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Identifying subtypes of criminal psychopaths: A replication and extension

Marc T. Swogger^{1,2} and David S. Kosson¹

¹ Department of Psychology, Rosalind Franklin University of Medicine and Science, North Chicago, Illinois

² Department of Psychiatry, University of Rochester Medical Center

Abstract

Psychopathy is an important construct in offender classification. Although several studies have suggested that there are two distinct subtypes of psychopaths, these studies have considerable limitations, including reliance on self-report measures, a failure to adequately address heterogeneity within the construct of psychopathy, and predictor-criterion contamination. A recent taxonomic study identified four subgroups of offenders, including primary and secondary psychopaths. We used cluster analysis to replicate and extend those findings to: 1) an independent sample; and 2) a PCL-R factor model that reduces predictor-criterion contamination. Additionally, we validated initial results using a novel clustering method. Results show that psychopathy subtypes are replicable across methods. Moreover, comparisons on other variables provide external validation of the subtypes consistent with prior theoretical conceptualizations.

Keywords

psychopathy; subtypes; primary psychopathy; secondary psychopathy; violence

Criminal offenders differ in important ways, and the classification of offenders into homogeneous groups has long been the subject of scientific inquiry. Such subdivision may inform efficient application of treatments and may be useful in the prediction of future dangerousness. Personality disorders are often considered useful in classifying criminal offenders. Among these, psychopathy, with its association with impulsivity, egocentricity and remorselessness, may be of particular use in offender taxonomies (Clements, 1996; Knight & Prentky, 1990; Lykken, 1995; Skeem et al., 2004). Psychopathy is reported to predict both violent and non-violent recidivism (Salekin, Rogers, Ustad & Sewell, 1998; Serin, 1996; Seto & Barbaree, 1999) as well as lack of treatment response (Harris, Rice, & Cormier, 1991; Rice, Harris, & Cormier, 1992; Wong & Hare, 2005) and a variety of deficits in emotional and cognitive function (for reviews see Hare, 1998; Newman, 1998).

The gold standard for assessing psychopathy is the Psychopathy Checklist-Revised (PCL-R; Hare, 1991). Extensive research attests to the reliability and validity of the PCL-R as a measure of psychopathy (Hare, 2003). Of the different structural models that underlie PCL-R scores, the two-factor model (Harpur, Hare, & Hakstian, 1989) has dominated the literature. In this model, Factor 1 consists of items related to affective and interpersonal behavior, whereas Factor 2 items are related to antisocial lifestyle and social deviance. Alternatively, a three-factor model

of psychopathy has been proposed in which Arrogant and Deceitful Interpersonal Style, Deficient Affective Experience, and Impulsive and Irresponsible Behavioral Style comprise the dimensions underpinning psychopathy (Cooke & Michie, 2001). These three factors correspond closely with the three domains — affective, interpersonal and behavioral — emphasized by Cleckley (1976) and Hare (1991). Cooke and Michie (2001) argued that the two-factor model provides an insufficient description of psychopathy and that all three factors in the newer model are necessary for characterizing the disorder. Recently, a four-facet model has been proposed (Hare, 2003) that incorporates the three factors utilized by Cooke and Michie, along with a facet comprised of PCL-R items related to antisocial behavior.

A variety of sources suggest that there is heterogeneity even within the subset of offenders who exhibit psychopathic features. One source of differences among psychopaths may relate to trait anxiety. There is considerable controversy regarding anxiety and psychopathy. Although deficient anxiety has been posited as the mechanism underlying psychopaths' failure to respond to punishment (Lykken, 1957), findings regarding this deficiency have been inconsistent with several studies reporting little association between psychopathy and self-reported anxiety (Hale, Goldstein, Abramowitz, Calamari, & Kosson, 2004; Schmitt & Newman, 1999) and other studies noting unique positive and unique negative relations between anxiety and scores on each of the two dimensions reported to underlie psychopathy (Hare, 2003). It remains plausible, however, that elevated trait anxiety distinguishes a subgroup of psychopaths (Poythress & Skeem, 2006). Consistent with this view, numerous differences between high-anxious and low-anxious psychopaths have been demonstrated (Newman, MacCoon, Vaughn, & Sadeh, 2005; Newman, Schmitt, & Voss, 1997).

Prior taxonomies have suggested a distinction between primary and secondary psychopathy (e.g., Karpman, 1948; Lykken, 1995). Primary psychopaths are said to exhibit traits consistent with Cleckley's (1976) conceptualization of the psychopath such as lack of remorse, lack of empathy, and shallow emotions. Secondary psychopaths are reportedly characterized by greater anxiety and negative affectivity, a higher level of substance abuse, and lower scores on PCL-R Factor 1 than primary psychopaths (Blackburn, 1998). Available data suggests that the presence versus absence of affective deficits may be of particular importance in differentiating primary from secondary psychopaths (Skeem, Poythress, Edens, Lilienfeld, & Cale, 2003).

Several cluster analytic studies using questionnaires that include scales purportedly measuring psychopathic traits have uncovered subtypes with characteristics consistent with the theoretical conceptualizations of primary and secondary psychopathy. Blackburn (1975), using the Minnesota Multiphasic Personality Inventory (MMPI), found evidence for two groups of impulsive, under-socialized criminals among patients at a British high-security psychiatric hospital: one with low anxiety, and one with high levels of anxiety and greater proneness to guilt. Henderson (1982) replicated these findings, again using the MMPI, among violent offenders. Wales (1995), using the Millon Clinical Multiaxial Inventory (MCMI), found two clusters of offenders with psychopathic traits among referrals to a forensic psychiatric service. Both scored high on the antisocial, narcissistic and histrionic scales of the MCMI. However, the first psychopathic cluster was relatively free of additional pathology, whereas the second cluster exhibited high scores on scales measuring schizoid, avoidant, dependent and passive-aggressive traits. Wales (1995) suggested that the first group corresponded with previous accounts of primary psychopathy, and the second with accounts of secondary psychopathy.

Blackburn and Coid (1999) employed the Structured Clinical Interview for DSM-III Axis II disorders (SCID-II) to establish six groups of criminal offenders based on psychiatric symptoms. Three of these groups were characterized by a large number of antisocial traits including impulsivity and criminal behavior, and membership in these groups was associated with high PCL-R scores. Moreover, two of these groups appeared similar to primary and

secondary psychopaths: the first group (primary psychopaths) was characterized by personality traits related to detachment; the second (secondary psychopaths), by traits related to sensitivity. The remaining antisocial subgroup had a mixture of traits, including those related to inhibition (i.e., avoidance, dependence, and schizoidia). Recently, Hicks, Markon, Patrick, Krueger, and Newman (2004) used the brief form of the Multidimensional Personality Questionnaire (MPQ-BF; Patrick, Curtin, & Tellegen, 2002) to identify psychopathic subtypes among PCL-R identified psychopaths. Their analysis resulted in the identification of two clusters: one with personality traits consistent with the proposed features of primary psychopaths (i.e., low Stress Reaction, high Agency) and one with traits consistent with the proposed features of secondary psychopaths (i.e., high Negative Emotionality, low Constraint, low Communion), respectively.

Despite some consistency regarding the nature of the psychopathic subtypes identified in these investigations, the field is just beginning to investigate subtypes of psychopathy (Poythress & Skeem, 2006), and the understanding of variants of psychopathy “seems to be characterized much more by theory and informed speculation than by data” (Skeem et al., 2003, p. 526). The studies upon which subtypes have been based are marked by important limitations. Some prior studies (e.g., Blackburn, 1975; Henderson, 1982) have included only one measure clearly related to the psychopathy construct in a cluster analysis, and thus could not detect differences in the dimensions of psychopathy. Moreover, many studies have relied primarily on self-report measures for data used in taxonomic analysis (Blackburn, 1975; Henderson, 1982; Hicks et al., 2004; Wales, 1995), and were subject to problems endemic to the assessment of personality pathology via self-report. In particular, several authors have argued that self-report methods are of limited value in assessing psychopathy, both because psychopaths are prone to distort information to manage others’ impressions of them (e.g., Hare, 2003) and because they lack insight into their own emotions and motivations (Cleckley, 1976). Further, scores on many self-report measures used in prior taxonomic studies exhibit only modest correlations with scores on expert-rater (Hare, 2003) and observer-rater (Kosson, Steuerwald, Forth, & Kirkhart, 1997) measures of overall psychopathy. Thus, although subtyping studies that primarily utilize self-report measures converge somewhat in their resolution of the heterogeneity of psychopathy, it is not clear whether the subtypes that emerge are representative of those that would emerge if observer or expert-rater assessment methods were used.

Christian, Frick, Hill, & Tyler (1997) used parent and teacher ratings to assess callous and unemotional traits, and parent and teacher reports on a structured interview to assess symptoms of conduct disorder and oppositional defiant disorder among children ages 6 to 13. A cluster analysis of the ratings yielded four clusters. Of the two clusters characterized by individuals with high rates of conduct disorder and oppositional defiant disorder symptoms, one was comprised of individuals who were additionally characterized by callous and unemotional traits. Findings suggest a group of children with traits that correspond with those of adult primary psychopaths, and another antisocial group that, similar to secondary psychopaths, was characterized by impulsive antisocial behavior, but did not exhibit affective traits of psychopathy.

Until recently, among the taxonomic studies in which the PCL-R was used to derive clusters (see Alterman et al., 1998), there had been little attention to heterogeneity within the construct of psychopathy. However, two recent studies have employed the dimensions of a PCL-R-based instrument as clustering variables. Skeem et al. (2004) incorporated both factors of the Psychopathy Checklist: Screening Version (PCL-SV; Hart, Cox, & Hare, 1995), along with other variables, in a cluster analysis of civil psychiatric patients at high risk for violence. Results suggested three subtypes of patients, including one group with high scores on both PCL-SV dimensions, and a second group of patients who had who had lower levels of core psychopathic traits but exhibited the behavioral features of psychopathy (i.e., impulsive and antisocial behavior), along with high levels of alcohol and drug use. Similarly, Vincent, Vitacco, Grisso,

and Corrado (2003) used the three factor solution in a sample of male juvenile offenders assessed with a preliminary version of the Psychopathy Checklist: Youth Version (PCL:YV; Forth, Kosson, & Hare, 2003). They specified a four-cluster solution and obtained clusters as follows: one relatively low on all three factors, one relatively high on all three factors, one relatively high on the interpersonal and affective factors only, and one relatively high on the behavioral factor only. The above studies provided evidence for heterogeneity among psychopaths that is largely consistent with that yielded by prior studies.

The important findings of Skeem et al. (2004) and Vincent et al. (2003) raise the question of whether similar psychopathic subtypes can be identified in a general adult offender population using the PCL-R. To our knowledge only one published study (Vassileva, Kosson, Abramowitz, & Conrod, 2005) has incorporated dimensions underlying PCL-R scores as separate measures in a cluster analysis of general adult offenders. Vassileva et al. (2005) included scores on Factor 1 and Factor 2, along with measures of trait anxiety, interpersonal behavior associated with psychopathy, and drug and alcohol problems in the cluster variate. Findings were congruent with previous studies that identified clusters of primary and secondary psychopaths. Moreover, external validity for the obtained clusters was demonstrated using indices of criminal activity. Consistent with prior literature, primary psychopaths had been charged with a greater number of violent crimes and had a history of more incarcerations compared with other groups. However, the secondary psychopathic subgroup was charged with a greater number of nonviolent crimes. Both primary and secondary psychopaths displayed significantly greater criminal versatility than other groups. Thus, results provided evidence consistent with previous theoretical literature on the heterogeneity of psychopathy. However, a notable limitation of that study was criterion contamination; the use of the two-factor model of psychopathy reduced the power of the external validation of identified subgroups by including items assessing involvement in early and serious antisocial behavior in one of the variables (Factor 2) used in the cluster analysis. Indeed, criterion contamination is a prevalent concern in research that uses the PCL-R to identify relationships between psychopathy and violence (Patrick & Zempolich, 1998).

The present study aimed to replicate and extend the findings of prior studies regarding the presence of primary and secondary psychopathic subgroups of offenders. In order to maximize the validity of our assessments we relied on validated interviews and behavioral assessment measures instead of self-report measures, where possible. To this end, we employed separate PCL-R dimensions and the Interpersonal Measure of Psychopathy (IM-P; Kosson et al., 1997). Use of the IM-P, in addition to the PCL-R, has been found to lead to improved prediction of several theoretically important criteria including adult fighting, interviewer ratings of interpersonal behavior (Kosson et al., 1997), and social cognitive biases (Kosson, Suchy, & Cools, 2001). Additionally, the present study extends previous studies in several ways.

The current study utilized the three-factor model of psychopathy, rather than the two-factor model, thus substantially reducing criterion contamination in testing the relationships between cluster membership and antisocial behavior, and allowing for more meaningful external validation of the clusters. The three-factor model also provided a more differentiated assessment of three domains generally recognized as important for defining psychopathy: interpersonal, affective and behavioral.

There is some controversy regarding whether important differences exist between African American and European American PCL-R-identified psychopaths (see Skeem, Edens, Camp, & Colwell, 2004; Sullivan & Kosson, 2006). Although there is evidence to support the utility of the construct of psychopathy among both African American and European American individuals, psychopathy is less well validated among African Americans (Cooke, Kosson, & Michie, 2001). European American and African American individuals exhibit different

associations between PCL-R scores and several self-reported personality traits (Kosson, Smith, & Newman, 1990), and cognitive and emotional deficits observed in European American psychopaths often do not generalize to African Americans (Newman & Schmitt, 1998; Newman, Schmitt, & Voss, 1997; Thornquist & Zuckerman, 1995). By limiting our sample to European Americans, we avoided the possibility that ethnic differences would contribute to the derivation of clusters that would not be reliable among either European American or African American individuals alone.

We also improved upon the clustering methodology of prior studies. Although the approach of using Ward's hierarchical method to seed a non-hierarchical k-means analysis is recommended by a number of authors (e.g., Aldenderfer & Blashfield, 1984; Hair, Anderson, Tatham, & Black, 1995), this approach has also been criticized. In particular, because the iterative clustering methods used in many prior investigations (e.g., Blackburn & Coid, 1999; Vassileva et al., 2005; Vincent et al., 2003) tend to find locally optimum solutions (Steinley, 2003), different runs on the same input data may produce different results. For this reason, we examined the reliability of the cluster profiles generated in our primary analysis using cluster analysis functions developed by Steinley (2003) that conduct many separate k-means analyses based on multiple random starting points. Steinley (2003) demonstrated that these routines are superior to the cluster analytic procedures provided by the major statistical packages.

Like Vassileva et al. (2005), we included measures of drug and alcohol abuse/dependence in the cluster variate. Substance abuse may be an important characteristic for the classification of criminal offenders (Cloninger, 1987; Lewis, Rice, & Helzer, 1983; Skeem et al., 2004), and may interact with other personality characteristics to predict criminal behavior. Whether patterns of substance abuse are genetically linked to persistent antisocial behavior is unknown (Reardon, Lang, & Patrick, 2002). However, the high prevalence of substance-related disorders among criminal offenders, and the a priori likelihood of observing a cluster of offenders characterized primarily by drug and alcohol problems compelled us to include substance abuse/dependence measures in the cluster variate.

Based on prior research, it was hypothesized that emergent clusters would include groups of primary psychopaths and secondary psychopaths. We expected primary psychopaths to be characterized by elevated scores on the interpersonal and affective factors of the PCL-R, and by anxiety scores lower than those of secondary psychopaths. This group was also expected to exhibit more violent criminality than other groups and considerable criminal versatility. Based on prior research and theory, we expected secondary psychopaths to be characterized by elevated trait anxiety and elevated scores on the behavioral dimension of psychopathy, though with somewhat lower scores on the affective dimension than the primary psychopaths. Prior findings (Skeem et al., 2004; Vassileva et al., 2005) also suggested that this cluster would have higher scores on measures of drug and alcohol abuse than members of other clusters, and would exhibit considerable criminal versatility and a greater number of non-violent charges than members of other clusters.

Prior taxonomic studies have reported that, consistent with distinctions between social deviance and psychopathology, not all offenders are characterized by psychological problems (Wales, 1995). Thus, a third cluster, consisting of individuals with lower scores on most measures was predicted. These individuals were also expected to engage in less violent and nonviolent criminal activity than primary and secondary psychopaths. In addition to clusters similar to those predicted above, Vassileva et al. (2005) uncovered a fourth group consisting of offenders with intermediate scores on the dimensions of psychopathy, but without sufficient elevation to consider them psychopathic. Because this cluster had been somewhat less

distinctive than the other clusters, it was of interest whether this cluster would replicate with new measures and in an independent sample.

Method

Participants

Participants were 258 European American male county jail inmates drawn from a larger sample and selected using the following criteria: (1) age between 18 and 44, (2) convicted of a felony or misdemeanor, and (3) data were available on measures used for cluster derivation. Inmates who exhibited overt psychotic symptoms, were unable to read English, or used psychotropic medication at the time of interviewer contact were excluded.¹

Procedures

Participants were recruited via telephone during which a general description of the study was provided. In addition, participants were informed that they would be paid \$5.00 or \$8.00 for their involvement in the study. The amount of compensation was increased during the course of the study to approximate changes in minimum wage. Of those invited, approximately 70% agreed to participate. A semi-structured interview was conducted to gather information regarding education, relationships, family life, and criminal, medical and work history. This information was used by trained raters to complete the PCL-R and to assess Conduct Disorder and Antisocial Personality Disorder (ASPD) according to DSM-IV criteria. Directly following the interview, participants completed a structured clinical interview to assess alcohol and drug abuse and dependence, and several self-report measures. The sessions took approximately two and a half hours to complete. Reviews of institutional files on each participant were conducted, and the PCL-R was completed based on the interview and file review. Afterwards, the interviewer completed the IM-P. During some sessions an additional trained rater was available to observe the interview and complete PCL-R and IM-P ratings independently.

Measures Used for Cluster Derivation

Psychopathy Factor Scores—Psychopathy was assessed using the 20-item PCL-R, based on an in-depth semi-structured interview, supplemented by available file information. In the present study, factor scores for the three PCL-R dimensions were used separately in cluster derivation. In this model, Factor 1 is comprised of items assessing primarily interpersonal features of psychopathy (e.g., glibness/superficial charm, pathological lying). Factor 2 consists of items assessing deficient affective experience (e.g., lack of empathy, shallow affect). Factor 3 consists of items assessing largely behavioral features of psychopathy (e.g., impulsivity, irresponsibility). The three-factor model has been replicated in a number of different samples (Cooke et al., 2001), and preliminary evidence suggests that the factors correlate differently with different types of violent behavior (Patrick, Hicks, Krueger, & Lang, 2005; Swogger, Walsh, & Kosson, in press) and different aspects of substance abuse (Walsh, Allen, & Kosson, 2005). Observer PCL-R scores were available for 37 participants in the current sample. Interrater reliability was adequate, as measured by mean weighted intraclass correlations (ICC) of .85 for PCL-R total scores and .81, .78, and .86 for the interpersonal, affective, and behavioral factors, respectively. Recent studies have also obtained compelling evidence for a four-factor model, including the dimensions of the three-factor model, as well as a dimension reflecting early and serious antisocial behavior. Although this model may offer significant descriptive advantages over the three-factor PCL-R model (Hare, 2003), we used only the first three factors in our variate in order to minimize predictor-criterion contamination.

¹The current sample is independent from that used by Vassileva et al. (2005).

Interpersonal Features of Psychopathy—The Interpersonal Measure of Psychopathy (IM-P) uses observations of participant behavior during interpersonal interactions to assess core interpersonal features of psychopathy. The IM-P has demonstrated high internal consistency and adequate validity, correlating twice as highly with Factor 1 scores as with Factor 2 scores in the two-factor PCL-R model (i.e., .5–.6 vs. .25–.3; Kosson et al., 1997; Kosson, Gacono, & Bodholdt, 2000). Moreover, IM-P scores contribute uniquely to prediction of observer ratings of interpersonal dominance, adult fighting, and interviewer emotional reactions to inmates (Kosson et al., 1997). In the current sample, interrater reliability for the IM-P was adequate, mean ICC = .79 ($n = 36$) for two independent raters.

Trait Anxiety—The State-Trait Anxiety Inventory Trait Scale (STAI-T, Form Y; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) is a widely used self-report questionnaire that assesses a stable propensity to anxiety and negative affect. The scale exhibits good internal consistency (alpha between .86 and .95), and good convergent validity with other self-report measures of anxiety (Hale et al., 2004; Spielberger et al., 1983) and with anxiety disorder diagnosis (Fisher & Durham, 1999).

Alcohol and Drug Abuse/Dependence—These were assessed using the substance abuse modules from the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1997). Separate ordinal variables for alcohol and drug problems ranged from 0 (*no abuse*), to 1 (*abuse*) to 4 (*severe dependence*) based on severity of the alcohol/substance abuse problem(s). The previous and current versions of these modules have been shown to exhibit good interrater reliability as aids in the diagnosis of substance use disorders (Martin, Pollock, Bukstein, & Lynch, 2000; Skre, Onstad, Torgersen, & Kringlen, 1991).

Measures used for External Validation and Profiling

Demographic Variables—Additional variables assessed for descriptive purposes included: (1) age, measured in years; (2) years of education, measured by highest number of completed years of formal schooling; and (3) intelligence, an estimate of Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1981) Full Scale IQ score derived from the Shipley Institute of Living Scale-Revised (SILS-R; Zachary, 1991). Prior studies have reported that SILS-R estimates of WAIS-R IQ correlate highly ($r = .85$) with actual WAIS-R IQ scores (Zachary, 1991).

Symptoms of Conduct Disorder (CD) and Antisocial Personality Disorder (ASPD)—The numbers of symptoms of ASPD and childhood CD were rated by the interviewer for 201 and 219 participants, respectively, using Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) criteria (American Psychiatric Association, 1994).

Criminal Behavior—Dependent variables regarding criminal behavior were obtained from interviews and institutional files. The number of violent and non-violent charges, and criminal versatility (i.e., the number of types of offenses committed) were rated based on interview as well as file information. Charges were recorded if reported by the participant during the interview or noted in the file. (Although the offense categories used were the same as those for PCL-R Item 20, the number of categories, not the PCL-R item, was the criterion used. It is also noteworthy that this PCL-R item does not load on any of the three PCL-R factors used to derive clusters.)

Results

Data Screening

Prior to analysis, data for the seven cluster variables (i.e., three PCL-R factors, the STAI-T, the IM-P, and alcohol and drug abuse scores) were screened for multicollinearity and outliers. None of the variables exhibited a conditioning index greater than 30 coupled with two or more variance proportions exceeding .50, indicating that there were no redundant variables (Tabachnik and Fidell, 2001). Scores greater than three standard deviations from the mean were considered outliers. Screening for outliers revealed six extreme scores on the IM-P. As is recommended when Ward's clustering method is applied (Comrey, 1985; Hair et al., 1995), extreme scores were deleted to improve the accuracy of the cluster solution. As recommended by Hair et al. (1995), all cluster variables were converted to *z*-scores prior to analysis.

Hierarchical Cluster Analysis

Analyses were conducted with SPSS 11 (SPSS Inc., 2001) unless otherwise indicated. Clusters were derived using Ward's hierarchical agglomerative method. The optimal cluster solution was determined using examination of percentage changes in agglomeration coefficients for solutions of 2–10 clusters.² As shown in Table 1, an examination of agglomeration coefficients revealed increases that remained below 1.5% at each stage until that in which four clusters were combined to form three. At this stage, an increase in the agglomeration coefficient exceeding 3% indicated a large jump in within-cluster variability, suggesting that dissimilar clusters were being combined (Hair et al., 1995). A second substantial jump in within-cluster variability at the one-cluster level indicated that a two-cluster solution might also be a valid cutoff point.

To verify that the four-cluster solution was a reliable solution, we used the Bootstrap Validation procedure available in ClustanGraphics (Clustan Ltd., 1998). This procedure identifies partitions in the data that exhibit the greatest departures from randomness through evaluation of changes in agglomeration coefficients over multiple trials (Clustan Ltd., 1998). Bootstrap validation was conducted using 200 random trials, and evaluation of results was limited to the final 10 fusion points, as in the above examination of agglomeration coefficients. This analysis indicated that coefficients at the four-cluster level exhibited the greatest departure from randomness, suggesting the reliability of the initial agglomeration coefficient analysis.

Iterative Cluster Analysis

A limitation of Ward's hierarchical method is that the results can be highly influenced by the cases initially assigned to clusters (Hair et al., 1995). For this reason, we followed the Ward's analysis with a *k*-means iterative analysis constrained to four clusters, using centroids from the hierarchical analysis as seed points, as recommended by several researchers (e.g., Hair, 1995; Milligan, 1980). Data comparing this two-step method with other methods suggests that it performs better than several other *k*-means procedures (Steinley, 2003), and it often produces a more reliable solution than using Ward's method alone by allowing switching of cases from one cluster to another (Borgan & Barnett, 1987; Milligan & Sokal, 1980). The cluster profiles generated by the *k*-means solution are described below.

²A refinement of Mojena's (1977) stopping rule available in Clustan (Clustan Ltd., 1998) was also examined. However, this procedure suggested a 26-cluster solution, which was deemed uninterpretable.

Cross-Validation of Cluster Assignment

Following the iterative analysis, we used cross-validation (see Calamari et al., 2004) to determine the reliability of cluster assignment across independent subsamples. First, the sample was split randomly into two subsamples. An Analysis of Variance (ANOVA) indicated no significant differences between the subsets on cluster variables ($ps > .05$). The aforementioned two-step clustering procedure was applied to each of the split samples. A discriminant function analysis was then used to determine the accuracy with which discriminant functions derived from the first subsample predicted cluster membership in the second. The mean correct classification rate was 95.3%, $\chi^2(44, n=129) = 409.076$, indicating that 95.3% of cases in the second subsample were correctly classified using discriminant functions derived from subsample one. A second discriminant function analysis correctly classified 92.2% of cases in subsample one from discriminant functions derived from subsample two, $\chi^2(44, n=129) = 403.41$. These analyses indicated that the classification scheme was reliable across subsamples.

Validation of Subgroups using a Novel Clustering Method

Steinley (2003) proposed that the k -means clustering method contained in major statistical packages provides solutions that may be only locally optimal. Thus, we ran an independent k -means analysis using a separate software package (i.e., MATLAB; MathWorks, 1999) and functions written by Steinley (2003) to address this problem. Steinley's approach to the analysis employs a strategy of multiple random seed points rather than seeding with Ward's method centroids and provided an additional check on the reliability of the two-step analysis presented earlier. The procedure was repeated 1,000 times. Agreement between the SPSS k -means analysis using Ward's method centroids as seed points and Steinley's method of k -means analysis was nearly perfect ($k = .98, p < .001$), suggesting that the former analysis provided solutions that were globally optimal.

Cluster Profiles

Table 2 presents mean scores for each of the eight variables used to derive the clusters and results of between-cluster post-hoc comparisons conducted using Tukey HSD tests following significant ANOVA results. The four clusters were named according to their average characteristics. Effect sizes are reported using Cohen's d (Cohen, 1992). All reported cluster differences are significant at $p < .01$ unless otherwise stated.

Cluster 1: Low Psychopathology Criminals—Members of this group comprised 31.8% ($n = 82$) of the sample. They were characterized by lower anxiety scores than men in all other clusters. They also exhibited lower scores on the IM-P ($d = 2.52$) and the interpersonal ($d = 1.34$) and affective ($d = 1.29$) dimensions of the PCL-R than members of Cluster 3, and lower scores on the behavioral dimension of the PCL-R than members of Clusters 3 and 4 ($ds = .92$ and 1.21). Members of Cluster 1 exhibited alcohol and drug abuse.

Cluster 2: Criminals with Negative Affect—Individuals in Cluster 2 comprised 32.6% ($n = 84$) of the sample. Members of this cluster differed from members of Cluster 1 on anxiety levels ($d = 2.88$). Whereas members of Cluster 1 were characterized by very low anxiety, members of Cluster 2 exhibited moderate anxiety levels. Individuals in Cluster 2 also exhibited fewer interpersonal signs of psychopathy (as measured by the IM-P) than members of Clusters 3 and 4 ($ds = 3.50$ and $.69$), and low scores on all PCL-R factors, with a pattern of significant differences identical to Cluster 1. They were also characterized by alcohol abuse and mild drug dependence.

Cluster 3: Primary Psychopaths—This group comprised 15.5% ($n = 40$) of the sample. These individuals had moderate trait anxiety scores that were elevated relative to Cluster 1.

Members of Cluster 3 had higher scores on the IM-P and on the interpersonal and affective dimensions of psychopathy than members of all other clusters (*ds* ranging from 1.02 to 1.83). Offenders in Cluster 3 also had high scores on the PCL-R behavioral factor, though only significantly higher than members of Clusters 1 and 2 (*ds* = .92 and .62). These individuals exhibited mild drug and alcohol dependence.

Cluster 4: Secondary Psychopaths—Members of this cluster comprised 20.2% ($n = 52$) of the sample, and were characterized by higher anxiety scores than members of the other clusters. They displayed scores on the IM-P that were higher than members of Cluster 2 ($d = .69$). Members of Cluster 4 exhibited scores on the interpersonal and affective PCL-R dimensions that were lower than members of Cluster 3 ($ds = 1.02$ and 1.05) but did not differ from those of men in Clusters 1 and 2. In contrast, members of Cluster 4 had higher scores on the behavioral dimension of psychopathy than members of Clusters 1 and 2 ($ds = 1.21$ and $.95$). Individuals in Cluster 4 exhibited severe drug and mild alcohol dependence, and their scores on both measures were significantly higher than members of Clusters 1 and 2 (ds range from $.56$ to 1.00). They also had higher scores on drug use than members of Cluster 3 ($d = .59$).

External Validation and Profiling

Groups were also contrasted on variables not included for cluster derivation using ANOVAs. All reported differences are significant at $p < .01$, based on Tukey HSD post hoc tests.

Demographics—No differences were found between the clusters on the demographic variables of age, handedness, intelligence, and completed years of education.

Criminal Behavior—Between cluster differences were found on number of violent charges, $F(3, 226) = 10.72, p < .001$, and criminal versatility, $F(3, 225) = 7.43, p < .001$. No differences were found on number of nonviolent charges, $F(3, 226) = 2.19$. Post hoc tests (Table 3) revealed that primary psychopaths had a significantly greater number of violent charges than men in all other clusters (ds range from $.54$ to $.93$, ps from $.04$ to $<.01$). Secondary psychopaths had a greater number of charges for violent crimes than criminals with negative affect ($d = .60, p = .02$). Both primary and secondary psychopaths exhibited greater criminal versatility than members of the other two clusters (ds range from $.61$ to $.69$).

Antisocial Personality Disorder and Conduct Disorder Symptoms—Following a significant ANOVA, $F(3, 200) = 11.67, p < .001$, between cluster comparisons revealed that both primary ($M = 3.97, SD = 1.66$) and secondary psychopaths ($M = 3.98, SD = 1.68$) displayed significantly more symptoms of ASPD than low psychopathology criminals ($M = 2.41, SD = 1.68; ds = .93$) and criminals with negative affect ($M = 2.75, SD = 1.62, ds = .74$ and $.75$), which did not differ. Differences were also found on number of childhood CD symptoms, $F(3, 218) = 7.91, p < .001$. Interestingly, secondary psychopaths displayed a greater number of conduct disorder symptoms than did criminals with negative affect and low psychopathology criminals ($ds = .64$ to $.84$).

Supplementary Analysis

Because PCL-R total scores are not independent of the variables used in the cluster analysis, they cannot be used to validate the clusters. Nevertheless, mean total PCL-R scores were calculated for each cluster, because these provide additional profiling information that may be of interest. Significant cluster differences, $F(3, 257) = 24.02, p < .001$, were identified for total PCL-R scores. Primary psychopaths had significantly higher scores ($M = 28.65$) than members of all other clusters (ds range from $.65$ to 1.44). The PCL-R total scores of secondary

psychopaths ($M = 25.27$) were higher than those of low psychopathology criminals ($M = 20.12$) and criminals with negative affect ($M = 20.62$) ($d_s = .82$ and $.80$), which did not differ.

Discussion

The present study identified distinct subgroups of primary and secondary psychopaths. These subgroups were remarkably similar to the psychopathic subgroups identified by Vassileva et al. (2005), and resembled groups identified in other studies using self-report measures (Hicks et al., 2004) or the PCL:SV (Skeem et al., 2004). Moreover, consistent with the possibility that the subgroups are temporally stable, present groups resemble groups identified in child and adolescent samples (Christian et al., 1997; Vincent et al., 2003). That these subgroups have now been replicated in an independent sample of adults using an atheoretical analysis, despite the inclusion of very different clustering variables from those used in most prior studies and the restriction of the sample to European Americans, provides substantial evidence for the robustness of these subgroups. The high level of participant classification agreement across subsamples and across clustering algorithms provided additional evidence for the reliability of the results. Moreover, the use of the three-factor model of psychopathy instead of the two-factor model reduced the likelihood that observed relationships between subgroup membership and indices of criminal behavior reflect predictor-criterion contamination, and provided a more fine-grained examination of the core features of psychopathy.

As we hypothesized, the cluster analysis identified a group of individuals that appears to be consistent with Cleckley's (1976) conceptualization of the psychopath and with Karpman's (1948) and Blackburn's (1998) conceptualization of the primary psychopath. Participants in this primary psychopath cluster were characterized by very high scores on the IM-P and the interpersonal and affective factors of the PCL-R, as well as high behavioral factor scores relative to the nonpsychopathic clusters. Consistent with prior findings, primary psychopaths had lower anxiety scores than secondary psychopaths. The finding that members of this group were charged with a greater number of violent crimes than members of all other groups and exhibited greater criminal versatility than members of nonpsychopathic clusters replicated Vassileva et al. (2005).

Consistent with prior findings, a second cluster of participants (secondary psychopaths) was characterized by higher anxiety or negative affectivity scores than all other clusters, along with considerable drug and alcohol problems. As hypothesized, secondary psychopaths were characterized by elevated scores on the behavioral dimension of psychopathy relative to nonpsychopathic clusters, and by scores on the affective dimension that were lower than those of primary psychopaths and similar to those of nonpsychopathic groups. This finding is consistent with Blackburn's (1975) assertion that secondary psychopaths are characterized by a greater capacity for guilt and remorse than primary psychopaths. The finding that secondary psychopaths displayed criminal versatility similar to that of primary psychopaths is also consistent with prior findings, though Vassileva et al.'s (2005) finding that secondary psychopaths had a greater number of nonviolent charges than members of other groups was not replicated. It is possible that the apparent relation between this profile and nonviolent offending reflected the use of PCL-R Factor 2 scores in that study. As noted earlier, Factor 2 includes several items whose scores are directly related to antisocial behavior.

In addition to subgroups with psychopathic features, a cluster characterized by low scores on most measures (low psychopathology criminals) was uncovered. This cluster was expected based on prior findings and, as hypothesized, individuals in this cluster were charged with fewer violent crimes and exhibited less criminal versatility than members of the psychopathic clusters. Contrary to our prediction, however, these individuals were not charged with significantly fewer nonviolent crimes than members of other clusters, demonstrating social

deviance in the absence of measured psychopathology. Moreover, the effect size for the between-cluster difference in nonviolent charges was relatively small ($d_s = .25$, etc.), suggesting that such differences would not be statistically significant unless a much larger sample was examined.

Our analysis also yielded a fourth cluster (criminals with negative affect) which was clearly nonpsychopathic. The men in this cluster were very similar to those in the low psychopathology criminals cluster in most respects, including exhibiting relatively less severe alcohol and substance abuse problems and relatively less extensive criminal histories than men in other clusters. The only significant difference between the criminals with negative affect and the low psychopathology clusters were with respect to measures of trait anxiety or negative affectivity: criminals with negative affect cluster exhibited greater negative affectivity. In contrast to a fourth cluster identified by Vassileva et al. (2005), individuals in this cluster did not exhibit moderately elevated scores on the behavioral dimension of psychopathy or on the number of childhood conduct disorder symptoms. Thus, it is possible that the fourth cluster identified by Vassileva et al. (2005) is unreplicable. Alternatively, it is possible that a cluster of criminals with some features of psychopathy is replicable only in analyses including the two-factor model of psychopathy or in samples including large numbers of African Americans.

The restriction of the current analysis to European Americans must be emphasized. This restriction was undertaken due to findings that, in several studies, European Americans and African Americans with high PCL-R scores have differed on laboratory tests of mechanisms underlying psychopathy, including response modulation deficits and emotional processing deficits (Newman & Schmitt, 1998; Newman, Schmitt, & Voss, 1997). Moreover, it was possible that Vassileva et al.'s (2005) findings could reflect an artificial set of groups resulting from the combining of African Americans and European Americans for analyses that would not replicate when groups are separated by ethnicity (J. P. Newman, personal communication, October 26, 1997). Sample sizes are often too small to yield powerful analyses with participants of only one ethnic group; however, we had a sufficient number of European Americans to permit this analysis. The current results strengthen our confidence that Vassileva et al.'s (2005) groups were not an artificial result of combining European American and African American participants. Moreover, they raise the possibility that similar subtypes of psychopaths can be identified across both European American and African American offenders. Only a future taxonomic study confined to African American offenders can fully address this issue.

The apparent robustness of the distinction between primary and secondary psychopaths across samples and across methods suggests that, despite their similarities, these subtypes characterized by psychopathic traits and antisocial behavior are constitutionally different. This raises the question of whether secondary psychopaths represent a distinct subgroup of true psychopaths. These individuals were labeled secondary psychopaths in the present study based on the relationship of their characteristics to prior descriptions and theory. However, whether they represent true psychopaths requires direct examination of these subgroups on measures other than antisocial behavior. In this regard, future studies of emotional and cognitive mechanisms and psychophysiology may be especially informative. Additionally, research that investigates the relationship between subgroup membership and criminal recidivism will provide powerful evidence regarding the validity and utility of the identified taxonomy.

Several limitations of the present study are notable. First, which criteria are the best for selecting the number of clusters in a data set is a matter of ongoing debate. The use of different criteria for determining the cluster solution might have resulted in the identification of a different number of groups of offenders. Although this is always a potential criticism of cluster analytic techniques, converging evidence from the analysis of agglomeration coefficients and the

bootstrapping analysis suggested that the four-cluster solution identified in the present study was appropriate. Second, as is the case with all cluster analyses, the use of different variables in the analysis might have resulted in a different cluster solution. However, the general similarity of these results to prior findings (Hicks et al., 2004; Skeem et al., 2004; Wales, 1995), the replication of the findings of Vassileva et al. (2005) using an independent and ethnically more homogeneous sample and an extension to an updated factor model, and the results of the discriminant function analysis suggesting stability of classification across subsamples all provide evidence for the reliability of the present results. Indeed, combined with the results of prior studies, the present findings provide persuasive empirical evidence that primary and secondary psychopathy are valid and reliable subtypes of the disorder among criminal offenders.

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References

- Aldenderfer, M.; Blashfield, R. Cluster Analysis. Beverly Hills, CA: Sage; 1984.
- Alterman AI, McDermott PA, Cacciola JS, Rutherford MJ, Boardman CR, McKay JR, Cook TG. A typology of antisociality in methadone patients. *Journal of Abnormal Psychology* 1998;107:412–422. [PubMed: 9715576]
- American Psychological Association. Diagnostic and Statistical Manual of Mental Disorders. Vol. 4. Washington, D.C.: Author; 2004. text revision
- Blackburn R. An empirical classification of psychopathic personality. *British Journal of Psychiatry* 1975;127:456–460. [PubMed: 1203635]
- Blackburn, R. Psychopathy and personality disorder: Implications of interpersonal theory. In: Cooke, DJ.; Forth, AE.; Hare, RD., editors. *Psychopathy: Theory, research and implications for society*. Dordrecht: Kluwer Academic Publishers; 1998. p. 269-301.
- Blackburn R, Coid JW. Empirical clusters of DSM-III personality disorders in violent offenders. *Journal of Personality Disorders* 1999;13:18–34. [PubMed: 10228924]
- Borgan FH, Barnett DC. Applying cluster analysis in counseling psychology research. *Journal of Counseling Psychology* 1987;34:456–468.
- Calamari JE, Wiegartz PS, Riemann BC, Cohen RJ, Greer A, Jacobi DM, Jahn SC, Carmin C. Obsessive-compulsive disorder subtypes: An attempted replication and extension of a symptom-based taxonomy. *Behavior Research and Therapy* 2004;42:647–670.
- Christian RE, Frick PJ, Hill NL, Tyler L. Psychopathy and conduct problems in children: II. Implications for subtyping children with conduct problems. *Journal of the American Academy of Child and Adolescent Psychiatry* 1997;36:233–241. [PubMed: 9031576]
- Cleckley, H. *The Mask of Sanity*. Vol. 5. St Louis, MO: Mosby; 1976.
- Clements CB. Offender classification: Two decades of progress. *Criminal Justice and Behavior* 1996;23:121–143.
- Cloninger CR. Neurogenetic adaptive mechanisms in alcoholism. *Science* 1987;236:410–416. [PubMed: 2882604]
- Clustan, Ltd. Bootstrap Validation. 1998. Retrieved February 15th, 2005. Available <http://www.clustan.com/bootstrap.html>
- Cohen J. A power primer. *Psychological Bulletin* 1992;112:155–159.
- Comrey AL. A method for removing outliers to improve factor analytic results. *Behavioral Research* 1985;20:273–281.

- Cooke DJ, Kosson DS, Michie C. Psychopathy and ethnicity: Structural, item, and test generalizability of the Psychopathy Checklist-Revised (PCL-R) in Caucasian and African American participants. *Psychological Assessment* 2001;13:531–542. [PubMed: 11793896]
- Cooke DJ, Michie C. Refining the construct of psychopathy: Towards a hierarchical model. *Psychological Assessment* 2001;13:171–188. [PubMed: 11433793]
- First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBL. *Structured Clinical Interview for DSM-IV Axis-IV Disorders (SCID-I), Clinician Version*. New York, NY: American Psychiatric Press; 1997.
- Fisher PL, Durham RC. Recovery rates in generalized anxiety disorder following psychological therapy: An analysis of clinically significant change in STAI-T across outcome studies since 1990. *Psychological Medicine* 1999;29:1425–1434. [PubMed: 10616949]
- Graham, JR. *MMPI-2: Assessing personality and psychopathology*. Vol. 2. New York, NY: Oxford University Press; 1993.
- Hair, JF.; Anderson, RE.; Tatham, RL.; Black, WL. *Multivariate data analysis*. Englewood Cliffs, NJ: Prentice Hall; 1995.
- Hale LR, Goldstein D, Abramowitz CS, Calamari JE, Kosson DS. Psychopathy is related to negative affectivity but not to anxiety sensitivity. *Behaviour Research and Therapy* 2004;42:697–710. [PubMed: 15081885]
- Hare RD. Comparison of the procedures for the assessment of psychopathy. *Journal of Consulting and Clinical Psychology* 1985;53:7–16. [PubMed: 3980831]
- Hare, RD. *The Hare Psychopathy Checklist — Revised*. Toronto: Multi-Health Systems; 1991.
- Hare, RD. Psychopathy, affect, and behavior. In: Cooke, DJ.; Forth, AE.; Hare, RD., editors. *Psychopathy: Theory, research, and implications for society*. Dordrecht, The Netherlands: Kluwer Academic Publishing; 1998. p. 105-137.
- Hare, RD. *Hare psychopathy checklist-revised (PCL-R)*. Vol. 2. Toronto, ON, Canada: Multi-Health Systems; 2003.
- Harris GT, Rice ME, Cormier CA. Psychopathy and violent recidivism. *Law and Human Behavior* 1991;15:625–637.
- Hart, SD.; Cox, DN.; Hare, RD. *Manual for the Hare Psychopathy Checklist: Screening Version (PCL-SV)*. Toronto, ON: Multi-Health Systems; 1995.
- Hemphill JF, Hare RD, Wong S. Psychopathy and recidivism: A review. *Legal and Criminal Psychology* 1998;3:139–170.
- Henderson M. An empirical classification of convicted violent offenders. *British Journal of Criminology* 1982;22:1–20.
- Hicks BM, Markon KE, Patrick CJ, Krueger RF, Newman JP. Identifying psychopathy subtypes on the basis of personality structure. *Psychological Assessment* 2004;16:276–288. [PubMed: 15456383]
- Karpman B. On the need for separating psychopathy into two distinct clinical types: symptomatic and idiopathic. *Journal of Criminology and Psychopathology* 1948;3:112–137.
- Knight, RA.; Prentky, RA. Classifying sexual offenders: The development and corroboration of taxonomic models. In: Marshall, WL.; Laws, DR.; Barbaree, HE., editors. *Handbook of Sexual Assault: Issues, theories, and treatment of the offender*. New York: Plenum Press; 1990. p. 23-52.
- Kosson, DS.; Gacono, CB.; Bodholdt, RH. Assessing psychopathy: Interpersonal aspects and clinical interviewing. In: Gacono, CB., editor. *The Clinical and Forensic Assessment of Psychopathy*. Mahwah, N.J.: Lawrence Erlbaum Associates; 2000. p. 203-230.
- Kosson DS, Smith SS, Newman JP. Evaluating the construct validity of psychopathy in black and white male inmates: Three preliminary studies. *Journal of Abnormal Psychology* 1990;99:250–259. [PubMed: 2212275]
- Kosson DS, Steuerwald BL, Forth AE, Kirkhart KJ. A new method for assessing the interpersonal behavior of psychopathic individuals: Preliminary validation studies. *Psychological Assessment* 1997;9:1–13.
- Kosson, DS.; Suchy, Y.; Cools, J. Social cognitive biases in psychopathic adolescents; Poster presented at the annual meeting of the Society for Research in Psychopathology; Madison, WI. 2001.
- Lewis CE, Rice J, Helzer JE. Diagnostic interactions: Alcoholism and antisocial personality. *The Journal of Nervous and Mental Disease* 1983;171:105–113. [PubMed: 6822817]

- Lilienfeld, SO.; Fowler, KA. The Self-Report Assessment of Psychopathy. In: Patrick, CJ., editor. *The Handbook of Psychopathy*. New York, NY: Guilford Press; 2006. p. 107-132.
- Lykken DT. A study of anxiety in the sociopathic personality. *Journal of Abnormal and Social Psychology* 1957;55:6-10.
- Lykken, DT. *The antisocial personalities*. Hillsdale, NJ: Lawrence Erlbaum Associates; 1995.
- Martin CS, Pollock NK, Bukstein OG, Lynch KG. Inter-rater reliability of the SCID alcohol and substance use disorders section among adolescents. *Drug and Alcohol Dependence* 2000;59:173-176. [PubMed: 10891630]
- MathWorks. MATLAB [computer software]. Natick, MA: 1999.
- Milligan GW. An examination of the effect of six types of error perturbation on fifteen clustering algorithms. *Psychometrika* 1980;45:325-342.
- Milligan GW, Sokal LM. A two-stage clustering algorithm with robust recovery characteristics. *Educational and Psychological Measurement* 1980;40:755-759.
- Mojena R. Hierarchical grouping methods and stopping rules: an evaluation. *Computer Journal* 1977;20:359-363.
- Newman, JP. Psychopathic behavior: An information processing perspective. In: Cooke, DJ.; Hare, RD.; Forth, A., editors. *Psychopathy: Theory research and implications for society*. The Netherlands: Kluwer Academic Publishers; 1998. p. 81-104.
- Newman JP, Schmitt WA. Passive avoidance in psychopathic offenders: A replication and extension. *Journal of Abnormal Psychology* 1998;107:527-532. [PubMed: 9715587]
- Newman JP, Schmitt WA, Voss WD. The impact of motivationally neutral cues on psychopathic individuals: Assessing the generality of the response modulation hypothesis. *Journal of Abnormal Psychology* 1997;106:563-575. [PubMed: 9358687]
- Newman JP, MacCoon DG, Vaughn LJ, Sadeh N. Validating a distinction between primary and secondary psychopathy with measures of Gray's BIS and BAS constructs. *Journal of Abnormal Psychology* 2005;114:319-323. [PubMed: 15869363]
- Patrick CJ, Curtin JJ, Tellegen A. Development and validation of a brief form of the Multidimensional Personality Questionnaire. *Psychological Assessment* 2002;14:150-163. [PubMed: 12056077]
- Patrick CJ, Hicks BM, Krueger RF, Lang AR. Relations between psychopathy facets and externalizing psychopathology in a criminal offender sample. *Journal of Personality Disorders* 2005;19:339-356. [PubMed: 16178678]
- Patrick CJ, Zempolich KA. Emotion and aggression in the psychopathic personality. *Aggression and Violent Behavior* 1998;3:303-338.
- Poythress, N.; Skeem, JL. Disaggregating psychopathy: Where and how to look for subtypes. In: Patrick, C., editor. *Handbook of Psychopathy*. New York: Guilford; 2006.
- Reardon ML, Lang AR, Patrick CJ. An evaluation of relations among antisocial behavior, psychopathic traits, and alcohol problems in incarcerated men. *Alcoholism: Clinical & Experimental Research* 2002;26:1188-1197.
- Rice ME, Harris GT, Cormier CA. An evaluation of a maximum security therapeutic community for psychopaths and other mentally disordered offenders. *Law and Human Behavior* 1992;16:399-412.
- Salekin RT, Rogers R, Sewell KW. A review and meta-analysis of the Psychopathy Checklist and Psychopathy Checklist — Revised: Predictive validity of dangerousness. *Clinical Psychology: Science and Practice* 1996;3:203-215.
- Salekin R, Rogers R, Ustad KL, Sewell KW. Psychopathy and recidivism in female inmates. *Law and Human Behavior* 1998;22:109-128. [PubMed: 9487793]
- Schmitt WA, Newman JP. Are all psychopathic individuals low-anxious? *Journal of Abnormal Psychology* 1999;108:353-358. [PubMed: 10369046]
- Serin RC. Violent recidivism in criminal psychopaths. *Law and Human Behavior* 1996;20:207-217.
- Seto MC, Barbaree HE. Psychopathy, treatment behavior, and sex offender recidivism. *Journal of Interpersonal Violence* 1999;14:1235-1248.
- Skeem JL, Edens JF, Camp J, Colwell LH. Are there ethnic differences in levelsof psychopathy? A meta-analysis. *Law and Human Behavior* 2004;28:505-527. [PubMed: 15638207]

- Skeem JL, Mulvey EP, Appelbaum P, Banks S, Grisso T, Silver E, Robbins PC. Identifying subtypes of civil psychiatric patients at high risk for violence. *Criminal Justice and Behavior* 2004;31:392–437.
- Skeem JL, Poythress N, Edens JF, Lilienfeld SO, Cale EM. Psychopathic personality or personalities: Exploring potential variants of psychopathy and their implications for risk assessment. *Aggression and Violent Behavior* 2003;8:513–546.
- Skre I, Onstad S, Torgersen S, Kringlen E. High inter-rater reliability for the Structured Clinical Interview for DSM-III-R Axis I (SCID-I). *Acta Psychiatrica Scandinavica* 1991;84:167–173. [PubMed: 1950612]
- Spielberger, CD.; Gorsuch, RL.; Lushene, R.; Vagg, PR.; Jacobs, GA. *Manual for the State-Trait Anxiety Inventory (Form Y)*. Palo Alto, CA: Mind Garden; 1983.
- SPSS, Inc.. *SPSS users guide, version 11.0*. Chicago, IL: 2001.
- Steinley D. Local optima in *k*-means clustering: What you don't know may hurt you. *Psychological Methods* 2003;8:294–304. [PubMed: 14596492]
- Sullivan, EA.; Kosson, DS. Ethnic and cultural variations in psychopathy. In: Patrick, CJ., editor. *The Handbook of Psychopathy*. New York, NY: Guilford Press; 2006. p. 437-458.
- Swogger MT, Walsh Z, Kosson DS. Domestic violence and psychopathic traits: Distinguishing the antisocial batterer from other antisocial offenders. *Aggressive Behavior*. in press
- Tabachnick, BG.; Fidell, LS. *Using Multivariate Statistics*. Vol. 4. Needham Heights, MA: Allyn & Bacon; 2001.
- Thornquist MH, Zuckerman M. Psychopathy, passive avoidance learning, and basic dimensions of personality. *Personality and Individual Differences* 1995;19:525–534.
- Vassileva J, Kosson DS, Abramowitz C, Conrod P. Psychopathy versus psychopathies in classifying criminal offenders. *Legal and Criminological Psychology* 2005;10:1–18.
- Vincent GM, Vitacco MJ, Grisso T, Corrado RR. Subtypes of adolescent offenders: Affective traits and antisocial behavioral patterns. *Behavioral Sciences and the Law* 2003;21:695–712. [PubMed: 14696027]
- Wales D. Personality disorder in an outpatient offender population. *Criminal Behaviour and Mental Health* 1995;5:85–94.
- Wechsler, D. *Wechsler Adult Intelligence Scale — Revised manual*. New York: Psychological Corporation; 1981.
- Wong, S.; Hare, RD. *Guidelines for a psychopathy treatment program*. Toronto, ON: Multi-Health Systems; 2005.
- Zachary, RA. *Shipley Institute of Living Scale: Revised Manual*. Los Angeles, CA: Western Psychological Services; 1991.

Table 1
Agglomeration coefficients and percentage changes.

Number of Clusters	Agglomeration Coefficient	Percentage Change to Next Level
10	805.33	5.18
9	847.04	5.44
8	893.12	5.91
7	945.90	6.58
6	1008.10	6.24
5	1071.00	7.72
4	1153.69	11.00
3	1280.55	10.50
2	1414.97	27.14
1	1799.00	-

Table 2

Cluster profiles (raw scores.)

	Cluster 1 LPC (N=82)		Cluster 2 CNA (N=84)		Cluster 3 PP (N=40)		Cluster 4 SP (N=52)		Tukey Test
	M	SD	M	SD	M	SD	M	SD	
Anxiety	28.80	3.92	39.74	3.66	39.93	5.07	54.12	5.17	4>3,2>1
Alcohol	1.62	1.30	1.62	1.42	1.95	1.57	2.42	1.45	4>1,2
Drug	1.72	1.39	2.01	1.40	2.33	1.14	3.02	1.20	4>3,2,1
IM-P	5.04	3.76	3.45	2.54	14.28	3.57	6.05	4.70	3>4,2,1,4>2
Interpersonal	3.91	2.14	3.39	1.81	6.30	1.34	4.44	2.20	3>4,2,1
Affective	4.04	1.96	3.89	1.88	6.30	1.53	4.56	1.77	3>4,2,1
Behavioral	5.50	2.03	6.14	1.72	7.14	1.50	7.73	1.62	4,3>2,1

Note. Alcohol and drug ratings refer to severity of abuse and dependence. Interpersonal, Affective, and Behavioral refer to factors 1, 2, and 3 of the PCL-R. IM-P = Interpersonal Measure of Psychopathy. Tukey = Tukey HSD Post Hoc Test for differences between cluster means ($p < .05$). LPC = Low Psychopathology Criminals. CNA = Criminals with Negative Affect. PP = Primary Psychopaths. SP = Secondary Psychopaths.

Table 3

Comparison of cluster means on violent and nonviolent criminal charges, criminal versatility, symptoms of antisocial personality disorder (ASPD), and childhood conduct disorder (CD).

	Cluster 1 LPC (N=71)		Cluster 2 CNA (N=80)		Cluster 3 PP (N=35)		Cluster 4 SP (N=41)		Tukey Test
	M	SD	M	SD	M	SD	M	SD	
Violent	2.01	2.41	1.57	2.21	4.77	4.31	2.91	3.28	3>4,2,1; 4>2
Nonviolent	8.61	8.49	10.09	7.33	12.57	11.69	12.29	10.97	NS
Versatility	3.76	1.72	3.75	1.46	4.74	1.48	4.91	1.93	4,3>2,1
ASPD	2.41	1.68	2.75	1.62	3.97	1.66	3.98	1.68	4,3>2,1
CD	2.53	2.13	2.94	2.51	3.47	2.06	4.73	3.02	4>2,1

Note. LPC = Low Psychopathology Criminals. CNA = Criminals with Negative Affect. PP = Primary Psychopaths. SP = Secondary Psychopaths. Tukey = Tukey HSD Post Hoc Test for differences between cluster means ($p < .05$).