0.8$ ). The majority of the participants were remanded ( $n = 67$ ; 84%), and the most common offenses were robbery ( $n = 49$ ; 61%) and assault ( $n = 18$ ; 23%). Approximately half of the participants ( $n = 39$ ; 49%) were descendants of immigrants or immigrants themselves, primarily from the Middle East, Northern Africa, and Europe. Thirty-six (45%) did not have any contact with the education system before their placement, and 51 (64%) came from single-parent households. According to the results of a structured diagnostic interview, the most common psychiatric diagnoses were conduct disorder ( $n = 61$ ; 76%), alcohol and substance abuse ( $n = 46$ ; 58%), attention deficit/hyperactivity disorder ( $n = 18$ ; 23%), anxiety

disorders ( $n = 14$ ; 18%), and mood disorders ( $n = 6$ ; 8%).

### Assessment Materials

*Inventory of Callous-Unemotional Traits.* The ICU (59) is a 24-item self-report questionnaire developed to assess CU traits. Each item is rated on a 4-point Likert scale ranging from 0 (“Not at all true”) to 3 (“Definitely true”). Twelve items require reverse scoring before the calculation of scale scores. Items can be summed to yield a total score. On the basis of factor analytic studies (50,62), three factors or subscales have generally emerged: uncaring (e.g., the reversed-scored item “I always try my best”), callousness (e.g., “I do not care who I hurt to get what I want”), and unemotional (e.g. “I hide my feelings from others”), which consists of 8, 11, and 5 items, respectively. The ICU is also available in parent- and teacher-rated formats, but in this study only the self-report version was used.

*Psychopathy Checklist: Youth Version.* The PCL:YV (53,77) is a 20-item clinical construct rating scale designed to assess psychopathic traits in youth between the ages of 12 and 18 years. The PCL:YV was adapted from the PCL-R (54). On the basis of a semi-structured interview and file reviews, each item is rated on a 3-point scale as either 0 (the item does not apply), 1 (the item applies to some extent), or 2 (the item applies to the youth). Scores on the 20 items can be summed to yield a dimensional score that ranges from 0 to 40 and measures the number and severity of psychopathic features present. The PCL:YV manual does not recommend any particular cut score for a categorical diagnosis of psychopathy, but previous research has used cut scores that have ranged from 20 to 30. In this study—consistent with other studies within the field (78,79)—we used a cut score of 25 on the PCL:YV for dividing the sample into two groups of high-scoring versus low-scoring participants.

The underlying factor structure of the PCL:YV is still under investigation, with studies finding support for various three- and four-factor models (47,80-82), thereby suggesting that the construct of psychopathy is essentially multidimensional. Given the unresolved nature of the underlying factor structure of the PCL:YV, for this study we chose to follow the PCL:YV manual, which uses the four-factor model. Regardless of the debate regarding the three- or four-factor structure of the PCL:YV, because the four-factor model is used in the official PCL:YV manual, we thought it would enhance the ecologic validity of the study, because it is presumably the scales recommended in the manual that most clinicians will use in routine practice. The four-factor model is based on 18 of the PCL:YV

items (53), and Factors 1, 2, and 3 are identical to the three factors of the modified Cooke and Michie model (45). Factor 1 consists of four items (impression management, grandiose sense of self-worth, pathological lying, and manipulation for personal gain) and measures the interpersonal features associated with psychopathy. Factor 2 also consists of four items (lack of remorse, shallow affect, callous/lack of empathy, and failure to accept responsibility), and it measures the affective impairments and deficits associated with psychopathy. It is generally presumed that the affective factor of psychopathy in particular corresponds with the construct CU traits. Factor 3 measures the behavioral features of psychopathy and consists of five items (stimulation seeking, parasitic orientation, lacks goals, impulsivity, and irresponsibility). Factor 4 captures the antisocial aspects of psychopathy and consists of five items (poor anger controls, early behavior problems, serious criminal behavior, serious violations of conditional release, and criminal versatility).

Research suggests that the PCL:YV has acceptable psychometric properties (53,83,84). In this study, inter-rater agreement in a subset of the sample ( $n = 20$ ) was excellent (intra-class correlation coefficients (ICCs) for PCL:YV scales was: total = .91; Factor 1 = .80; Factor 2 = .79; Factor 3 = .77; Factor 4 = .82). The PCL:YV total scale scores ranged from 3 to 35, with a mean of 20.58 (SD = 8.16). Mean scores for Factors 1, 2, 3, and 4 were 3.73 (SD = 2.36), 4.49 (SD = 2.46), 5.64 (SD = 2.30), and 5.29 (SD = 2.46), respectively. A total of 27 (34%) participants received a PCL:YV total score of 25 or higher.

*Interpersonal Reactivity Index.* The Interpersonal Reactivity Index (85,86) is a 28-item self-report questionnaire comprised of four discrete 7-item subscales, each of which assesses a specific aspect of the global construct of empathy. Items are scored on a 5-point Likert scale that ranges from 0 (“Does not describe me very well”) to 4 (“Describes me very well”). Scores on the four scales can range from 0 to 28, with higher scores indicating higher empathy. The perspective-taking scale taps the respondent’s ability or proclivity to adopt the psychological point of view of others; the fantasy scale assesses the respondent’s tendency to transpose him- or herself imaginatively into fictitious characters’ inner lives in books and movies. The empathic concern scale taps feelings of sympathy and concerns for unfortunate others, and the personal distress scale measures respondents’ feelings of anxiety and unease during tense interpersonal situations. Mean scores obtained during the current study for the perspective-taking,

fantasy, empathic concern, and personal distress scales were 12.24 (SD = 4.77), 13.54 (SD = 5.96), 13.59 (SD = 6.97), and 9.13 (SD = 5.42), respectively. The internal consistency were found to be adequate (coefficient alpha = .80, .85, .93, and .84 for the perspective-taking, fantasy, empathic concern, and personal distress scales, respectively).

*Reactive-Proactive Aggression Questionnaire.* The Reactive-Proactive Aggression Questionnaire (RPQ) (87) is a 23-item self-report questionnaire for the assessment of reactive and proactive aggression tendencies in children and adolescents. Items are rated on a 3-point scale from 0 (“Never”) to 2 (“Often”) and summed to yield scores for a reactive scale (11 items) and a proactive scale (12 items) as well as for a total scale score based on the summing of all items. Higher scores reflect higher levels of aggression. Mean scores for the reactive, proactive, and total scales were 11.16 (SD = 6.01), 8.19 (SD = 4.51), and 19.35 (SD = 9.49), respectively. Internal consistency values for the reactive, proactive, and total scales were acceptable (coefficient alphas = .93, .85, and .93, respectively).

*Health of the Nation Outcome Scales for Children and Adolescents.* Health of the Nation Outcome Scales for Children and Adolescents (HoNOSCA) (88,89) is a rating scale that measures emotional and behavioral problems. HoNOSCA is comprised of 15 items. The first 13 items are used to compute the A section total score that indicates the overall level of psychosocial impairments; the items measure problems related to disruptive/aggressive/antisocial behaviors, overactivity/concentration, self-injury, substance misuse, scholastic skills, physical illness, hallucinations/delusions, nonorganic somatic symptoms, emotional symptoms, peer relationships, self-care and autonomy, family relationships, and school attendance. These 13 items can then be further grouped into four subscales: A) behavior; B) impairment; C) symptoms; and D) social problems. The last two items, which constitute the B section, rate parental understanding of the children’s problems and information regarding available services. These last two items were omitted in the present study, so only the 13 items from the A section were used in this study.

Items are rated from 0 (“No problems”) to 4 (“Severe problems”). HoNOSCA has been found to have acceptable reliability and validity (90). In the current study, the total scale scores ranged from 3 to 33, with a mean of 19.35 (SD = 7.77). For subscales A, B, C, and D, the mean scores were 7.89 (SD = 2.88), 2.33 (SD = 1.66), 1.51 (SD = 1.64), and 7.63 (SD = 3.65), respectively. Inter-rater agreement in a subset of the sample ( $n = 20$ ) was

excellent for the total scale (ICC = .91) and good to excellent for the subscales and items (ICCs ranged from .71 to .88). The internal consistency for the total scale was also satisfactory (coefficient alpha = .80).

*Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version.* The Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present and Lifetime Version (K-SADS-PL) (91), is a semi-structured diagnostic interview for the assessment of current and past psychopathology in children and adolescents between the ages of six and 18 years according to DSM-IV criteria. This measure was used to describe the psychiatric characteristics in the sample. In this study, inter-rater agreement in a subset of the sample ( $n = 20$ ) was excellent, with kappa and ICC values for categorical agreement on specific diagnoses and dimensional agreement on the number of emotional and alcohol and substance use disorders ranging from .77 to .86.

*Wechsler Intelligence Scale, vocabulary subtest.* We used the vocabulary subtest of the Wechsler Intelligence Scale for Children, Third Edition (WISC-III) (92), and the Wechsler Adult Intelligence Scale, Third Edition (WAIS-III) (93), to estimate verbal intelligence. Younger participants (those 16 years old or younger) were assessed with the WISC, and older participants (those 17 years old and older) were assessed with the WAIS. The vocabulary subtest is a test of accumulated verbal learning that generally reflects the nature and level of an individual's schooling and learning environments. The vocabulary subtest is the most reliable of the verbal subtests and the single best indicator of general intelligence (94). Raw scores were converted to scaled scores with a mean of 10 and a standard deviation of 3. In this sample, scaled scores ranged from 6 to 11, with a mean of 8.51 (SD = 1.14). Inter-rater agreement in a subset of the sample ( $n = 20$ ) was excellent (ICC = .82).

#### ***Translation of the Inventory of Callous-Unemotional Traits***

The English version of the ICU was translated and adapted into Danish in accordance with published guidelines for the translation of instruments for cross-cultural research (95). First, the ICU was translated independently into Danish by two psychologists, who then met and agreed upon an initial version. Next, a third psychologist back-translated the instrument into English, at which point all of the translators met to make decisions about the final version.

#### **Ethics**

The study was approved by the Research Ethics Committee for Region Zealand acting under the Danish Act on a Biomedical Research Ethics Committee System and the Processing of Biomedical Research Projects as well as by the Danish Data Protection Agency. Because the participants were minors, it would generally be required that informed consent be obtained from a parent or guardian. However, the Research Ethics Committee for Region Zealand gave special permission for the young people participating in this study to give informed consent without the researcher also asking for parental consent. This procedure was chosen to minimize the rejection rate. All participants chose to give informed consent in writing, without parental involvement. Participants were not offered any remuneration for their participation.

#### **Procedure**

All assessments were performed at the secure sites in quiet areas. The first author conducted all assessments. Before the assessments were undertaken, participants were informed about the study aims and procedures and told that their assessment results would be treated with confidentiality and would not be shared with staff, relatives, or anyone else unless the participants gave special permission for this. Participants were provided with clear instructions for completing self-report inventories and told that, apart from the WISC/WAIS test, there were no preferred or "correct" answers to any of the questions but that they should try to respond as honestly as possible. To minimize test fatigue, the participants were also told to ask for breaks whenever they felt the need. Finally, all participants were explicitly instructed not to share or discuss their responses on the self-report questionnaires with the researcher. They were instructed to put their responses in a sealed envelope when they finished so that the PCL:YV administration and ratings could be done blind to ICU results. We deliberately decided that ICU assessments would be conducted first and that the PCL:YV interview would occur last. All other assessments were performed in between. Within this scheme, the order of presentation was randomized with the use of [www.randomizer.org](http://www.randomizer.org) (96) to counteract potential order effects. This scheme was chosen to ensure that the respondents were not fatigued by the comprehensive assessment battery when filling out the self-report inventory. Moreover, we were keen to maximize the time gap between the administration of the ICU and PCL:YV to minimize the risk of priming effects.

If participants had reading difficulties ( $n = 37$ ), the researcher read the self-report items out loud while the participants marked their responses on a separate copy of the questionnaires, out of sight of the researcher. This procedure was in accord with previous research practices and served to maintain standardized administration procedures.

The PCL:YV, WISC/WAIS, HoNOSCA, and K-SADS-PL assessments were audio recorded for purposes of later estimation of inter-rater agreement. After approximately nine days ( $M = 9$ ;  $SD = 1.1$ ; range, 7 to 12), ICU follow-up assessments were conducted to assess test-retest reliability. Retest assessments were only conducted with half of sample ( $n = 40$ ). To counteract the effects of recall bias, participants were explicitly instructed not to try to remember their previous responses but rather to respond as they felt was most appropriate at present.

When data collection was finished, an experienced clinical psychologist (the second author) read through file information and listened to randomly selected recordings of the PCL:YV, K-SADS, and WISC-III/WAIS-III ( $n = 20$ ) assessments and recoded them, blind to the original ratings done by the primary investigator, to compute inter-rater agreement. The same psychologist also completed HoNOSCA ratings on the basis of files and interviews. IBM Statistical Package for the Social Sciences (SPSS) software for Mac, version 20.0 (97), was used to randomly select the cases that were to be re-rated.

Before data collection began, the two psychologists who conducted the PCL:YV ratings were trained by the first author of this instrument, A. E. Forth, and checked for reliability. Both senior authors of this article were available throughout the data collection process to supervise clinical ratings.

### Data Analytic Strategy

The Kolmogorov-Smirnov test was used to test whether the distribution of scores was normal. To assess the internal consistency of the ICU, we calculated Cronbach's alpha, mean inter-item correlations, and item-total correlations. In accordance with conventional standards, we considered alpha coefficients of more than .70 (98) and mean inter-item correlations within the range of .15 to .50 (99) to be acceptable. Test-retest reliability was assessed with the use of ICCs. ICCs were also used to assess inter-rater agreement on dimensional ratings using absolute agreement for single measures. ICC values were characterized as follows: poor agreement:  $< .40$ ; fair to good agreement:  $.40$  to  $.75$ ; and excellent agreement:  $> .75$  (100).

Bivariate correlation analyses, namely the Pearson product-moment correlation, were used to assess criterion and construct validity for continuous scores. Correlations were interpreted as follows:  $r < .30$  = low;  $r$  from  $.30$  to  $.50$  = moderate; and  $r > .50$  = large (101).

To examine the independent and incremental effects of the ICU for predicting variance in PCL:YV scores over and above demographic and clinical predictor variables, a series of hierarchical linear regressions were conducted. PCL:YV continuous scale scores were used as outcome variables. In Step 1, age, Danish/non-Danish ethnicity, verbal intelligence scores, number of alcohol and substance use disorders, number of emotional disorders (anxiety plus affective disorders), number of positive attention-deficit/hyperactivity disorder criteria, and number of positive conduct disorder criteria were entered. In Step 2, the ICU score was entered. Multicollinearity was not considered a problem in these analyses if the variance inflation factor (VIF) was less than 10 (102) and the tolerance statistic was more than 0.1 (103).

Receiver operating characteristic (ROC) analysis was used to assess the discriminative validity of the ICU for detecting psychopathy. A cut score of 25 or more on the PCL:YV was used for these analyses. ROC curves were obtained for ICU total and the three subscales by plotting pairs of sensitivity (true-positive rate) against 1-specificity (false-positive rate) for all possible cut scores. The area under the ROC curve (AUC) is an index of the measure's overall diagnostic efficiency or discriminative ability. The AUC can range from 0 to 1, and .50 indicates chance-level accuracy. We interpret AUC values  $< .70$  as low accuracy; from  $.70$  to  $.90$  as moderate accuracy; and  $> .90$  as high accuracy (104). In this study, the AUC can be interpreted as the probability that the ICU will yield a higher score for a randomly selected adolescent with a score of 25 or more on the PCL:YV as compared with a randomly chosen adolescent with a score of less than 25 on the PCL:YV.

Although we report all validity correlations for the interest of the reader, due to the large number of statistical tests performed, in common with previous research within the field (105), a minimal statistical significance level of .01 (two-tailed) was required for results to be considered significant in this study.

Data were analyzed with the use of IBM SPSS software as described previously, except for the ROC analyses, which were performed with MedCalc for Windows, version 12.0.

**Results**

***Descriptive Statistics and Distribution of Inventory of Callous-Unemotional Traits Scores***

Table 1 displays descriptive statistics and the distribution of ICU scale scores in the total sample. The mean of the ICU total scale score was 33.88 (SD = 11.61), and the median score was 31.50. Visual inspection of histogram plots and the Kolmogorov-Smirnov test indicated that the ICU total, callousness, and unemotional scales were non-normally distributed.

***Reliability: Internal Consistency, Test-Retest Reliability, and Inter-Scale Correlations***

Information about the internal consistency and test-retest reliability of the ICU is provided in Table 2. Cronbach’s alpha and mean inter-item correlations were all acceptable as judged by conventional

standards (99,106), and they were comparable with those previously published (50,60-62,70,107). Inspection of the item-total correlations did not suggest that the removal of any items could improve the ICU scales’ internal consistency as measured by Cronbach’s alpha, except for item 10 (“I do not let my feelings control me”). Deleting this item would raise the alpha for the ICU total from .89 to .90 and for the callousness subscale from .78 to .81. Considering that the potential raise in alpha by deleting item 10 from two of the ICU scales would only be marginally higher, we decided to retain all items for further analyses.

Test-retest reliability of the ICU scales in a subsample of participants ( $n = 40$ ) after a period of 9 days was excellent. ICCs ranged from .82 to .88.

**TABLE 1.** Descriptive statistics and distribution of Inventory of Callous-Unemotional Traits scale scores

Inventory of Callous-Unemotional Traits Scale	Descriptives			Distribution		Kolmogorov-Smirnov Test	
	Mean	SD	Observed Range	Skew	Kurtosis	<i>D</i>	<i>df</i>
Total	33.88	11.61	12 to 60	.24	-.82	.10*	80
Uncaring	15.08	4.41	4 to 24	-.18	-.48	.07	80
Callousness	11.65	5.65	2 to 27	.67	-.08	.13**	80
Unemotional	7.15	3.20	2 to 15	-.01	-.77	.12**	80

\* $p < .05$  (two-tailed)  
 \*\* $p < .01$  (two-tailed)

**TABLE 2.** Internal consistency and test-retest reliability of the Inventory of Callous-Unemotional Traits

Inventory of Callous-Unemotional Traits Scale	Internal Consistency ( $N = 80$ )		9-Day Test-Retest Reliability ( $n = 40$ )
	Coefficient Alpha	Mean Inter-Item Correlations	Intra-Class Correlation
			Coefficient
Total	.89	.26	.88***
Uncaring	.78	.32	.82***
Callousness	.78	.24	.86***
Unemotional	.78	.41	.82***

\*\*\* $p < .001$  (two-tailed)

As shown in Table 3, all three ICU subscales were highly correlated with the total scale ( $r_s$  ranged from .80 to .92). Inter-subscale correlations were also large ( $r_s$  ranged from .61 to .72), although they were somewhat lower than those obtained for the subscale-total correlations.

**TABLE 3.** Inventory of Callous-Unemotional Traits inter-scale correlations

	Pearson Correlation Coefficients		
	Total	Uncaring	Callousness
Uncaring	.88***		
Callousness	.92***	.72***	
Unemotional	.80***	.61***	.62***

\*\*\* $p < .001$  (two-tailed)

***Criterion Validity of the Inventory of Callous-Unemotional Traits with the Psychopathy Checklist: Youth Version***

Concurrent associations for continuous scores between the Inventory of Callous-Unemotional Traits and the Psychopathy Checklist: Youth Version. Bivariate correlations between the ICU and PCL:YV are presented in Table 4. All correlations were positive and statistically significant, and they ranged from moderate to large. As expected, the highest correlations was obtained for the ICU total and subscales with the PCL:YV total and the affective factor (Factor 2).



*Independent effects of the Inventory of Callous-Unemotional Traits for predicting Psychopathy Checklist: Youth Version scores.* To examine whether the ICU total was associated with psychopathy and its subfactors above and beyond other demographic and clinical characteristics, a series of block-wise hierarchical regression analyses were conducted, with the

covariates entered in Step 1 and the ICU total added in Step 2. Table 5 reports the standardized beta coefficients, adjusted  $R^2$ , and  $R^2$  changes for these analyses. VIF ranged from 1.05 to 2.30 and tolerance ranged from 0.44 to 0.95, thereby indicating that multicollinearity was not a problem in these analyses.

**TABLE 4.** Bivariate correlations between the Inventory of Callous-Unemotional Traits and the Psychopathy Checklist: Youth Version

Inventory of Callous-Unemotional Traits	Psychopathy Checklist: Youth Version				
	Total	Factor 1: Interpersonal	Factor 2: Affective	Factor 3: Behavioral	Factor 4: Antisocial
Total	.76***	.41***	.77***	.61***	.52***
Uncaring	.71***	.31**	.63***	.65***	.54***
Callousness	.67***	.41***	.69***	.51***	.40***
Unemotional	.61***	.34**	.70***	.41***	.42***

\*\*  $p < .01$  (two-tailed)  
\*\*\*  $p < .001$  (two-tailed)

**TABLE 5.** Hierarchical multiple regression analyses for variables predicting Psychopathy Checklist: Youth Version total and factor scores

	Psychopathy Checklist: Youth Version Scales				
	Total	Factor 1: Interpersonal	Factor 2: Affective	Factor 3: Behavioral	Factor 4: Antisocial
	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$
<b>Step 1</b>					
Age	-.07	-.08	-.18	-.03	.06
Danish ethnicity	.13	.27*	.25*	.05	-.11
Verbal intelligence quotient	.14	.33**	.24*	-.02	-.04
Substance use	.04	-.17	.04	.22*	.06
Emotional disorder	.00	-.08	.00	.03	.13*
Attention-deficit/hyperactivity disorder	.04	-.06	-.06	.16	.05
Conduct disorder	.87***	.59***	.72***	.61***	.74***
Adjusted $R^2$	.69	.29	.41	.56	.72
$\Delta R^2$	.72***	.35***	.46***	.60***	.75***
F(72,79)	26.54***	5.53***	8.82***	15.45***	30.56***
<b>Step 2</b>					
Age	-.00	-.05	-.08	.01	.06
Danish ethnicity	.01	.22	.06	-.04	-.12
Verbal intelligence quotient	.10	.32**	.18*	-.04	-.04
Substance use	.01	-.18	-.00	.20*	.06
Emotional disorder	.03	-.07	.04	.05	.14*
Attention-deficit/hyperactivity disorder	.00	-.08	-.11	.13	.04
Conduct disorder	.60***	.47**	.29**	.41***	.71***
Inventory of Callous-Unemotional Traits total	.38***	.17	.61***	.29**	.05
Adjusted $R^2$	.77	.29	.61	.60	.72
$\Delta R^2$	.07***	.02	.19***	.04**	.00
F(71,79)	33.86***	5.09***	16.33***	15.81***	26.51***

\*  $p < .05$  (two-tailed)  
\*\*  $p < .01$  (two-tailed)  
\*\*\*  $p < .001$  (two-tailed)

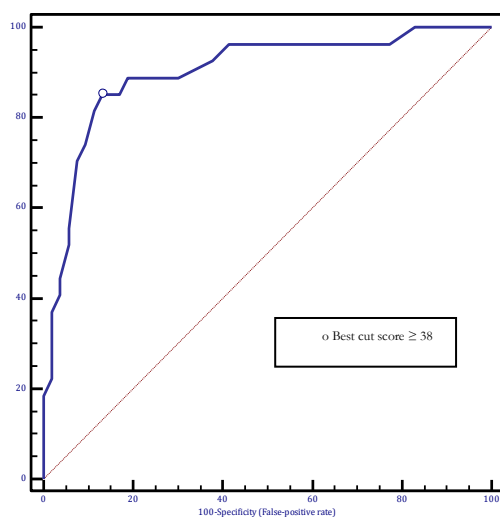
The ICU total provided a unique and significant contribution to the concurrent prediction of variance in the PCL:YV total scores, affective scale scores, and behavioral scale scores but not to the prediction of variance in the interpersonal and antisocial factor scores. Incremental  $R^2$  values for including the ICU total in the block of predictor variables for the PCL:YV total, affective, and lifestyle factors were 7%, 19%, and 4%, respectively.

The largest significant increase in predicted variance was for the affective factor, which suggests that the ICU total was a specifically robust and relatively strong predictor of CU traits, as measured by the PCL:YV, over and above the other demographic and clinical predictors. The presence of conduct disorder symptoms was the only covariate to remain a significant predictor for all of the PCL:YV scales when the ICU was entered in Step 2; this suggests

that, in this sample, the amount of conduct problems was significantly associated with all of the PCL:YV scales. Also in Step 2, it was found that verbal intelligence independently added to the prediction of the interpersonal factor scores on the PCL:YV.

*Discriminative accuracy of the Inventory of Callous-Unemotional Traits for high versus low psychopathy groups.* To investigate the discriminative accuracy and validity of the ICU for detecting participants with high psychopathy scores (PCL:YV total,  $\geq 25$ ), ROC analyses were conducted for each of the ICU scales. Figure 1 displays the ROC curve for the ICU total scale.

**FIGURE 1.** Receiver operating characteristic curve for the Inventory of Callous-Unemotional Traits total scale demonstrating discriminative criterion validity for psychopathy on the Psychopathy Checklist: Youth Version



*Note.* This receiver operating characteristic curve for the Inventory of Callous-Unemotional Traits total scale demonstrates the discriminative criterion validity for psychopathy on the Psychopathy Checklist: Youth Version (total  $\geq 25$ ). This curve was significantly different from the non-informative 45-degree diagonal reference line ( $p < .0001$ ), with an area under the curve of .90 ( $SD = 0.04$ ). A cut score of 38 yielded the optimal balance between sensitivity and specificity (.85 and .87 respectively).

The ROC curve for the ICU total was significantly different ( $p < .0001$ ) from the 45-degree non-informative diagonal reference line. The AUC for the ICU total was .90 ( $SE = 0.04$ ; 95%  $CI = .83$  to  $.96$ ), which indicates moderate to high discriminatory accuracy. Sensitivity was perfect (100%) for scores of less than approximately 20, and specificity was perfect (100%) for scores of more than approximately 52. A score of 38 on the ICU total scale correctly classified 86% of the participants and yielded the highest values for both sensitivity (.85; 95%  $CI$ , .66 to  $.96$ ) and specificity (.87; 95%  $CI$ , .75 to  $.95$ ).

Significant ROC curves ( $p < .0001$ ) were also obtained for the ICU's uncaring, callousness, and unemotional subscales, with an AUC of .87 ( $SE = 0.04$ ; 95%  $CI = .78$  to  $.94$ ), .89 ( $SE = 0.04$ ; 95%  $CI = .80$  to  $.95$ ), and .80 ( $SE = 0.05$ ; 95%  $CI = .69$  to  $.88$ ), respectively. Comparison of the AUC for each of the three ICU subscales with the AUC of the ICU total revealed that only the unemotional subscale was significantly different ( $z$ , 3.28;  $p < .001$ ), which indicates a somewhat lower discriminatory accuracy of this subscale as compared with the ICU total for discriminating between groups with high and low psychopathy scores.

### **Construct Validity of the Inventory of Callous-Unemotional Traits**

Results of the associations between the ICU and indices of aggression, empathy, and psychosocial functioning are listed in Table 6.

*Reactive and proactive aggression.* As expected, all ICU scales were statistically significant and positively correlated with self-reported reactive and proactive aggression (see Table 6). The magnitude of the obtained correlations ranged from .40 to .61, which indicates moderate to high associations between CU traits and self-reported aggressive tendencies. Of all of the ICU scales, the total scale displayed the highest correlations with all three RPQ scales ( $r$ s ranged from .53 to .61). In terms of reactive versus proactive aggression, the ICU total, callousness, and unemotional scales displayed their largest associations with the proactive scale. In terms of ICU subscales, the callousness scale showed the largest correlations with the RPQ total and proactive scales ( $r$ s = .57 and .58, respectively).

*Empathy.* The ICU total was moderately to highly negatively correlated with all self-reported dimensions of empathy ( $r$ s ranged from  $-.47$  to  $-.82$ ; see Table 6), as predicted. For all ICU scales, the largest negative correlations were obtained with the empathic concern scale ( $r$ s ranged from  $-.68$  to  $-.82$ ); this indicates that a lack of feelings of sympathy and concern for unfortunate others seems to be an especially pronounced feature of individuals with CU traits as measured by the ICU.

*Psychosocial functioning.* The ICU total was moderately to highly correlated with psychosocial impairments as measured by the HoNOSCA total and the four subscales ( $r$ s ranged from .33 to .80; see Table 6). At the level of specific HoNOSCA items, the ICU total was moderately to highly correlated with problems concerning disruptive and aggressive behavior,

**TABLE 6.** Bivariate correlations between the Inventory of Callous-Unemotional Traits and measures of aggression, empathy, and psychosocial functioning

Scales	Inventory of Callous-Unemotional Traits			
	Total	Uncaring	Callousness	Unemotional
<i>Reactive-Proactive Aggression Questionnaire</i>				
Total	.61***	.53***	.57***	.48***
Reactive	.53***	.50***	.47***	.40***
Proactive	.59***	.45***	.58***	.48***
<i>Interpersonal Reactivity Index</i>				
Perspective-taking	-.52***	-.53***	-.41***	-.44***
Fantasy	-.50***	-.45***	-.38**	-.54***
Empathic concern	-.82***	-.70***	-.74***	-.68***
Personal distress	-.47***	-.33*	-.47***	-.43***
<i>Health of the Nation Outcome Scales for Children and Adolescents</i>				
Total	.46***	.48***	.37**	.35**
Item 1: Disruptive/aggressive	.38***	.35**	.30**	.38**
Item 2: Overactivity/attentional difficulty	.22*	.31**	.14	.13
Item 3: Non-accidental self-injury	.03	.06	.02	-.01
Item 4: Alcohol, substance/solvent misuse	.19	.25*	.12	.11
Item 5: Scholastic or language skills	.26*	.26*	.22*	.19
Item 6: Physical illness/disability problems	.18	.21	.18	.06
Item 7: Hallucinations and delusions	.51***	.43***	.43***	.48***
Item 8: Nonorganic somatic symptoms	-.01	-.04	.02	-.01
Item 9: Emotional symptoms	-.20	-.13	-.28*	-.07
Item 10: Peer relationships	.49***	.44***	.42***	.41***
Item 11: Self-care and independence	.35**	.31**	.31**	.27*
Item 12: Family life and relationships	.27*	.35**	.18	.18
Item 13: Poor school attendance	.46***	.42***	.44***	.33**

\* $P < .05$  (two-tailed)\*\* $P < .01$  (two-tailed)\*\*\* $P < .001$  (two-tailed)

hallucinations and delusions, peer relationships, self-care and independence, and poor school attendance.

All ICU subscales were statistically significant and moderately to highly associated with the HoNOSCA total, impairment, symptoms, and social problems scales. However, only the ICU's uncaring subscale was statistically significantly ( $p < .01$ ) associated with the behavior subscale of the HoNOSCA. The uncaring scale was the only subscale to be correlated with overactivity, attentional difficulties, and problems with family life and relationships.

## Discussion

This study was the first to investigate the psychometric properties of the Danish version of the ICU, and the results generally support the reliability, criterion validity, and construct validity of this tool. The participants in this study were adolescent boys who had been remanded or sentenced to secure institutions in Denmark. Because most of the reliability and validity data from this study were comparable to those previously reported for both community and incarcerated samples in North America and Europe, by extension, this study also lends further support to the cross-cultural validity of the ICU as a self-report measure of CU traits. Moreover, for non-English-speaking countries such as Denmark, the adaptation of important measures and the

evaluation of their psychometric strengths and weaknesses are vital to make these tools available to national researchers and clinicians. Although most of the current results are consistent with those that have been previously published, some warrant further discussion.

### *Reliability of the Danish Inventory of Callous-Unemotional Traits*

Results for internal consistency and test-retest reliability were satisfactory by conventional standards and comparable with those previously published, which indicates that the Danish ICU is a reliable measure of CU traits among incarcerated adolescent boys. Item-total correlations revealed that item 10 was the only item to lower alpha values for two of the ICU scales; this was also reported in some previous studies (62). It should be noted that estimates of test-retest reliability were obtained from a somewhat small subsample and only for a period of approximately nine days. Given that CU traits are conceptualized as personality traits, it could be argued that longer test-retest periods are warranted before we are able to draw more firm conclusions regarding this aspect of the ICU's reliability.

### *Criterion Validity of the Inventory of Callous-Unemotional Traits Against the Psychopathy Checklist: Youth Version*

In this study, the ICU showed good criterion validity with the PCL:YV; this was as expected on the basis of theoretical grounds but not in accordance with that of two previously reported studies comparing the ICU with the PCL:YV. The correlations obtained in the present study ranged from moderate to large. Furthermore, we found that the ICU total scale was significantly associated with the PCL:YV total as well as the affective and behavioral factors, which yielded incremental gains for the (cross-sectional) prediction of variance on the three PCL:YV scale scores over and above other demographic and clinical variables. Results from the ROC analyses further corroborated these findings by demonstrating good discriminatory ability of the ICU for the categorical classification of participants in high and low psychopathy groups based on a score of 25 on the PCL:YV as the threshold. Taken together, these findings suggest that the ICU has good concurrent and discriminative criterion validity with the PCL:YV, particularly with regard to the total and affective scales.

However, there are some discrepancies between the results of this study and the two previously published investigations addressing this topic. Fink and colleagues (70) reported obtaining a somewhat low but significant correlation ( $r = .27$ ;  $p < .05$ ) between the ICU and PCL:YV total scales, whereas Feilhauer and colleagues (63) obtained a small and non-significant association ( $r = .13$ ;  $p =$  non-significant). In the Feilhauer study, however, one of the ICU subscales was reported to be significantly correlated with both the PCL:YV total ( $r = .24$ ;  $p < .05$ ) and the interpersonal/affective factor ( $r = .27$ ;  $p < .05$ ). How can these disparate findings be explained? First, it may be important to contextualize the findings of the two studies. Indeed, studies examining various other self-report measures of psychopathy associations with the PCL:YV have reported comparably disparate results, with correlations varying from low to high in magnitude and with a general tendency toward obtaining moderate associations (51,57). Similar tendencies have also been found within the adult literature (108). Thus, the discrepancies are not specific to the ICU but actually characteristic of most self-report instruments that measure psychopathic traits when they are validated against rater-based measures such as the PCL:YV. Part of the explanation of this tendency toward obtaining primarily moderate associations between the PCL:YV and other self-report measures of psychopathic traits in youth is due to heteromethod assessment effects (73,109). Within this context, the difference between results of the studies is perhaps not so unexpected or unusual.

Second, sample and cross-cultural differences could have influenced the results. In the Feilhauer study, a Dutch sample of detained youth was used. Fink's American sample was comprised of both girls and boys with a mean age of 17 years who were incarcerated at a Southwestern juvenile maximum-security detention facility. With regard to ethnicity, 73% of the participants were classified as Hispanic. Moreover, participants in the studies were volunteers, and very little information was presented regarding the participants who refused to participate. Such sample differences may explain some of the discrepancies.

Third, characteristics of the PCL:YV could be invoked as part of the explanation. For instance, the reliability for PCL:YV factor scales in both the Fink and Feilhauer studies, as assessed with Cronbach's alpha, was below .70; in our study, the reliability ratings were above this threshold.<sup>1</sup> In terms of internal consistency as measured by Cronbach's alpha, it is likely that the low reliability of the PCL:YV factor scales has to do with the low number of items on the PCL:YV factor scales (53). Stronger statistical indices of the reliability of the PCL:YV factor scales obtained from factor analytic and structural equation modeling as well as item-response analysis does in fact support the reliability of these scales (46,57). Moreover, in all three studies, internal consistency of the PCL:YV total scale was acceptable, thus making it unlikely that the reliability of the PCL:YV scales can actually add to the explanation of the divergent results.

Fourth, sample size was a general limitation in all three studies, including the present one, effectively reducing statistical power and perhaps introducing sampling bias (110,111). This may also help to explain the discrepancies between our results and those found in the literature. Regardless, this remains certainly an important issue for future researchers to address by focusing on the associations between self-report and rater-based assessment of psychopathic and CU traits as well as potential mediators and moderators of these associations across samples and cultures.

### Construct Validity

The obtained results provide further evidence for the cross-cultural construct validity of the ICU by demonstrating expected convergent and divergent associations with ratings of self-reported empathy and aggression and expert-rated psychosocial impairments.

The associations with elevated scores of reactive and proactive aggression are consistent with previous research regarding links between CU traits

<sup>1</sup> Reliability data for the PCL:YV scales are available at request from the first author and will be published in another article.

and types of aggression (4,62,63,112-114). The tendency of the ICU's callousness and uncaring subscales to be particularly correlated with aggression is also consistent with the results of previous research (50,61,107).

Regarding empathy, as predicted and as reported in earlier studies (4,62), the ICU was highly negatively correlated with all four dimensions of empathy as measured with the IRI, especially the empathic concern scale. This is consistent with developmental research, which suggests that CU traits in boys are associated with less affective empathy or reduced responsiveness to distressing stimuli (20,22,44,115,116). It is also consistent with developmental research, which has indicated that high levels of empathy or sympathy for others are negatively related with antisocial behavior (117,118).

Although most research into CU traits has tended to focus on aggression and criminal behavior, comparatively little research has investigated their association with psychosocial functioning. In this study, we found that CU traits were positively associated with psychosocial impairments. These findings are consistent with recent research that has suggested that CU traits are independently and longitudinally associated with psychiatric problems in the community (10) and clinical severity (9). Together, these results suggest that CU traits are associated with considerable psychiatric treatment needs. Moreover, CU traits were significantly associated with social problems, and this is consistent with previous research (9,60,61).

At the item level of the HoNOSCA, two notable findings emerged that warrant comment. First, in this study, the ICU was significantly and moderately associated with poor school attendance (item 13) but not with scholastic and language skills problems (item 5); however, the latter item was actually correlated with the ICU total ( $r = .26$ ), uncaring ( $r = .26$ ), and callousness ( $r = .22$ ) scales at the .05 level of significance. One could interpret these results as indicating that problems with academic achievement are more related to a lack of concern about educational performance, as indicated in the DSM-5 conceptualization of CU traits, rather than with learning difficulties. Such an interpretation would be consistent with previous studies, which have shown that clinically referred boys with conduct problems and high levels of CU traits are less likely to be assigned to special teachers and thus experience fewer learning difficulties as compared with boys with low levels of these traits (9). However, another study failed to obtain any significant association between CU traits and academic performance (119), which indicates that further research is needed to discover the links between CU traits and academic performance.

The association between the ICU and the HoNOSCA item concerning hallucinations, delusions, and abnormal perceptions (item 7) was also notable. Although none of the participants were currently psychotic when included in the study, many participants showed a tendency toward suspicious and paranoid thoughts, which is rated on this item (88). The obtained association is consistent with studies reporting a relatively high prevalence of paranoid and schizotypal personality disorders in offender samples (120,121). Paranoid and schizotypal personality disorders are severe disorders on their own, but they also increase the risk of the future development of psychosis or schizophrenia (122,123), which suggests that they can be viewed as prodromes of the future psychotic illnesses that are common in forensic populations (124). Furthermore, the tendency toward paranoid thoughts and perceptions is in accordance with recent research that has focused on distorted social cognition and dysfunctional mentalizing characteristics of psychopathy and antisocial personality disorder (43,125-127).

### Limitations and Future Directions

Several methodological limitations must be taken into account when interpreting the results of this study. Sample size was the most important limitation. The sample size was relatively small as compared to some other studies of the ICU. The small sample size may have reduced statistical power for identifying weak but significant correlations between the ICU and other measures. In addition, the sample size did not allow for sufficient power to explore the underlying factor structure or the structural validity of the ICU nor to assess the extent to which the ICU and the PCL:YV are concordant with latent-variable statistics, including item response theory, which is generally considered statistically stronger than the correlation and regression analyses used in this study (128,129). Future research using item response theory models is needed not only to examine the concordance of the ICU and PCL:YV but also to assess the differential item functioning of the ICU across cultures and samples.

The nature of the sample was another limitation that may affect the generalizability of our findings. In this study, the sample was comprised of remanded and sentenced adolescent boys in secure institutions. Future studies are needed to examine whether the findings of this study are reproducible in different samples, including samples of female offenders, clinical samples, and community samples.

The study design was cross-sectional, which implies that cause and effect cannot be inferred. We can also not infer anything about predictive validity.

Furthermore, the results of this study should be interpreted with respect to the research context in which it was conducted. Participants were aware that their test results would only be used for research purposes and treated confidentially, so the test results had no practical consequences for their institutional stays or their court cases. Accordingly, the participants in this study may have been more honest in their responses on the ICU than they may have been if they were assessed in contexts in which the results affect case management and judicial decision making. It is therefore unclear whether similar results would be obtained if the data were gathered in the context of routine clinical and court assessments. This is an important applied issue for future studies to address.

Finally, it should be emphasized that the ROC analysis of the ICU against the PCL:YV, as reported in this study, should not be interpreted as indicating that the ICU could or should be used as a screening tool for psychopathy.

### Clinical Implications

The ICU seems promising as an extended self-report measure of CU traits that can be used in research to shed light on the developmental precursors of psychopathy. With an improved understanding of the complex causative, risk, and protective factors as well as the developmental trajectories of psychopathy, clinicians and researchers are better equipped to develop targeted prevention and treatment programs, thereby ultimately lessening the burden of this debilitating disorder on society, families, victims, and individuals with CU traits. The ICU may be a useful assessment instrument for the diagnostic evaluation of conduct-disordered youth.

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