Validity of the Externalizing Spectrum Inventory in a Criminal Offender Sample: Relations with Disinhibitory Psychopathology, Personality, and Psychopathic Features

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Abstract

The Externalizing Spectrum Inventory (ESI; Krueger, Markon, Patrick, Benning, & Kramer, 2007) provides a self-report based method for indexing a range of correlated problem behaviors and traits in the domain of deficient impulse control. The ESI organizes lower-order behaviors and traits of this kind around higher-order factors encompassing general disinhibitory proneness, callous-aggression, and substance abuse. The current study used data from a male prisoner sample ($N = 235$) to evaluate the validity of ESI total and factor scores in relation to external criterion measures consisting of externalizing disorder symptoms (including child and adult antisocial deviance and substance-related problems) assessed via diagnostic interview, personality traits assessed by self-report, and psychopathic features as assessed by both interview and self-report. Results provide evidence for the validity of the ESI measurement model and point to its potential utility as a referent for research on the neurobiological correlates and etiological bases of externalizing proneness.

Keywords

externalizing psychopathology; disinhibition; aggression; psychopathy; substance abuse; construct validity

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Validity of the Externalizing Spectrum Inventory in a Criminal Offender Sample: Relations with Disinhibitory Psychopathology, Personality, and Psychopathic Features Dimensional models of psychopathology represent a promising alternative to traditional discrete-disorder approaches to defining mental disorders, both in terms of research directions and implications for clinical practice (Cuthbert, 2005; Widiger & Sankis, 2000). Problems involving deficient impulse control such as antisocial behavior and substance abuse frequently co-occur with one another, and covary in turn with personality traits reflecting impulsivity, aggression, and disinhibition/dysconstraint. An integrative hierarchical model of this domain of behaviors and traits, the *externalizing spectrum model* (Krueger, Hicks, Patrick, Carlson, Iacono, & McGue, 2002; Krueger, Markon, Patick, Benning, & Kramer, 2007; Krueger, Markon, Patrick, & Iacono, 2005), was recently operationalized in the form of the Externalizing Spectrum Inventory (ESI; Krueger et al., 2007), a self-report based instrument for use with clinical and non-clinical samples. Structural analyses of the lower-order trait scales of this inventory reveal the presence of an overarching higher-order factor reflecting disinhibitory traits and general proneness to impulse control problems, along with two distinct subfactors (residual factors), one reflecting callous-aggressive tendencies and the other excessive use of substances (Krueger et al., 2007).

While the ESI represents a promising new approach to the measurement of disinhibitory problems and traits, the inventory remains to be systematically validated. Validity results that have been reported for the ESI to date (Bernat, Nelson, Steele, Gehring, & Patrick, in press; Hall, Patrick, & Bernat, 2007; Nelson, Patrick, & Bernat, 2011) are for a preliminary 100-item screening version that provides for effective estimation of scores on the inventory as a whole, but not its distinguishable factors. To further investigate the validity of the ESI measurement model, the current study sought to: 1) introduce a method for computing scores on the three higher-order factors that emerged from Krueger et al.'s (2007) structural analysis of the ESI subscales; and 2) examine the predictive validity of total scores as well as scores on the three higher-order factors of the ESI in relation to key criterion variables assessed via interview and self-report. Specifically, we evaluated the convergent and discriminant validity of scores on the higher-order factors of the ESI (Krueger et al., 2007), operationalized as composites of relevant lower-order scales, in an incarcerated offender sample in relation to criterion variables including interview-based assessments of impulse control (externalizing) disorders defined according to DSM-IV criteria, personality traits as assessed by self-report, and psychopathic features as assessed by interview and self-report. Incarcerated offenders were studied due to the high base rate of impulse control problems in this population and the potential utility of the externalizing spectrum model for assessing individuals within correctional and forensic settings.

Externalizing Spectrum Model: Conceptualization and Measurement

Factor analytic studies of the comorbidity among mental disorders described in current and earlier versions of the Diagnostic and Statistical Manual for Mental Disorders (DSM; American Psychiatric Association, 2000) have revealed two broad factors or dimensions accounting for the systematic covariance among disorders of highest prevalence: an *internalizing* factor, representing the variance in common among fear, anxiety, and unipolar mood disorders; and an *externalizing* factor, representing the shared variance of antisocial personality and substance-related disorders (Kendler, Prescott, Myers, & Neale, 2003; Krueger 1999a; Krueger, Caspi, Moffitt, & Silva, 1998). These broad factors have been interpreted as phenotypic manifestations of underlying vulnerabilities contributing to disorders of differing types, and personality traits known to be associated with these disorders. Behavior genetic research on the externalizing factor in particular has provided compelling support for this perspective. For example, Krueger et al. (2002) reported very high (>80%) heritability for externalizing proneness operationalized as the shared variance among DSM antisocial and substance disorder symptoms along with disinhibitory personality traits; similarly high heritability for this common externalizing factor has been reported by others (Kendler et al., 2003; Young, Stallings, Corley, Krauter, & Hewitt, 2000).

Regarding personality traits indicative of externalizing proneness, investigators in this area (e.g., Sher and Trull, 1994) have identified two trait domains as particularly relevant: disinhibition, encompassing traits such as impulsivity, sensation seeking, and unconventionality; and negative affectivity, encompassing traits such as anxiousness, suspiciousness, and aggressiveness. Research employing the Five Factor Model, for example, indicates that a personality profile marked by low Conscientiousness (lack of regard for order and control) and low Agreeableness (proneness to hostility and conflictual relations with others) is associated with antisocial behavior in community (Lynam, Leukefeld, & Clayton, 2003) and psychiatric samples (Trull, 1992). In Tellegen's (1982) three-factor model, embodied in the Multidimensional Personality Questionnaire (MPQ; see also: Patrick, Curtin & Tellegen, 2002; Tellegen & Waller, 2008), these two broad domains are represented by higher-order factors of Constraint (reversed) and Negative Emotionality (NEM). Prior research has demonstrated relations between these broad MPQ factors and disorders within the externalizing spectrum (e.g., Krueger, Caspi, Moffitt, Silva, & McGee,

1996). Moreover, Krueger (1999b) reported that higher and lower scores, respectively, on the NEM and CON factors of the MPQ at age 18 predicted subsequent diagnoses of antisocial personality disorder (APD) and substance dependence at age 21.

Thus, available evidence supports an integrative perspective on externalizing problems and tendencies in which antisocial and substance-related disorders (or partial symptomatic expressions of these), along with personality traits in the domains of disinhibition/ impulsivity and negative emotionality, are regarded as indicators of a common, largely heritable liability factor. Krueger et al. (2007) developed the externalizing spectrum inventory (ESI) to operationalize this model for assessment purposes. The ESI consists of 415 items organized into 23 unidimensional subscales, reflecting content domains of impulsiveness/sensation-seeking, irresponsibility and externalization of blame, aggression, deceitfulness, and substance use/problems of differing types. All 23 ESI scales load on a general factor ("Externalizing"), with the strongest and purest loadings evident for scales indexing problematic impulsivity, irresponsibility/lack of dependability, thievery, and alienation. In addition to loading on the general disinhibitory/externalizing factor, some scales also load on one of two subsidiary factors. One set of scales—those reflecting relational aggression and deficient empathy, along with destructiveness, excitement seeking, rebelliousness, and dishonesty—load together on a *Callous-Aggression* subfactor. Another set of scales, reflecting recreational and problematic use of marijuana, other drugs, and alcohol, load together on a *Substance Abuse* subfactor.

In a report that focused on brain reactivity differences in individuals with high levels of externalizing proneness, Hall et al. (2007) presented validity data for overall scores on a 100-item screening version of the ESI in relation to differing self-report criterion measures. Consistent with the above-noted personality correlates of externalizing defined in terms of DSM disorder symptoms, overall scores on the ESI-100 were shown to correlate positively and negatively, respectively, with higher-order MPQ factors of NEM and CON, and negatively with scores on a well-established measure of socialization (Gough, 1960). Higher overall scores on the ESI were also associated with higher reported incidence of rule-breaking behaviors in childhood and adulthood, and heightened evidence of alcohol dependence and drug abuse. More recently, Blonigen et al. (2011) reported that scores on this 100-item version of the ESI strongly predicted scores on a well-established integrity test, the Personnel Research Blank (Gough, Arvey, & Bradley, 2004), designed to screen for tendencies toward counterproductive behaviors in employment settings (i.e., higher ESI scores predicted lower integrity scores). These results provide additional evidence for the validity of scores on the ESI as a whole.

While informative, these existing published studies have limitations. Both utilized non-clinical samples (i.e., university students) and reported findings only for the ESI as a whole, not its distinctive factors, in relation to narrow sets of self-report based criterion measures. Thus, a key aim of the current study was to further evaluate the validity of the ESI and its factors in relation to a broader array of criterion measures including interview-based assessments of externalizing psychopathology and psychopathic features, along with self-report assessments of psychopathy and personality traits of varying types.

Externalizing and Psychopathy

The personality syndrome of psychopathy has clear empirical and theoretical links to the domain of externalizing psychopathology. Psychopathy entails antisocial behavior reflecting deficient impulse control coupled with characteristic emotional deficits and an exploitative interpersonal style. Hare's (2003) Psychopathy Checklist-Revised (PCL-R), the most widely used instrument for assessing psychopathy in correctional and forensic settings, indexes

these characteristic features through 20 items scored on the basis of a diagnostic interview and review of archival records. One subset of items (those associated with Factor 1) captures the emotional and interpersonal features of the syndrome, and another (associated with Factor 2) indexes the antisocial deviance features of psychopathy. The Factor 2 component of the PCL-R appears to reflect tendencies in common with the general externalizing factor of the ESI—including impulsivity, irresponsibility, boredom susceptibility, aggressiveness, and law-breaking (cf. Krueger et al., 2007). Consistent with this perspective, scores on PCL-R Factor 2 relate more strongly than scores on Factor 1 to broad externalizing scores reflecting the shared variance among child and adult symptoms of DSM APD, alcohol and drug problems, and disinhibitory personality style (Patrick, Hicks, Krueger, & Lang, 2005). In contrast, the Factor 1 component of the PCL-R—which includes deficient empathy, lack of remorse, and manipulative exploitation of others—can be hypothesized to tap tendencies in common with the Callous-Aggression subfactor of the ESI. Consistent with this hypothesis, higher scores on PCL-R Factor 1 are associated with tendencies toward narcissism, antagonism, emotional insensitivity, and proactive aggression (Hall, Benning, & Patrick, 2004; Hare, 2003; Derefinko & Lynam, 2006; Patrick, 1994; Porter & Woodworth, 2006).

A counterpart to the PCL-R for assessing psychopathy in community as well as offender samples on the basis of self-report is the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996). In parallel with the PCL-R, evidence has accumulated for distinctive affective-interpersonal and antisocial deviancy factors to the PPI that, although not equivalent to the interview-based PCL-R factors (Blonigen et al., 2010), do show similar patterns of relations with external criterion variables (Benning et al., 2005; Blonigen et al., 2010; Poythress et al., 2010). Notably, scores on the two distinctive factors of the PPI can be estimated effectively using scores on broadband personality inventories such as the MPQ (Benning, Patrick, Blonigen, Hicks, & Iacono, 2005). Based on prior published findings, we hypothesized that Factors 1 and 2 of the PPI, whether computed directly from subscales of the PPI or estimated from scores on the MPQ, would show preferential relations with the callous-aggression subfactor and the general disinhibitory/externalizing factor of the ESI, respectively.

Current Study Objectives

The present study sought to: 1) introduce an approach to computing scale-based composite scores reflecting the distinctive higher-order factors of the ESI (general disinhibition, callous-aggression, substance abuse) identified by Krueger et al. (2007),[1] and 2) evaluate the validity of ESI total and composite scores in relation to a range of relevant criterion measures. To ensure strong representation of individuals with high levels of externalizing tendencies, a participant sample consisting of incarcerated prisoners was tested. Criterion measures included symptoms of disinhibitory disorders listed in DSM-IV-TR (APA, 2000), assessed on the basis of diagnostic interviews; scores on an omnibus self-report personality inventory, the brief form of the Multidimensional Personality Questionnaire (MPQ-bf; Patrick et al., 2002), along with a specific measure of narcissistic tendencies (Narcissistic Personality Inventory; Raskin & Terry, 1988); and psychopathic features as assessed by diagnostic interview (PCL-R; Hare, 2003) and self-report (PPI; Lilienfeld & Andrews, 1996).

We hypothesized that total ESI scores (ESI_{Total}) and estimated scores on the General Disinhibition factor of the ESI (ESI_{DIS}) would be predictive of disinhibitory disorders

[1]We considered it important to first establish the criterion-related validity of scale-based indices of the ESI factors before undertaking further work to develop item-based measures of these factors.

including child/adult antisocial behavior and problematic substance use, a personality style marked by unconstrained negative affect, and impulsive and antisocial facets of psychopathy in particular. We further hypothesized that estimated scores on the Callous-Aggression subfactor of the ESI (ESI_{AGG}), particularly when controlling for general disinhibitory (ESI_{DIS}) tendencies, would selectively predict aggressive forms of child and adult antisocial deviance, be reflective of a narcissistic, hostile, antagonistic, and forceful personality style, and be predictive of interpersonal, affective, and antisocial facets of psychopathy. Lastly, we predicted that scores on the Substance Abuse subfactor of the ESI (ESI_{SUB}) would account for variance in DSM-defined substance use disorders beyond that accounted for by General Disinhibition (ESI_{DIS}) scores.

Method

Participants and Procedures

Study participants were 243 male prisoners from a medium-security state correctional facility in Minnesota who met the following criteria: no current major mental disorder (i.e., schizophrenia, Bipolar I) as determined from questions pertaining to mental health history on a brief pre-test screening questionnaire and information contained in prison file records, competency in English, free from visual or hearing impairments, and no imminent release date. The mean age of the sample was 32.2 years (SD = 7.7, range = 19-55). The racial composition was as follows: Caucasian, 57.7%; African American, 16.6%; Hispanic, 9.1%; Native American, 4.6%; Asian, 1%; mixed race, 4.1%; other, 7.1%. As discussed below, eight participants were excluded from analyses due to concerns over invalid responses to self-report measures, resulting in a sample size of 235. All participants provided written informed consent prior to study participation.

Data for the current study were collected as part of a larger, three-session assessment protocol. The PCL-R and a portion of the questionnaire measures (including the ESI) were administered in the initial session of testing; the diagnostic interview focusing on DSM-IV disinhibitory disorders was administered in the second session (by a separate interviewer), along with another portion of the questionnaires; the remaining questionnaires were completed in session 3. Scores for the PCL-R were available for the entire participant sample, but scores for certain other criterion measures were missing for some participants; *n*s for each criterion measure are presented in the data Tables. Participants received a payment of $10 for each session of testing, deposited into their institutional account. All three testing sessions were typically completed within two weeks.

The PCL-R and DSM-IV interviews were videotaped so that independent raters could perform secondary ratings on a subset (35% and 42%, respectively) of these interviews. Interviewers and secondary raters were clinical psychology graduate students or advanced undergraduate psychology majors trained extensively in concepts pertaining to DSM-IV externalizing disorders and psychopathy, and in specific procedures for PCL-R and DSM-IV diagnostic assessments. Absolute-agreement intraclass correlation coefficients were computed to evaluate interrater reliability of the PCL-R psychopathy and DSM-IV disorder diagnoses.

Measures

Externalizing Spectrum Inventory (ESI)—The current study utilized a 159-item version of the ESI consisting of the items of the 100-item form used by Hall et al. (2007) and Blonigen et al. (2011)—which as a set correlate very highly ($r = .98$) with scores on the full (415-item) inventory—supplemented by additional items chosen to ensure representation of all 23 lower-order ESI subscales and provide for effective estimation of

scores on the general factor and subfactors identified by Krueger et al. (2007).[2] Scales that loaded most heavily on one or another of the factors were represented more strongly in the item set than scales that loaded to a lesser degree. The representation of particular subscales, in terms of percentage of full-form items included in the 159-item ESI, ranged from 8.7% for the alcohol use and dependability subscales (i.e., 2 of 23 items) to 70% for the problematic impulsivity subscale (i.e., 14 of 20 items). Items were answered using a 4-point scale, with response options of *True*, *somewhat true*, *somewhat false*, and *False*.

The focus of the current study was on evaluating the correlates of overall scores on the ESI and scores on its general factor and subfactors. The internal consistency reliability (Cronbach's α coefficient) for items comprising the 159-item ESI as a whole was .97, and the mean inter-item correlation was .19.[3] For purposes of analysis, total scores on the ESI were computed by summing and averaging responses to all questions after coding all items in the direction of high scores indicating higher levels of externalizing. Using data from the ESI development sample (Krueger et al., 2007), the correlation between total scores on the 159-item ESI and scores on the full ESI was extremely high ($r = .99$); the correlation between scores on the 159-item ESI and scores reflecting the aggregate of items from the full ESI *not included* in the 159-item ESI was also very high ($r = .96$).

Along with total scores, we also estimated scores for the ESI_{DIS} factor and the two subfactors of the ESI (ESI_{AGG}, ESI_{SUB}) by aggregating scores for particular subscales into composite scores. The procedure we used to compute composite scores corresponding to factor/subfactor scores drew upon data from Krueger et al. (2007) pertaining to the strength and distinctiveness of particular ESI subscales as indicators of the general factor, or one or the other ESI subfactor. Specifically, for each of the factors, we computed composite scores consisting of standardized, weighted aggregates of the subscales that functioned as robust, distinctive indicators of each.[4] In Krueger et al. (2007; see Table 5), the subscales of the ESI that loaded prominently (.49 or higher; median = .73) on the ESI_{DIS} factor while loading minimally (<.22) on either subfactor were: irresponsibility, problematic impulsivity, impatient urgency, planful control (−), dependability (−), theft, and alienation. The subscales most robustly indicative of the ESI_{AGG} subfactor (loadings of .3 or higher; median = .46) were: relational aggression, empathy (−), destructive aggression, excitement seeking, physical aggression, rebelliousness, and honesty (−). Scales indicative of the ESI_{SUB} subfactor (loadings of .30 or higher; median = .48) were: marijuana use, marijuana problems, drug use, drug problems, and alcohol use. The alcohol problems scale (loading = .24) was also included in the computation of ESI_{SUB} due to the relevance of its content and because its inclusion as an indicator of this subfactor contributed to the overall fit of the Krueger et al. (2007) model.

The weights assigned to subscales in the computation of factor score composites consisted of the standardized loadings for those subscales on relevant factors as reported by Krueger et al. (2007). Weights were applied to maximize the correspondence of the computed factor scores to the higher-order factors that emerged from the structural analysis of the ESI. Table

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[2]Copies of the full (415-item) ESI, and the 100- and 159-item versions, can be obtained on request from the corresponding author.
[3]Internal consistency reliabilities (Cronbach's α) for subscales used in factor score computations in the present study were as follows: irresponsibility, .88; problematic impulsivity, .89; theft, .87; impatient urgency, .86; planful control, .66; dependability, .47; alienation, .64; relational aggression, .91; empathy, .63; destructive aggression, .88; excitement seeking, .88; physical aggression, .90, rebelliousness, .90; honesty, .77; marijuana use, .94; drug use, .87; marijuana problems, .90; alcohol use, .82; drug problems, .90; alcohol problems, .92.
[4]Correlations (Pearson's *r*) between ESI-159 and ESI-415 subscales used in computation of composite scores, utilizing data from Krueger et al. (2007), were as follows: irresponsibility, .96; problematic impulsivity, .98; theft, .97; impatient urgency, .92; planful control, .88; dependability, .86; alienation, .87; relational aggression, .95; empathy, .87; destructive aggression, .94; excitement seeking, .92; physical aggression, .95, rebelliousness, .93; honesty, .86; marijuana use, .97; drug use, .97; marijuana problems, .95; alcohol use, .84; drug problems, .96; alcohol problems, .92.

1 shows the weights assigned to subscales that were included as indicators of the general factor (ESI_{DIS}) and the two subfactors (ESI_{AGG}, ESI_{SUB}). Data from the ESI development sample (Krueger et al., 2007) were used to directly evaluate convergence between ESI-415 factor scores reported by Krueger et al. (2007) and ESI-159 factor score composites employed in the current analyses. Factor scores for the ESI-415 were derived by re-specifying, in Mplus (version 5; Muthén & Muthén, 1998-2007), the best-fitting hierarchical (bifactor) model of the 23 ESI subscales reported by Krueger et al., and then estimating regression-based factor scores from parameters of the model. ESI-159 composite scores were computed as standardized, weighted subscale aggregates for participants in the final wave of the ESI development sample ($n = 599$) for whom complete item-level data were available (see Krueger et al., 2007, for a description of the iterative process of item creation and scale refinement). For the general factor (ESI_{DIS}), the correlation between ESI-159 composite scores and ESI-415 regression-based factor scores in this subsample was .98. Controlling for variance in common with the general factor, ESI-159 composite scores for ESI_{AGG} and ESI_{SUB} each showed correlations of .89 with corresponding regression-based estimates of the two subfactors derived from the ESI-415 model. These analyses thus demonstrated a high degree of correspondence between ESI-159 factor score composites and scores on the general factor and subfactors from the ESI-415 structural model.

Within the present study sample, scores on each of the ESI factors correlated highly with ESI_{total} scores: ESI_{DIS} = .89; ESI_{AGG} = .85; ESI_{SUB} = .75. ESI factor scores also showed moderate to high intercorrelations: ESI_{DIS} and ESI_{AGG} r = .72, ESI_{DIS} and ESI_{SUB} r = .58; ESI_{AGG} and ESI_{SUB} r = .41. However, after controlling for their mutual association with ESI_{DIS}, scores on ESI_{AGG} and ESI_{SUB} emerged as uncorrelated (r < .01).

DSM-IV-TR (APA, 2000) Disinhibitory Psychopathology—A semi-structured diagnostic interview, patterned after relevant sections of the Structured Clinical Interview protocols for DSM-IV Axis I and II disorders (SCID-I and II; First, Spitzer, Gibbon, & Williams, 2002; First, Gibbon, Spitzer, Williams, & Benjamin, 1997), was conducted to assess for lifetime DSM-IV-TR symptoms of disinhibitory disorders including childhood conduct disorder (CD), adult antisocial behavior (AAB), alcohol dependence (AD), drug dependence (DD; illicit drug of choice and/or most problematic in consequences), and nicotine use disorder (NUD). Absolute-agreement intraclass correlation coefficients between primary and secondary diagnostic symptom ratings for a subset of participants (35%) were as follows: CD, .93; AAB, .73; AD, .96; DD, .98; and NUD, .91.

Based on prior research pointing to distinct subcategories of CD symptoms reflecting rule-breaking and aggression (Tackett, Krueger, Sawyer, & Graetz, 2003; Tackett, Krueger, Iacono, & McGue, 2005), we also examined scores for differing subsets of CD reflecting symptom groupings within the DSM-IV-TR (aggression toward people and animals, destruction of property, deceitfulness or theft, and serious violations of rules). In addition, we computed a composite interview-based index of externalizing proneness consisting of scores on the common factor derived from a factor analysis of symptoms of CD, AAB, AD, DD, and NUD (cf. Hicks et al., 2007; Patrick, Bernat, Malone, Iacono, Krueger, & McGue, 2006).

Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982; Tellegen & Waller, 2008)—Participants completed a brief form of the MPQ (MPQ-bf; Patrick et al., 2002) consisting of 155 items. The MPQ assesses 11 primary traits (Wellbeing, Social Potency, Achievement, Social Closeness, Stress Reaction, Alienation, Aggression, Control, Harm Avoidance, Traditionalism, Absorption) organized around three higher-order dimensions: positive emotionality (PEM; reflecting proneness to positive mood states and experiences), negative emotionality (NEM; reflecting tendencies toward negative mood

states and experiences), and constraint (CON; reflecting presence versus absence of tendencies toward planfulness, behavioral restraint, and conventional attitudes). The PEM factor is divisible into an agentic subfactor (PEM-A), reflecting proneness to derive well-being from leadership and achievement, and a communal subfactor (PEM-C), reflecting the propensity to derive satisfaction from affiliative relationships with others (Patrick et al., 2002; Tellegen & Waller, 2008). Values of Cronbach's α for the MPQ lower-order scales in the current sample were as follows: Wellbeing = .79, Social Potency = .80, Achievement = .76, Social Closeness = .84, Stress Reaction = .84, Alienation = 79, Aggression = .87, Control = .81, Harm Avoidance = .78, Traditionalism = .51, Absorption = .73. The MPQ also includes validity scales that provide for identification of inconsistent or biased response styles. 233 participants completed the MPQ; of these, 8 were judged to have invalid profiles. Thus, valid MPQ data were available for 225 participants.

Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988)—The NPI consists of 40 items designed to index narcissistic personality disorder as defined in the DSM-III (APA, 1980). Total scores on the NPI (Cronbach's α = .83 for the current sample) have been shown to correlate with constructs related to psychopathy and with FFM personality traits of Agreeableness (−), Openness to Experience (+), and Extraversion (+) (Paulhus & Williams, 2002). The NPI also yields scores on 7 subscales: Authority (α = .71), Exhibitionism (α = .55), Superiority (α = .55), Entitlement (α = .49), Exploitativeness (α = .60), Self-Sufficiency (α = .37), and Vanity (α = .70). In view of recent data supporting an alternative 2-factor representation of the NPI (Corry, Merritt, Mrug, & Pamp, 2008; Kubarych, Deary, & Austin, 2004), we also examined relations for scores on broader factors of Power (α = .80) and Exhibitionism (α = .59) as described in these studies.

Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996)—The PPI has emerged in recent years as one of the best-validated self-report measures for the assessment of psychopathy. As noted earlier, scores on its two factors (termed *fearless dominance* and *impulsive antisociality*; Benning et al., 2005) can be estimated from scores on broadband inventories of normal personality, including the MPQ. Measures of abnormal personality such as scales of the Minnesota Multiphasic Personality Inventory (MMPI) have also been shown to reliably predict scores on the PPI (Selbom, Ben-Porath, Lilienfeld, Patrick, & Graham, 2005). In the present study, we estimated PPI total and factor scores from the primary trait scales of the MPQ using regression-based formulae described by Benning et al. (2005). PPI factor scores computed in this manner have demonstrated validity in relation to a wide range of psychopathy-related criterion measures (Benning et al., 2005; Blonigen, Hicks, Krueger, Patrick, & Iacono, 2005). Participants in the current study were additionally administered the items of the three subscales of the PPI that define the inventory's fearless dominance factor: Social Potency, Stress Immunity, and Fearlessness. Cronbach's α reliabilities for these PPI subscales were .88, .78. and .88, respectively. Administration of these PPI subscales enabled us to compare relations of MPQ-estimated fearless dominance scores with ESI factor scores against relations for fearless dominance scores derived directly from the PPI.

Psychopathy Checklist Revised (PCL-R)—The PCL-R (Hare, 2003) was developed to assess criminal psychopathy in forensic settings. Its 20 items are scored on the basis of data from a semistructured interview in conjunction with information derived from collateral sources (i.e., institutional file records). The items of the PCL-R are viewed as having a hierarchical organization (Hare & Neumann, 2006), in which items comprising its affective-interpersonal (Factor 1) and antisocial deviance (Factor 2) components can be further subdivided into facets reflecting social guile and manipulativeness (Interpersonal facet), callous-unemotionality (Affective facet), impulsive-irresponsible tendencies (Lifestyle

facet), and antisocial behaviors (Antisocial facet). Scores for the PCL-R as a whole were computed for each participant, along with scores on its two broad factors and four lower-order facets. Interrater reliabilities of scores for the subset of study participants (42%) evaluated by independent diagnosticians were as follows: PCL-R total scores, .89; Factor 1, .82; Factor 2, .87; Interpersonal facet, .82; Affective facet, .76; Impulsive/Reckless Lifestyle facet, .77; Antisocial facet, .85. Values of Cronbach's α for these scores in the current sample were as follows: PCL-R total, .79; Factor 1, .79; Factor 2, .59; Interpersonal facet, .66; Affective facet, .73; Impulsive/Reckless Lifestyle facet, .63; Antisocial facet, .59.

Data Analysis

Simple (Pearson) correlations were computed to examine the validity of ESI_{total} and composite scores (ESI_{DIS}, ESI_{AGG}, ESI_{SUB}) for predicting disinhibitory psychopathology as assessed by interview, personality trait variables assessed via self-report, and psychopathic features as assessed by interview (PCL-R scores) and self-report (PPI scores). In addition, for each criterion variable, regression analyses were undertaken in which ESI_{DIS}, ESI_{AGG}, and ESI_{SUB} scores were included jointly as predictors. To quantify the distinct contribution of each of the ESI subfactors (ESI_{AGG}, and ESI_{SUB}) to prediction of criterion measures after controlling for their overlap with the general ESI_{DIS} factor, we also report semipartial correlation coefficients from the regression analyses for ESI_{AGG} and ESI_{SUB}. In addition, we report the multiple R for each regression model to quantify the relationship between the ESI factors as a set and each criterion measure. Findings from these regression analyses serve to emulate the hierarchical structure of the ESI reported by Krueger et al. (2007), in which variance associated with the ESI_{AGG} and ESI_{SUB} subfactors was parameterized as separate from variance associated with the general disinhibitory-externalizing factor. Statistical analyses excluded the eight participants whose MPQ profiles were deemed invalid. All statistical effects were evaluated at a significance level of .005.

Results

Interview-Based Assessment of Disinhibitory Psychopathology

Table 2 presents correlations between ESI scores and symptoms of DSM-IV-TR (APA, 2000) defined disinhibitory disorders (child and adult antisocial behavior and substance use disorders) assessed via diagnostic interview. Semipartial correlation coefficients are also presented for ESI_{AGG} and ESI_{SUB} composite scores to characterize unique predictive relations for these subfactors after controlling for their overlap with ESI_{DIS}. In addition, Table 2 presents multiple Rs for the prediction of each criterion variable from scores on the three ESI composite scores (ESI_{AGG}, ESI_{SUB}, and ESI_{DIS}) together. Along with evaluating relations with overall symptom counts for each of these DSM diagnoses, we also examined predictive associations for ESI_{total} and composite scores with individual AAB symptoms and with distinct subsets of CD symptoms reflecting aggression, property destruction, deceitfulness and theft, and serious violations of rules.

As predicted, ESI_{total} scores exhibited significant relations with symptom counts for all DSM disinhibitory disorders assessed, and a robust association with interview-based externalizing factor scores reflecting the systematic overlap among symptoms of these varying disorders; the magnitude of the association with the disorder-based externalizing factor ($r = .66$) was commensurate with what one would expect of indices of the same construct assessed in differing measurement domains (i.e., self-report vs. interview). In general, associations for ESI_{DIS} paralleled those for ESI_{total} scores, with the magnitudes of association somewhat lower for most variables. In contrast with ESI_{total} scores, ESI_{DIS} showed a higher correlation with adult (AAB) symptoms of APD than with child (CD) symptoms. The ESI_{DIS} composite scores showed significant relations with most individual

adult (AAB) criteria, but notably not with the Aggressive/Irritable and Lacks Remorse criteria.

In terms of simple (zero-order) correlations, ESI_{AGG} evidenced positive associations with symptom counts for disinhibitory disorders (alcohol dependence being the lone exception), and associations of similar magnitude with child and adult symptoms of APD. However, consistent with our hypotheses, regression analyses controlling for overlap with ESI_{DIS} indicated that variance unique to ESI_{AGG} was unrelated to symptoms of any of the substance-use disorders (AD, DD, NUD) and showed a stronger association with CD symptoms (the aggressive subset, in particular) than with AAB symptoms. The specific AAB symptoms predicted most strongly by the unique variance in ESI_{AGG} were the two that emerged as unrelated to the ESI_{DIS}: aggressiveness and lack of remorse.

At the zero-order level and in regression analyses, scores on ESI_{SUB} significantly predicted both child and adult symptoms of APD, and as predicted, symptoms of AD, DD, and NUD. However, the unique variance in ESI_{SUB} scores was not significantly related to any of the individual AAB symptoms, but did show significant relations with the property destruction and serious violation of rules symptoms of CD (but not the aggressive symptoms) as well as with AD and DD symptoms.

Self-Report Based Personality Variables

Table 3 presents results of correlational and regression analyses for personality trait variables consisting of MPQ higher-order factor and primary trait scores and NPI total and subscale scores. Consistent with our hypotheses, ESI_{total} scores showed significant positive and negative associations, respectively, with the higher-order NEM and CON factors of the MPQ and positive relations with scores on the NPI as a whole, two of its subscales (Exploitativeness, Exhibitionism), and the NPI Power factor. ESI_{total} scores were associated positively with the MPQ primary trait of Social Potency in the domain of PEM as well as all traits in the domain of NEM (Stress Reaction, Alienation, Aggression), and negatively with the trait of Control in the domain of CON. Higher scores on ESI_{DIS} were associated with high MPQ NEM (all facets) and low CON (diminished Control, in particular), along with somewhat diminished levels of Achievement and Social Closeness. ESI_{DIS} showed a modest positive association with one specific subscale of the NPI (Exploitativeness), but was unrelated to NPI narcissism as a whole.

At the zero-order level, scores on ESI_{AGG} showed positive and negative associations, respectively, with MPQ NEM (all facets) and CON (the Control facet, specifically). As predicted, regression analyses indicated that relations with Stress Reaction (+) and Control (−) subscales of the MPQ were attributable to overlap with ESI_{DIS}; after controlling for this overlap, variance unique to ESI_{AGG} was associated strongly with MPQ Aggression, and moderately with MPQ Social Potency. In addition, as a function of weak positive associations with Well-being and Achievement facets of PEM, coupled with the more robust association with Social Potency, ESI_{AGG} showed a net positive association with MPQ PEM-A after controlling for its overlap with ESI_{DIS}. ESI_{AGG} also evidenced robust associations with scores on the NPI as a whole and four of its subcales (Exploitativeness, Entitlement, Exhibitionism, Authority), in both simple correlations and regression analyses, as well as associations with both broad factors of the NPI (Power, Exhibitionism).[5]

In contrast with ESI_{DIS} and ESI_{AGG}, ESI_{SUB} evidenced significant zero-order associations only with personality variables in the domain of NEM (i.e., higher-order factor scores, and

[5]Caution is warranted in interpreting results for NPI subscales due to low alpha coefficients for some.

the facet scale of Aggression), which was attributable to its overlap with ESI_{DIS} (as revealed by regression analyses). Controlling for overlap with ESI_{DIS}, the ESI_{SUB} composite showed a significant association with the Control (+) and Social Closeness (+) trait scales of the MPQ, the latter of which, combined with weak positive associations with the trait of Social Closeness, yielded a modest positive relationship with the higher-order PEM-C factor. ESI_{SUB} did not show a significant association with scores on the NPI as a whole, either in simple correlational or regression analyses, and at the subscale level it evidenced a modest zero-order relationship only with Exploitativeness—attributable to its overlap with ESI_{DIS}.

Self-Report and Interview Based Psychopathy Measures

Table 4 presents results from simple correlation and regression analyses for criterion measures of psychopathy as assessed by self-report (PPI; Benning et al., 2003; 2005; Lilienfeld & Andrews, 1996) and diagnostic interview (PCL-R; Hare, 2003). ESI_{total} scores predicted overall scores on the PCL-R and PPI (estimated using trait scales of the MPQ) to a comparable, moderate degree. With respect to distinctive components of psychopathy, ESI_{total} scores showed predicted associations with the antisocial deviance (Factor 2) component of both the PCL-R and the PPI. In contrast, relations with the affective-interpersonal (Factor 1) component were non-significant for both the PCL-R and the PPI (whether estimated from MPQ trait scales, or computed from subscales of the actual PPI). With respect to the lower-order PCL-R facets, ESI_{total} scores were predictive of the impulsive-irresponsible ("Lifestyle") and Antisocial facets, and to a weaker degree the Interpersonal facet.

Results for ESI_{DIS} generally paralleled those for ESI_{total} scores, with the magnitude of correlations somewhat lower for some criterion variables and somewhat higher for others. Consistent with our hypotheses, ESI_{DIS} predicted antisocial deviance (PPI-II and PCL-R Factor 2) scores, but not affective-interpersonal (Factor 1) scores. With respect to the lower-order PCL-R facets, ESI_{DIS} was associated primarily with the impulsive-irresponsible ("Lifestyle") facet. In contrast with ESI_{DIS} scores, ESI_{AGG} evidenced significant associations with both the affective-interpersonal (Factor 1) and antisocial deviance (Factor 2) components of psychopathy, whether assessed in terms of the PCL-R or the PPI. As predicted, the associations with Factor 1 emerged most robustly in regression analyses, after controlling for overlap with ESI_{DIS}. Regression analyses for constituent subscales of PPI-I revealed that the association between the unique variance in ESI_{AGG} and PPI-I was attributable specifically to PPI Fearlessness and Social Potency. As a function of its relations with both factors of psychopathy, ESI_{AGG} showed stronger relations with total scores on both the PCL-R and the PPI compared to ESI_{DIS} at the zero-order level. With respect to the lower-order PCL-R facets, ESI_{AGG} evidenced significant associations with three out of four facets at the zero-order level (the Affective facet being the exception). In regression analyses controlling for overlap with ESI_{DIS}, the association with the impulsive-irresponsible ("Lifestyle") facet dropped out, and the association with the callous-unemotional (Affective) facet increased somewhat and reached significance. ESI_{SUB} scores showed a positive association with Factor 2 of the PCL-R, but predominantly as a function of its overlap with the ESI_{DIS} factor. ESI_{SUB} showed a modest positive association with actual PPI-1 scores at the zero-order level that remained significant in the regression analysis.

Discussion

Our goals in the current study were to: 1) introduce a scale-based approach to computing scores on the distinctive higher-order factors of the ESI identified by Krueger et al. (2007); and 2) evaluate the construct validity of ESI total and factor scores in relation to a range of relevant criterion measures. Incarcerated offenders were studied to ensure strong

representation of individuals with high externalizing propensities and pathology. Our findings are discussed below in terms of the constructs embedded within the ESI.

Convergent and Discriminant Validity of Higher-Order ESI Constructs

Scores on the ESI as a whole (ESI_{total}) reflect a general disinhibitory propensity that is associated with a heightened incidence of DSM-defined externalizing disorders and elevated levels of psychopathic features (impulsive-antisocial features, in particular), and a personality profile marked by high negative affectivity in particular (i.e., traits of stress reactivity, alienation, and aggression), along with impulsiveness/low control. Krueger et al. (2007) demonstrated that the subscales of the ESI are organized hierarchically, with all scales indexing the broad externalizing propensity to varying degrees. In the current study, the broad externalizing factor was operationalized by aggregating the purest scale indicators of this factor into the ESI_{DIS} composite. The current findings provide support for the idea that the ESI as a whole, and the general factor on which all of its subscales load, indexes general proneness to disinhibitory psychopathology (Krueger et al., 2002, 2007) and affiliated traits in the domains of negative affectivity and impulsiveness (cf. Krueger, 1999b; Sher & Trull, 1994). ESI_{total} and ESI_{DIS} scores also showed significant positive relations with psychopathy as indexed by both the self-report based PPI and the interview-based PCL-R. Consistent with prediction based on prior work (Patrick et al., 2005), associations were most evident for the antisocial deviance (Factor 2) component of each psychopathy measure. The consistency of validity coefficients for ESI_{total} and ESI_{DIS} in relation to most criterion measures reflects the dominant contribution of the broad externalizing factor to the variance in each. However, differences were evident in relations of the two ESI scores with some criterion measures (e.g., ESI_{total} scores were more strongly predictive of aggressive conduct problems and PCL-R antisocial behavior than ESI_{DIS} scores, and exclusively predictive of affective-interpersonal features of psychopathy and exhibitionistic features of narcissism). As discussed below, these differences can be attributed to unique contributions of the ESI_{AGG} and ESI_{SUB} subfactors to variance in ESI_{total} scores.

Scores on ESI_{AGG} (in particular, when controlling for overlap with ESI_{DIS}) are indicative of antisocial tendencies involving aggression, hostility, and deficient remorse or empathy. Interestingly, the unique variance in ESI_{AGG} was related more strongly to child than adult symptoms of APD, presumably owing to the stronger emphasis on aggressive antisocial tendencies in the conduct disorder criteria. This finding is consistent with theory and research suggesting a subdimension (Tackett et al., 2003, 2005) or subtype (cf. Frick & White, 2008) of conduct disorder distinguished by callous-aggressive tendencies. Consistent with this perspective, the specific adult APD criteria that evidenced significant associations with the unique variance in ESI_{AGG} (i.e., after controlling for ESI_{DIS}) were the aggression/hostility and lack of remorse items.

Associations of ESI_{AGG} with affective-interpersonal symptoms of psychopathy were especially pronounced when controlling for ESI_{DIS}. In contrast with ESI_{DIS} scores, which correlated mainly with the impulsive-irresponsible (Lifestyle) facet of the PCL-R, the unique variance in ESI_{AGG} was unrelated to the Lifestyle facet, but robustly associated with the antisocial facet as well as the interpersonal and affective facets. These findings appear consistent with models of psychopathy conceptualizing affective-interpersonal and disinhibitory components of the syndrome as distinct phenotypic entities (Cooke & Michie, 2001), with potentially different underlying etiologies (Frick & White, 2008; Patrick et al., 2009).

Taken together, these findings are consistent with the notion that callous-unemotional traits reflect stable psychopathic tendencies identifiable in youth that persist into adulthood (Frick & White, 2008). In this regard, ESI_{AGG} appears to tap aspects of the core affective-

interpersonal component of psychopathy, which distinguishes the syndrome from antisocial-externalizing deviance associated with the diagnosis of APD. ESI_{AGG} is characterized in personality terms by tendencies toward narcissism, self-centeredness, attention-seeking, and forceful/aggressive interactions with others, consistent with predictions that ESI_{AGG} would reflect an aggressive, interpersonally antagonistic personality profile (cf. Lynam & Widiger, 2007). Notably, whereas the general disinhibition factor of the ESI (ESI_{DIS}) was robustly associated with all facets of negative emotionality, ESI_{AGG} was associated only with the aggression facet after controlling for overlap with ESI_{DIS}. This overall profile coincides with the phenotypic concept of *meanness* described by Patrick and colleagues (2009) as a core element of psychopathic personality, distinguishable from the *disinhibition* component.

Composite scores indexing the Substance Abuse subfactor of the ESI (ESI_{SUB}) exhibited some significant relations with available criterion measures, but these associations were generally weaker and less distinctive than associations for scores on the general disinhibition factor (ESI_{DIS}) or the callous-aggression subfactor (ESI_{AGG}). ESI_{SUB} scores accounted for variance in DSM-IV APD symptoms (in particular, property destruction and serious rule violations in childhood) and substance-related disorders beyond that accounted for by ESI_{DIS}. One possible basis for this incremental relationship could be personality factors associated distinctively with substance abuse proneness that contribute to maladaptive behavioral outcomes separately from disinhibitory-externalizing tendencies. However, the unique variance in ESI_{SUB} scores evidenced only weak relations with MPQ personality traits—specifically, traits entailing adaptive as opposed to maladaptive tendencies (i.e., higher Social Closeness and Control). This finding could perhaps reflect the fact that substance use can be a social activity, as suggested by previous research documenting a positive relationship between the broad trait of extraversion and alcohol use (e.g., Brennan, Walfish, & AuBuchon, 1986; for a review see Sher & Trull, 1994). Alternatively, the contribution of ESI_{SUB} to prediction of APD symptoms as well as substance problems could reflect the fact that engagement in alcohol and/or drug abuse contributes directly to reckless, destructive behavior through the disinhibiting effects of substances themselves and the contexts in which abuse occurs (e.g., peer situations involving recreational or adventurous activities). Finally, with regard to psychopathy, ESI_{SUB} evidenced a significant positive association with Factor 1 of the PPI ("fearless dominance") even after controlling for its overlap with ESI_{DIS}—possibly indicative of a distinct pattern of substance abuse among individuals high in boldness/venturesomeness (Cleckley, 1976; Hicks, Iacono, & McGue, 2011).

Implications for Clinical Assessment and Research

Dimensional models of psychopathology have proven valuable as a means of addressing the well-known phenomenon of diagnostic cormorbidity through delineation of broad factors accounting for the systematic covariance among disorders of particular kinds. These broad factors have been conceptualized as underlying trait dispositions that confer vulnerability to varying disorders within a spectrum (Krueger, 1999b; Krueger et al., 2002; Mineka, Watson, & Clark, 1998). If so, from both etiological-investigative and clinical-intervention standpoints, it becomes important to establish methods for assessing disorders known to be interrelated in terms of the broad factors they share as well as the aspects that mark each as distinct. The ESI provides a method of this kind for assessing disorders in the externalizing spectrum. The measurement model on which it is based organizes this domain of problems and traits hierarchically—in terms of interrelated lower-order subscales that function as indicators of broader thematic dimensions (Krueger et al., 2007). At the lower-order scale level, the ESI provides fine-grained information about proclivities of various types including impulsiveness, irresponsibility, deceitfulness, thievery, alienation, rebelliousness, sensation-seeking, aggressiveness, and alcohol/drug abuse and dependence. At the higher-order factor

level, it provides information about an individual's position along broad dispositional dimensions reflecting general disinhibitory tendencies, aggressive/exploitative behavior reflecting callousness and excitement-seeking, and proclivities toward abuse of alcohol and drugs not accounted for by general disinhibition.

The current study is the first to systematically evaluate the validity of the ESI in relation to interview- and self-report based criterion measures in a clinical participant sample. Our analysis focused on validation of the ESI as a whole and its general factor and subfactors because the abbreviated (159-item) version of the inventory we used—for reasons of feasibility in the context of a large overall assessment protocol—was designed to provide effective measurement at the higher-order factor level, but not at the lower-order scale level. The study yielded compelling evidence for the validity of the ESI and its general disinhibition factor in relation to clinical diagnostic criteria and personality trait variables. This, in conjunction with recent work establishing the validity of overall ESI scores in relation to physiological criterion measures (Bernat et al., 2011; Hall et al., 2007; Nelson et al., 2011), encourages use of the ESI as a method for quantifying general proneness to disinhibitory (externalizing) psychopathology. In future studies utilizing the ESI in correctional settings, it will be useful to further evaluate the predictive validity of the instrument in relation to other problem behaviors such as risk-taking and suicidality, institutional adjustment (including disciplinary infractions), participation in and response to treatment, and behavior upon release from prison (including social-occupational adjustment and recidivism).

Our findings also provide evidence for the callous-aggression subfactor of the ESI as a point of contact between the externalizing spectrum and the core affective-interpersonal features of psychopathy. Whereas the ESI general disinhibition factor correlated exclusively with the antisocial deviance (Factor 2) component of psychopathy, variance unique to ESI_{AGG} evidenced robust associations with the affective-interpersonal (Factor 1) component as well as with persistent engagement in aggressive-antisocial behavior. Taken together, these findings indicate that the general and callous-aggression factors of the ESI differentially index two of the three phenotypic components specified in the triarchic model of psychopathy (Patrick et al., 2009): the disinhibition and meanness components, respectively. In this regard, ESI_{AGG} represents a promising referent for further work aimed at clarifying the nature and scope of the meanness construct proposed by Patrick et al. (2009). Given that operational measures are at best approximations to intended constructs and that the process of construct validation is inherently iterative (Cronbach & Meehl, 1955), further systematic research incorporating alternative measures of the meanness construct along with additional criterion variables (including behavioral and neurobiological as well as psychometric and diagnostic criteria) is needed to extend the current work.

Our results also provide some evidence for the validity of the ESI substance abuse subfactor —particularly in relation to alcohol and drug dependence as defined by DSM criteria. However, a limitation of the current study with respect to validating this component of the ESI model is that the participant sample consisted of incarcerated offenders rather than individuals selected specifically for substance use disorders. Although substance-related problems are common among incarcerated individuals, problems of this kind may be more intertwined with a pattern of chronic antisocial behavior reflecting general disinhibitory proneness in such individuals. It is quite conceivable that associations for ESI_{SUB} with criterion measures of personality and psychopathology would differ in samples consisting of patients undergoing treatment for substance use disorders, in whom addictive behaviors comprise the predominant presenting problem. We look forward to further research evaluating the criterion-related validity of the ESI in samples consisting of individuals with primary alcohol and drug disorder diagnoses, as well as samples of individuals exhibiting

addictive behaviors of other types (e.g., pathological gambling; compulsive sexual behavior). Thus, further research is needed examining the criterion-related validity of this component of the ESI in samples consisting of individuals with primary substance disorders.

In studies of this kind, as well as in other follow-up research with correctional samples, it will be useful to include administration of the full ESI to enable assessment of participants at both the lower-order scale and higher-order factor levels. This research would provide for validation of individual ESI scales, and for characterization of individuals in terms of lower-order scale profiles. It will be interesting, for example, to test for the presence of subgroups of individuals exhibiting particular configurations of ESI scale elevations using techniques such as model-based cluster analysis (cf. Hicks, Markon, Patrick, Krueger, & Newman, 2004)—and to evaluate whether these subgroups differ in key clinical outcomes such as response to treatment and relapse/recidivism. In follow-up work utilizing the full ESI-415 item set, it will be also valuable to develop item-based measures of the ESI's higher-order factors in order to facilitate additional research on their distinctive correlates.

A further notable point is that the hierarchical measurement model on which the ESI is based provides an innovative approach to assessment from the standpoint of neurobiological analysis. Research to date indicates that variance in the shared disinhibitory factor underlying disorders in the externalizing spectrum is predominantly heritable (~80%; Krueger et al., 2002; Vollebergh, Iedema, Bijl, Graaf, Smit, & Ormel, 2001) and accounts for observed relations between indices of brain response and differing problems and traits in this spectrum (Bernat et al., 2011; Hall et al., 2007; Nelson et al., 2011; Patrick et al., 2006). These findings provide support for the idea that scores on the general disinhibitory factor reflect variations in underlying dispositional vulnerability to externalizing psychopathology, and point to this factor as a crucial target of study in efforts to establish neurobiologically-oriented systems for diagnosing mental disorders (cf. Hyman, 2007; Insel & Scolnick, 2006) and identify brain mechanisms underlying disorders in this spectrum (cf. Patrick & Bernat, 2010). Given evidence for distinguishable genetic influences contributing to affective-interpersonal features of psychopathy (Blonigen. Carlson, Krueger, & Patrick, 2003; Viding, Blair, Moffitt, & Plomin, 2005) and specific liability to substance-related problems (e.g., Kendler et al., 2003), genetic and neuroscientific studies focusing on the distinct callous-aggression and substance abuse subfactors as operationalized by the ESI are also likely to be valuable in this regard.

Acknowledgments

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Table 1

Scales of the Externalizing Spectrum Inventory (Krueger et al., 2007): Weights Used in Computation of Disinhibition, Callous-Aggression, and Substance Abuse Composite Scores.

Disinhibition		Callous-Aggression		Substance Abuse	
Subscale	*Weight*	*Subscale*	*Weight*	*Subscale*	*Weight*
Irresponsibility	.925	Relational Aggression	.676	Marijuana Use	.613
Problematic Impulsivity	.913	Empathy	−.554	Drug Use	.490
Theft	.872	Destructive Aggression	.551	Marijuana Problems	.476
Impatient Urgency	.726	Excitement Seeking	.457	Alcohol Use	.357
Planful Control	−.661	Physical Aggression	.412	Drug Problems	.303
Dependability	−.661	Rebelliousness	.305	Alcohol Problems	.237
Alienation	.487	Honesty	−.305		

Table 2

Relations between Externalizing Spectrum Inventory (ESI) Composite Scores and Interview Assessed DSM-IV Disinhibitory Psychopathology Symptoms: Pearson Correlations and Regression Coefficients

Criterion Measure	ESI Total $r_{zero\text{-}order}$	General Disinhibition $r_{zero\text{-}order}$	Callous-Aggression $r_{zero\text{-}order}$ / $r_{semipartial}$	Substance Abuse $r_{zero\text{-}order}$ / $r_{semipartial}$	Model R
Common Externalizing Factor[a]	**.66**	**.54**	**.53** / **.22**	**.57** / **.31**	**.67**
Adult Antisocial Behavior					
Total Symptom Count	**.54**	**.45**	**.47** / **.20**	**.42** / .18	**.53**
Unlawful Behavior	**.24**	**.22**	.13 / −.05	**.28** / .19	**.29**
Deceitfulness	**.46**	**.39**	**.37** / .12	**.36** / .16	**.44**
Impulsivity	**.27**	**.22**	**.26** / .14	.20 / .09	.28
Aggression/Hostility	.19	.09	.21 / **.21**	.11 / .05	.23
Disregard for Safety	**.32**	**.29**	**.25** / .06	**.22** / .07	**.31**
Irresponsibility	**.31**	**.31**	.18 / −.06	**.29** / .14	**.34**
Lack of Remorse	**.22**	.15	**.27** / **.22**	.14 / .05	.28
Conduct Disorder					
Total Symptom Count	**.42**	**.30**	**.45** / **.34**	**.34** / .19	**.49**
Aggression Criteria[b]	**.32**	.20	**.38** / **.33**	.19 / .07	**.40**
Property Destruction Criteria[b]	**.37**	**.29**	**.33** / .17	**.35** / **.21**	**.40**
Deceitfulness/Theft Criteria[b]	**.37**	**.28**	**.38** / **.25**	**.25** / .10	**.39**
Serious Rule Violation Criteria[b]	**.24**	.14	**.24** / .19	**.28** / **.23**	**.34**
Substance Use Disorders (Symptoms)					
Alcohol Dependence	**.30**	**.30**	.17 / −.07	**.33** / **.20**	**.37**
Nicotine Use Disorder	**.29**	**.22**	**.22** / .07	**.27** / .17	**.29**
Drug Dependence	**.57**	**.47**	**.33** / −.04	**.62** / **.43**	**.64**

Note. $n = 162$. Bold font entries are significant at the $p < .005$ level.

Zero-order correlations ($r_{zero\text{-}order}$) reflect bivariate correlations for each ESI score and criterion measure. To index distinct contributions of Callous-Aggression and Substance Abuse scores to prediction of criterion measures after controlling for their mutual association with General Disinhibition, semipartial correlation coefficients ($r_{semipartial}$) from regression models incorporating all three ESI factors as predictors are presented alongside zero-order correlations.

Model R = multiple R from regression model incorporating scores on all three ESI factors (General Disinhibition, Callous-Aggression, Substance Abuse) as predictors of the criterion measure.

[a]The common Externalizing Factor represents the shared variance amongst DSM-IV disinhibitory disorders (symptom counts) extracted via principal axis factor analysis.

[b]Conduct Disorder symptom groupings based on categories of diagnostic criteria specified in DSM-IV-TR (APA, 2000).

Table 3

Relations between Externalizing Spectrum Inventory (ESI) Composite Scores and Self-Report Personality Measures: Pearson Correlations and Regression Coefficients

Criterion Measure	ESI Total $r_{zero-order}$	General Disinhibition $r_{zero-order}$	Callous-Aggression $r_{zero-order}$ / $r_{semipartial}$	Substance Abuse $r_{zero-order}$ / $r_{semipartial}$	Model R
Higher-Order MPQ factors (n = 225)					
Agentic Positive Emotionality	−.04	−.17	.02 / **.20**	.02 / .14	**.30**
Communal Positive Emotionality	.00	−.13	−.02 / .10	.09 / **.20**	**.26**
Negative Emotionality	**.45**	**.43**	**.53** / **.32**	**.26** / .02	**.54**
Constraint	**−.22**	**−.31**	**−.29** /−.09	−.08 / .12	**.35**
Primary MPQ Trait Scales					
Wellbeing	−.06	−.15	−.03 / .10	.04 / .15	.24
Social Closeness	−.12	**−.21**	−.17 /−.02	.03 / **.18**	**.28**
Social Potency	**.22**	.08	**.26** / **.30**	.14 / .12	**.34**
Achievement	−.11	**−.19**	−.07 / .10	−.04 / .08	.23
Stress Reaction	**.34**	**.40**	**.34** / .07	.17 /−.07	**.42**
Alienation	**.30**	**.33**	**.36** / .17	.15 /−.05	**.38**
Aggression	**.44**	**.33**	**.57** / **.48**	**.26** / .08	**.59**
Control	**−.33**	**−.47**	**−.38** /−.05	−.11 / **.18**	**.51**
Harm Avoidance	−.12	−.12	−.16 /−.11	−.06 / .01	.16
Traditionalism	.07	.04	−.02 /−.07	.05 / .03	.09
Absorption	.15	.11	.18 / .14	.09 / .03	.18
NPI (n = 224)					
Total	**.20**	.12	**.30** / **.32**	.12 / .07	**.34**
Raskin & Terry (1988) 7-factor					
Authority	.15	.06	.17 / **.19**	.13 / .12	.22
Exhibitionism	**.24**	.15	**.36** / **.37**	.13 / .05	**.40**
Superiority	−.10	−.09	−.02 / .07	−.09 /−.03	.12
Entitlement	.15	.12	**.27** / **.27**	.03 /−.05	**.30**
Exploitativeness	**.34**	**.30**	**.39** / **.26**	**.19** / .02	**.40**
Self-Sufficiency	−.08	−.13	−.04 / .08	.01 / .11	.19
Vanity	.03	.02	.08 / .10	.03 / .02	.10
Kubarych et al. (2004) 2-factor					
Power	**.19**	.13	**.27** / **.25**	.10 / .03	**.28**
Exhibitionism	.15	.07	**.28** / **.33**	.07 / .03	**.34**

Note. Bold font entries are significant at the $p < .005$ level.

Zero-order correlations ($r_{zero-order}$) reflect bivariate correlations for each ESI score and criterion measure. To index distinct contributions of Callous-Aggression and Substance Abuse scores to prediction of criterion measures after controlling for their mutual association with General Disinhibition, semipartial correlation coefficients ($r_{semipartial}$) from regression models incorporating all three ESI factors as predictors are presented alongside zero-order correlations.

Model R = multiple R from regression model incorporating scores on all three ESI factors (General Disinhibition, Callous-Aggression, Substance Abuse) as predictors of the criterion measure.

MPQ = Multidimensional Personality Questionnaire; NPI = Narcissistic Personality Inventory

Table 4

Relations between Externalizing Spectrum Inventory (ESI) Composite Scores and Self-Report and Interview-Based Psychopathy Facets: Pearson Correlations and Regression Coefficients

Criterion Measure	ESI Total $r_{zero-order}$	General Disinhibition $r_{zero-order}$	Callous-Aggression $r_{zero-order}$ / $r_{semipartial}$	Substance Abuse $r_{zero-order}$ / $r_{semipartial}$	Model R
PPI Scores					
PPI-I (actual; *n = 224*)	.15	.01	**.19** / **.27**	.18 / **.21**	**.34**
Fearlessness	**.30**	**.23**	**.34** / **.26**	**.28** / .17	**.39**
Social Potency	.07	−.07	.11 / **.23**	.09 / .16	**.29**
Stress Immunity	**−.24**	**−.33**	**−.23** / .02	−.08 / .13	**.36**
PPI-I (MPQ estimated; *n = 225*)	.05	−.10	.11 / **.26**	.07 / .14	**.31**
PPI-II (estimated)	**.41**	**.47**	**.51** / **.25**	.18 /−.10	**.54**
PPI Total (estimated)	**.35**	**.29**	**.48** / **.39**	.18 / .02	**.49**
PCL-R Scores (n = 235)					
Total	**.37**	**.29**	**.40** / **.28**	**.24** / .09	**.41**
Factor 1	.14	.07	**.22** / **.24**	.03 /−.02	**.25**
Factor 2	**.46**	**.39**	**.45** / **.25**	**.35** / .16	**.49**
PCL-R Facets					
Interpersonal Style	.17	.11	**.23** / **.22**	.03 /−.04	**.24**
Deficient Affective Experience	.08	.02	.17 / **.21**	.02 / .01	.21
Antisocial Tendencies	**.26**	.14	**.32** / **.31**	**.19** / .13	**.37**
Impulsive Behavioral Style	**.45**	**.46**	**.38** / .08	**.35** / .11	**.48**

Note. Bold font entries are significant at the *p* < .005 level.

Zero-order correlations ($r_{zero-order}$) reflect bivariate correlations for each ESI score and criterion measure. To index distinct contributions of Callous-Aggression and Substance Abuse scores to prediction of criterion measures after controlling for their mutual association with General Disinhibition, semipartial correlation coefficients ($r_{semipartial}$) from regression models incorporating all three ESI factors as predictors are presented alongside zero-order correlations.

Model *R* = multiple *R* from regression model incorporating scores on all three ESI factors (General Disinhibition, Callous-Aggression, Substance Abuse) as predictors of the criterion measure.

PPI = Psychopathic Personality Inventory; PCL-R = Psychopathy Checklist Revised