

# EVIDENCE OF A TAXON UNDERLYING SERIOUS ANTISOCIAL BEHAVIOR IN BOYS

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It has recently been argued from studies of adults that chronically antisocial offenders constitute a discrete class of individuals. If this is true, it is likely that the class can be identified in childhood. Taxometric analyses were applied to items assessing antisociality in children. These items were similar in content to several established measures of antisocial behavior in children: the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition, Conduct Disorder; the Psychopathy Checklist–Youth Version; and the Childhood and Adolescent Taxon Scale. Participants were 1,111 school-age boys from a community sample of students. Taxometric analyses using each of the three measures of antisocial behavior yielded evidence of an underlying taxon. In addition, two other tests of consistency strengthened the conclusion that a taxon underlying serious antisocial behavior can be demonstrated in children.

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**R**esearchers have long known that a large proportion of violent crime is committed by those offenders who exhibit persistent antisociality beginning from a very young age. In fact, it has typically been found that about 5% of the serious offenders in a cohort account for more than 50% of violent crime in that group (see Farrington, Ohlin, & Wilson, 1986, for a review). This lifetime criminal persistence has alternately (and often interchangeably) been referred to as

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psychopathy (e.g., Hare, 1991), sociopathy (e.g., Mealey, 1995), and antisocial personality disorder (APD) (American Psychiatric Association [APA], 1994). Many researchers believe that lifelong persistent offenders differ from other offenders in fundamental ways, but it remains unclear whether the construct of lifelong persistent antisociality should be construed as taxonic or nontaxonic—that is, whether people fall into two separate, nonoverlapping classes or whether people simply differ in the degree to which they exhibit antisocial tendencies.

Meehl and Golden (1982) describe a taxon as an “entity, type, syndrome, species, disease, or more generally, a nonarbitrary class” (p. 127). Some generally accepted taxa are biological sex and biological species. Within psychopathology, there is evidence of taxonicity for a growing number of disorders. For example, there is evidence for a “schizotypy” taxon underlying schizophrenia (Blanchard, Gangestad, Brown, & Horan, 2000; Golden & Meehl, 1979; Korfine & Lenzenweger, 1995; Lenzenweger & Korfine, 1992; Tyrka et al., 1995), an endogenous depression taxon (Grove et al., 1987; Haslam & Beck, 1994), and a latent taxon underlying bulimia nervosa (Gleaves, Lowe, Snow, Green, & Murphy-Eberenz, 2000).

Recently, Harris, Rice, and Quinsey (1994) set out to determine whether psychopathy should be conceptualized as reflecting an underlying taxon (a natural discrete class of persons). The Psychopathy Checklist–Revised (PCL-R) is the instrument most frequently used to measure the construct of psychopathy in adults. By convention, a cutoff score of 30 on this measure is used to identify someone as a psychopath (Hare, 1991). The scores obtained on this measure are usually interpreted as reflecting how much someone matches the “prototypical psychopath” rather than whether that person is or is not a psychopath. Harris et al. (1994) sought evidence of a taxon in the two

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PCL-R factors separately, as well as from non-PCL-R childhood variables reflecting antisocial conduct (collected from file information). Evidence from that study supported the validity of some of the PCL-R and other variables assessing childhood history (Childhood and Adolescent Taxon Scale, or CATS) as indicators of a discrete natural class. Chronic antisocial behavior beginning in childhood such as impulsivity, irresponsibility, and poor behavioral controls was the most central feature of this class, not adult antisociality or the interpersonal and affective characteristics reflected by PCL-R Factor 1.

Subsequently, it was demonstrated that the criteria used to diagnose APD (APA, 1994) are also valid indicators of this underlying persistent antisociality taxon (Skilling, Harris, Rice, & Quinsey, 2000). These results suggest that lifelong persistent antisociality, as indexed by some of the PCL-R items, APD (scored as a scale), and CATS, reflects a single categorical entity that is most clearly evident in behavioral, child, and adult antisocial indicators. This entity, then, begins early in childhood and comprises a lifelong pattern of persistent antisocial behavior.

Apart from this research, there is little or no scientific evidence on the discreteness of lifelong persistent antisociality. Our previous research (Harris et al., 1994; Skilling et al., 2000) has provided persuasive but not yet conclusive evidence that persistent antisociality is a natural class. The evidence is not yet conclusive for several reasons: The first and perhaps most critical reason is that the taxon has not been established in children. By most theoretical accounts, persistent antisociality begins early in life, and all of the available empirical evidence also points to a genetic and/or very early environmental diathesis. Therefore, if persistent antisociality is a natural class, and it begins early in life, the class should be demonstrable in children. The finding from Harris et al. (1994) that childhood behavior problems assessed in adulthood were strong taxon indicators suggests that it may be possible to identify this group earlier in life. There is increasing support for the idea that children who exhibit both early hyperactivity-impulsivity-attention problems and conduct disorder may be "fledgling psychopaths" (Lynam, 1996); they may also be the children who become lifelong persistent criminals. Early identification of

these high-risk children would permit the implementation of interventions designed to prevent an ensuing lifelong pattern of antisocial behavior. In addition, longitudinal studies could establish the frequency with which children in the antisociality class (should it exist) do not develop adult criminal careers and aid in the crucial task of identifying the characteristics associated with desistence.

The second reason why the evidence that persistent antisociality is underlain by a taxon is persuasive, but not yet conclusive, is that the sample on which the taxometric analyses were conducted contained a substantial number of offenders who suffered from various forms of serious mental illness, such as schizophrenic and affective disorders. Although subsidiary analyses conducted on offenders who did not have these co-occurring diagnoses also showed evidence of the taxon, it could be argued that the taxometric analyses were in some way affected by the psychopathology of the sample. Finally, critics have also argued that the findings from a single site might not generalize to other settings. This issue of generality particularly involves the possibility that the taxon findings applied only to unsuccessful offenders (i.e., that chronic criminality is taxonic but not persistent antisociality *per se*). Although this is very unlikely given the finding in the Harris et al. (1994) study that criminal history itself shows no evidence of taxonicity, the earlier study was unable to rule out this possibility entirely.

This study examined whether a taxon underlying serious antisociality can be demonstrated in children, as suggested by the theory that there is a class of lifelong persistent offenders who are extremely antisocial. It is hypothesized that persistent antisociality is underlain by a taxon, and those later found to be persistently antisocial in adulthood can be identified as seriously antisocial at a young age. This study included boys only to increase the base rate of serious antisocial behavior. To detect a taxon, the base rate of the phenomenon of interest must be high or the sample very large. Estimates in the adult population suggest that the base rate for psychopathy in males may be lower than 5% and even lower for females (Hare, 1996). Therefore, it is likely that even with as many as 1,000 female participants, there would be too few seriously antisocial individuals for taxometric analyses to identify this class should it exist.

## METHOD

### PARTICIPANTS

Data were obtained from a larger study examining bullying and victimization in early adolescence (Craig, Connolly, & Pepler, 1998). Schools in a large urban area were invited to participate in the bullying and victimization study. Of these schools, six agreed to take part. All children who were present in the classroom during data collection phases were given the opportunity to participate. Therefore, this sample was almost completely uncensored. There were 1,111 boys in this sample, with a mean age of 11.8 (1.2), spanning Grades 4 through 8. The majority of boys were Caucasian (76%). Thirteen percent were of Asian or South Asian ancestry, 3% were African Canadian, and the remaining 8% reported "other" for nationality. A large percentage of the boys reported living with both natural parents (81%). Only 4% reported living with a natural and a stepparent, and an additional 12% reported living in a single-parent household. All the data were obtained from self-report measures in the spring of 1996 during the second wave of data collection. Parents and children provided both written and oral consent.

### MEASURES

Items for the measures used in this were culled from variables collected in a longitudinal study on bullying and victimization (Craig et al., 1998). Items already available in this database were used to match items on the Youth Version of the Psychopathy Checklist (PCL-YV) as well as the CATS to replicate the measures used by Harris et al. in their 1994 study (that study used the PCL-R and eight indicators of childhood behavior problems, the CATS). In addition, items from this database were used to match the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (*DSM-IV*) conduct disorder (CD) items (APA, 1994) because they are the most commonly used criteria to assess serious antisocial behavior in children. A table of matched items is available on request from the first author.

From this already established data set, we were able to match all but 1 of the 8 CATS items, all but 1 of the 15 *DSM-IV* conduct disorder

items, and 13 of the 18 PCL-YV items. We also coded somatic complaint items from the Youth Self-Report Survey (Achenbach, 1991), also readily available in the data set. Each of these measures is discussed in turn below.

*CATS.* Harris et al. (1994) established that eight childhood variables could identify members of the antisociality class. These variables include the following: (a) elementary school maladjustment, (b) teen alcohol abuse score, (c) childhood aggression, (d) childhood behavior problems, (e) parental alcohol problems, (f) suspended or expelled from school, (g) separated from parents before age 16, and (h) arrested before age 16. The item *parental alcohol problems* was not available in the bullying database. The remaining seven variables were coded from the database, dichotomized, and summed to form a scale that ranges from 0 to 7, reflecting, according to the previous analyses (Harris et al., 1994), the probability that the participant was a member of the antisociality class.

*CD criteria.* Fourteen of the 15 *DSM-IV* CD (APA, 1994) items were coded from the available variables. A diagnosis of CD was not arrived at by the standard method described in the *DSM-IV*; instead, the 14 criteria were coded as 0 (*not present*) or 1 (*present*) and then summed to form a scale ranging from 0 to 14, reflecting the number of CD symptoms present. This procedure was done to carry out taxometric analyses on the sample. Of the 14 available items, 8 were chosen for use in the taxometric analyses (see Gangestad & Snyder, 1985). These 8 items, as recommended by Meehl and Golden (1982), were most highly correlated with the total score on the CD scale but were not highly correlated with one another. The item "has forced someone into sexual activity" was not available for scoring in the original database.

*PCL-YV.* Items from the 18-item PCL-YV (Forth, Hart, & Hare, 1990) were used to measure psychopathy in this sample of children. However, only 13 of the 18 items were available for coding in the original database. Of these 13 available items, 8 were chosen for use in the taxometric analyses (see Gangestad & Snyder, 1985). These 8 items were most highly correlated with the total score on the PCL-YV

but were not highly correlated with one another, as recommended by Meehl and Golden (1982). These items included five criteria from Factor 1 of the checklist: (a) grandiose sense of self-worth, (b) pathological lying, (c) conning and manipulative, (d) lack of remorse or guilt, and (e) callous/lack of empathy, as well as three items from Factor 2: (a) poor behavioral controls, (b) irresponsibility, and (c) juvenile delinquency. These 8 items were dichotomized and then summed to form a scale ranging from 0 to 8, reflecting the number of psychopathy characteristics.

Although the PCL-YV is often completed with an interview and a review of an adolescent offender's files, scores in this study were based entirely on the self-report information already available in the database. Self-report measures are widely used to assess antisocial behavior in adolescence. This type of measurement strategy has proven concurrent and predictive validity as assessed by comparing self-reports with official records of delinquent behavior (see Farrington, Loeber, Stouthamer-Loeber, Van Kammen, & Schmidt, 1996).

*Somatic complaints.* Eight items representing various physical complaints were available in the original database (from Achenbach, 1991) and were employed in the taxometric analyses. These items were as follows: (a) feeling dizzy, (b) aches, (c) headaches, (d) nausea, (e) problems with eyes, (f) skin problems, (g) stomach aches, and (h) vomiting. They were dichotomized and then summed to form a scale ranging from 0 to 8. This measure was used for control analyses to confirm that a taxon would not be detected for a construct that was hypothesized to be nontaxonic.

#### PROCEDURE AND DATA ANALYSES

*Interrater reliability.* Three independent raters chose items from the existing bullying database to represent each of the variables on all four measures used in this study. There was 100% agreement among all raters on the items to be used in the Somatic Complaints scale and the CAT Scale. There was disagreement between raters on what items were to be used on 1 of the 14 CD items and 2 of the 13 PCL-YV items. Disagreements were resolved by a fourth rater who decided on the appropriateness of the final item sets. This procedure was undertaken

to ensure that the items chosen to represent the PCL-YV, the CATS, and the CD items were the most equivalent ones available in the existing database.

*Taxometric analyses.* The reasoning behind taxometric techniques is straightforward. It is conjectured for bootstrapping purposes that if two observable indicators are valid for a taxon, they will differentiate between the taxon and its complement and will not covary otherwise (i.e., they will not correlate with each other either among taxon members or among members of the complementary class). A nonzero correlation results from mixing individuals from the taxon and complement together. To take a simple example, imagine one wished to detect a biological gender taxon among a group of male and female 5-year-olds but knew only indirectly informative things about each child—hair length, favorite toy, commonly worn clothing, and so on. One would expect that among a group of girls, toy choice, hair length, and how often the child wears dresses would have reasonably low intercorrelations, and in a group of boys, similar low intercorrelations among these indicators would exist. On the other hand, in a group composed equally of boys and girls, hair length, toy choice, and type of clothing indicators should be much more highly intercorrelated because they are effects of (or are correlated with) a common cause. If they were, evidence consistent with a natural dichotomy would exist; if they were not, this would tend to refute the taxonic hypothesis.

In this study, the taxometric methods chosen were those that exhibited the best sensitivity and specificity in previous research by Harris et al. (1994), as well as recommended by Meehl (1995) as the most powerful taxometric methods available. The two methods used were Maxcov-Hitmax and MAMBAC (“mean above minus below a cut”). We also performed two additional tests of consistency, the Goodness of Fit Index (GFI) and base rate estimates. In addition, we compared the graphs with a graph of a measure thought to be nontaxonic in line with recommendations from Waller and Meehl (1998) and Waller (personal communication, February 7, 2000).

The Maxcov-Hitmax method (Meehl & Golden, 1982; Meehl & Yonce, 1996; Waller & Meehl, 1998) is one of several taxometric analyses. This particular analysis can be performed with a set of construct valid dichotomous items. It has been recommended that eight indica-

tors (Gangestad & Snyder, 1985) be used when applying Maxcov-Hitmax to a multi-item scale. Seven or eight items is probably the minimum number of items that would still give an acceptable number of intervals for graphing but does not result in the inclusion of too many item pairs with substantial within-class correlations. The eight items are chosen because each item correlates highly with the total score on the instrument but does not have similar manifest content. One can apply Maxcov-Hitmax to multi-item scales by removing two of the items from the scale and constructing a subscale from the remaining items. The total sample of individuals is divided into subsamples by dividing the range of subscale scores into intervals (e.g., one for each possible score on a 0-6 subscale). This procedure iterates through all combinations of the eight variables taken two at a time. If a taxon exists, the covariance between the two items set aside, plotted against the sum of the remaining six items, should be peaked, with a maximal value where individuals from both classes are mixed together nearest a 50/50 mix and much lower values at the extremes. A base rate of .50 (half the individuals are in the taxon group and half in the complement) gives a peak in the center of the observed distribution. A nontaxonic latent structure results in graphs that are generally flat when smoothed (multiple peaks when unsmoothed). Meehl and Yonce (1996) have recently reported strong evidence of the validity of this method from computer simulations.

The MAMBAC method is a taxometric procedure that can be used with two quasi-continuous variables that are thought to discriminate a taxon from its complement class. The MAMBAC procedure requires the evaluation of the mean participants exhibit on one variable above versus below a series of cut scores on a second variable (Meehl, 1992; Meehl & Yonce, 1994). This mean difference reaches a maximum at that cut point where the taxon and its complement class mixed are best discriminated, whereas the difference becomes progressively smaller as the cutoff moves toward higher or lower scores. Thus, an inverted U-shaped graph indicates a taxon. By contrast, if there is no taxon and scores on each scale are unimodally distributed along a continuum, the MAMBAC graph will show an upright U-shaped curve. Again, when seen graphically, the peak of the distribution varies with the latent base rate, with the peak moving to the right as the base rate decreases.

The GFI is one among several consistency tests that allows one to assess whether the covariation between indicators generated by the taxonic model fits the observed pattern of covariation (Waller & Meehl, 1998). In simulation studies of the GFI, Waller and Meehl (1998) found that high values were produced in taxonic but not nontaxonic samples. The GFI can be interpreted as a multivariate  $R^2$ ; values of this index range from 0.00 to 1.00, with higher values indicating better fit. In taxometric samples with little or no within-class interitem covariance, GFI values were generally greater than .90.

Base rate estimates of the underlying latent class also allow one to assess the consistency of the taxometric results. Estimates of the taxon base rate can be obtained from each of the putative taxon indicators, and these estimates should be sufficiently similar in magnitude. If the estimates are not similar in magnitude, it suggests that one or more of the indicators does not conform to the taxometric model (Golden, 1982). However, if the estimates are similar, it is unlikely that different nonredundant methods would provide consistent estimates if actual base rates corresponding to real empirical classes did not exist (Gangestad & Snyder, 1985). Therefore, consistent base-rate estimates should increase confidence in the taxonic model.

Meehl and colleagues (Meehl, 1995; Meehl & Yonce, 1994, 1996; Waller & Meehl, 1998) have reported strong evidence of the validity of these methods from computer simulations. However, Miller (1996) raised concerns about the validity of the Maxcov-Hitmax procedure, arguing that evidence from one taxometric graph is not sufficient evidence of a taxon because spuriously taxonic-looking graphs can occur. Meehl and colleagues (Meehl, 1996; Meehl & Yonce, 1996; Waller & Meehl, 1998) agree with this point but argued (consistent with their previous writings) that a taxon should be inferred only when multiple taxometric procedures agree. They also argued that validity of results should be judged on numerical consistency rather than on conventional statistical significance. If several taxometric methods indicated the presence of a taxon, and parameter estimates arrived at in different ways (derived within and across taxometric procedures) were numerically consistent, then there would be strong grounds for believing the taxon exists (Meehl, 1995; Waller, personal communication, February 7, 2000; Waller & Meehl, 1998), and it would be

**TABLE 1: Descriptive Statistics and Correlations Among Main Study Variables**

	M	SD	Alpha	2	3	4	5	6
CATS	0.81	.04	.71	.76	.75	.60	.68	.25
CD	1.24	.07	.83		.82	.71	.70	.30
PCL-YV total	3.82	.13	.77			.87	.91	.36
PCL Factor 1	1.91	.07	.59				.58	.28
PCL Factor 2	1.79	.07	.57					.34
Somatization (SC)	1.57	.06	.74					

NOTE: CATS = Childhood and Adolescent Taxon Scale; CD = Conduct Disorder; PCL-YV = Psychopathy Checklist–Youth Version; SC = Somatic Complaint. All correlations are significant at  $p < .001$ .

a “damn strange coincidence” otherwise (Meehl, 1990a, 1990b; Salmon, 1984).

Miller (1996) also questioned the suitability of dichotomous indicators in the Maxcov-Hitmax method. Meehl and Yonce (personal communication, February 8, 2000) note that the weight of the evidence to date supports the use of dichotomous indicators in the Maxcov-Hitmax procedure, when consistency tests are properly employed. In this study, it was predicted that the CD, PCL-YV, and CATS items would indicate the presence of a taxon, whereas the somatic complaints measure would not, using the taxometric procedures described above.

## RESULTS

### PSYCHOMETRIC PROPERTIES AND INTERCORRELATIONS

All scales had satisfactory internal consistency, although the reliabilities of the two factors of the PCL-YV were somewhat low when examined individually because of the small number of items making up each factor. Cronbach’s alphas for each scale are given in Table 1 along with descriptive statistics for each scale. Intercorrelations among the main study variables are also given in Table 1. These correlations indicate that the measures are all significantly related to one another in the expected directions.

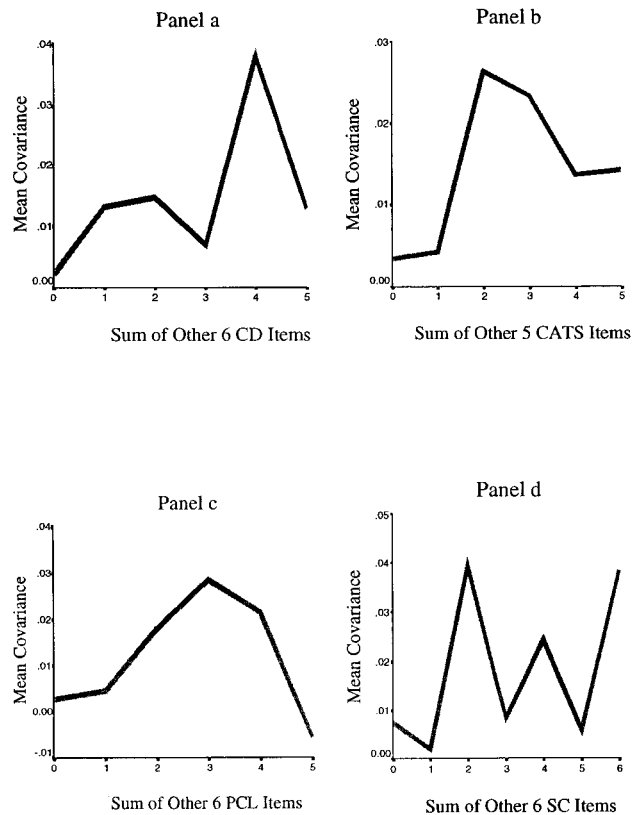
Because several of the scales had Cronbach alphas near .70, it was of interest to examine the correlations among the main variables of interest (CD, CATS, and PCL-YV) after correcting for attenuation. This gives us an estimate of the “true” relationship between variables if the scales were perfectly reliable. In all cases, the correlations would approach unity ( $r = 1.00$ ) after this correction.

#### TAXOMETRIC ANALYSES

*Measures of serious antisociality.* Both the Maxcov-Hitmax and MAMBAC methods yielded strong evidence of taxonicity for all three measures of serious antisocial behavior—the CD, CATS, and PCL-YV items. The Maxcov-Hitmax method yielded a peaked covariance curve for the items from each measure as shown in Figure 1, panels a, b, and c. And the MAMBAC method resulted in an inverted U-shaped function for all measures as shown in Figure 2. According to the Monte Carlo demonstrations provided by Meehl and Yonce (1994, 1996), the Maxcov-Hitmax and MAMBAC analyses both gave evidence of an underlying taxon for all three measures of antisociality. Consistency tests performed with the PCL-YV and CATS measures also bolstered the position that an underlying taxon exists, GFI = .95 (Waller & Meehl, 1998).

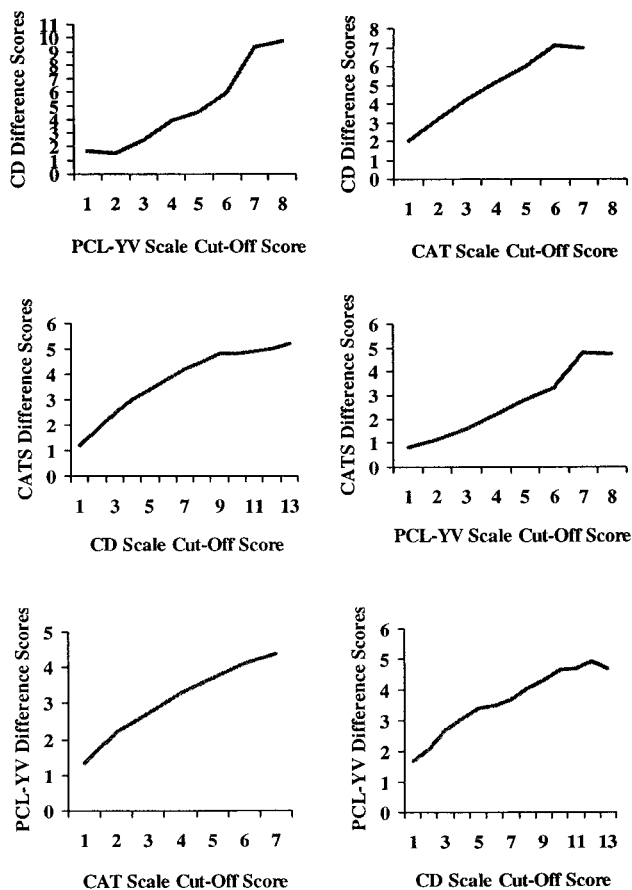
Smoothing of the graphs was not necessary to observe the underlying taxon with any of the antisociality measures. There is no agreed-on (e.g., mathematically derived) method available for setting a critical numerical value for testing whether a plot produced by these analyses is taxonic or not (Miller, 1996). Therefore, we asked eight laypeople from various disciplines, with no special training in taxometric analyses, to compare these graphs with sets of simulated taxonic and nontaxonic plots, provided by Meehl and Yonce (1994, 1996). Participants were asked to decide, for each plot, which set it most resembled. All eight placed all of our taxometric plots with the taxonic plots provided. The probability of this degree of agreement occurring by chance is less than .001.

*Somatic complaints.* Evidence for a taxon underlying serious antisociality was strengthened by the finding that the dichotomized variables reflecting somatic complaints did not yield evidence of a taxon



**Figure 1:** Panel a. The Maxcov-Hitmax Method Applied to Eight Conduct Disorder (CD) Items. Panel b. The Maxcov-Hitmax Method Applied to Seven Childhood and Adolescent Taxon Scale (CATS) Items. Panel c. The Maxcov-Hitmax Method Applied to Eight Psychopathy Checklist (PCL)-Youth Version Items. Panel d. The Maxcov-Hitmax Method Applied to Eight Somatic Complaint Scale (SC) Items.

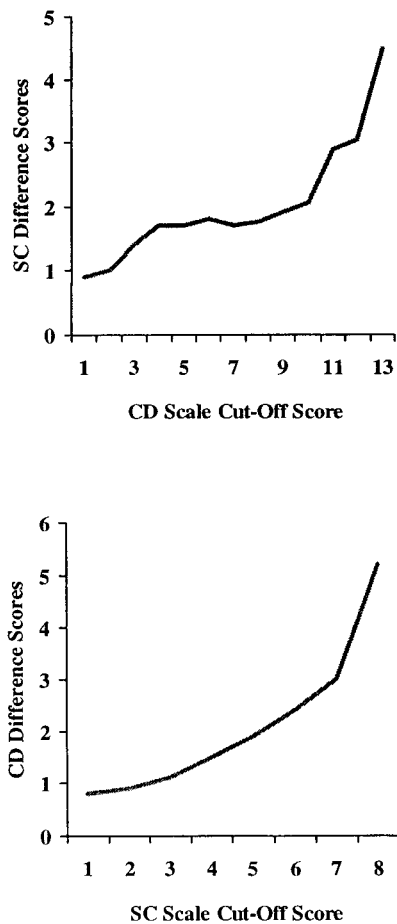
on the same tests. The Maxcov-Hitmax method did not produce a covariance graph with a single peak as would be expected if a taxon existed (see Figure 1, panel d), and the MAMBAC method produced an upright U-shaped graph indicating a nontaxonic entity as seen in Figure 3. It was predicted that this measure would not yield evidence of a taxon because there is no theoretical rationale why seriously anti-social children should have more or fewer somatic complaints than



**Figure 2: The MAMBAC Curves for Participants on the Six Combinations of Antisociality Measures.**

NOTE: CD = Conduct Disorder; PCL-YV = Psychopathy Checklist-Youth Version; CAT = Childhood and Adolescent Taxon.

other children. The analyses using Somatic Complaints items were inconsistent with a natural disjunction and implied a nontaxonic finding as predicted. The observer test described above was also used to evaluate these graphs. Again, there was 100% agreement among the observers, but in this case they agreed that these graphs were most similar to the nontaxonic graphs provided by Meehl and Yonce (1994, 1996).



**Figure 3: The MAMBAC Curves for Participants on the Somatic Complaints (SC) Scale.**

NOTE: CD = Conduct Disorder.

*Base rate of serious antisociality.* The mathematical procedure for estimating the taxon base rates (as outlined by Golden, 1982) yielded remarkably consistent results in this uncensored sample of boys. The eight estimates corresponding to each of the CD criteria were consistent (range of .07 to .09) and averaged .08. The same was true for the eight PCL-YV indicators (range of .08 to .12) with an average of .10,

and the seven CATS indicators (range of .08 to .09) with an average base rate of .09. Across all three measures, the overall grand base rate for the antisociality taxon was .09. There was substantial agreement among measures as to who belonged to this upper 9% of the sample, the members of the antisociality class, and who did not (percentage agreement = .96 to .97;  $\phi = .62$  to  $.67$ ,  $p < .0001$ ). In addition, an examination of the distributions of all three measures clearly showed two distinct groups, one group of boys who were not identified as antisocial by any of the measures (87.3% of the sample) and another group clearly identified as seriously antisocial on every measure employed (4.3% of the sample).

## DISCUSSION

Previous research (Harris et al., 1994; Skilling et al., 2000) has provided persuasive but not yet conclusive evidence that lifelong persistently antisocial offenders differ from other offenders in essential ways—that offenders fall into two separate, nonoverlapping classes. The evidence was not yet conclusive for several reasons, but primarily because the taxon had not been established in children. If these offenders engage in a lifelong pattern of antisocial behavior beginning in early childhood and constitute a distinct class of offenders, then this class should be demonstrable in early childhood. The main goal of this study was to determine whether a distinct group of boys, boys who may be on a trajectory of lifelong antisocial behavior, could be uncovered in an uncensored community sample of children.

The taxometric analyses in this study provided evidence of a discontinuous, discrete entity underlying scores on three different measures of serious antisocial behavior in children, the DSM-IV CD, eight items of the PCL-YV, and the CATS. These results indicate that a distinct class of boys who have already engaged in serious antisocial behavior can be identified in childhood. These findings support the claim by Skilling et al. (2000) that lifelong persistent antisociality is underlain by a taxon. Longitudinal studies are required, however, to determine whether boys who are identified as taxon members in childhood exhibit a lifelong pattern of antisocial conduct.

The results also suggest that, although we have identified a distinct group of young boys, we have not yet determined the optimal set of indicators, because all three measures provided evidence of the antisociality class. One set of childhood indicators may more accurately predict lifelong persistent antisociality, but this question cannot be answered with these data. Rather, longitudinal studies are required to determine which indicators might be optimal for this task.

The fact that all three measures provided evidence for an antisociality class has implications for the development of measurement tools and diagnostic criteria for serious antisocial behavior in children. When scored in a continuous manner, the correlations between the PCL-YV and CD were extremely high and, in fact, approach unity when corrected for measurement error. It has been suggested by some researchers (e.g., Frick, O'Brien, Wootton, & McBurnett, 1994) that the importation of the psychopathy construct from the adult literature would improve our ability to identify the children at highest risk for future violence. Although this may be true, it is also possible that a change in how we use the CD criteria from the *DSM* may also be useful. These results suggest that the number of criteria required (3 of 15) for a diagnosis of CD (APA, 1994) is too low and is likely identifying children who are not truly members of the antisociality class. Our results also imply that the continuous measures (PCL-YV score, CD as a scale, etc.) indicate the probability that an individual is a member of the class rather than how "antisocial" one is, and that diagnostic cut-offs lead to misclassifications when they are not empirically derived (or are derived based on different empirical criteria).

It is of interest that Harris et al. (1994) found that items from Factor 2 of the PCL-R, but not generally Factor 1, were taxon indicators. The opposite was found in this study, with five of the eight taxon indicators belonging in Factor 1 of the PCL-YV. However, it is not presently clear whether this is a contradictory finding. First, items were chosen for the taxometric analyses based on their psychometric properties in this particular sample—some items were discarded at the outset as described in the method and were not given an opportunity to be identified as taxon indicators. In addition, certain items of the PCL-YV were unavailable. Moreover, there were several important differences between the two studies. The most important difference is that all the variables in this study were from self-report. Participants were asked

to report how frequently they had engaged in certain behaviors versus the typical scoring of Factor 1 items, which are scored from impressions gained in an interview and/or (as in the Harris et al. study) file review.

Second, these measures were taken at a different developmental phase; it may be that these items, when measured by self-report, carry more weight at this age than in adulthood. It may be that interpersonal and affective traits are very important to the persistent antisociality construct but more difficult to measure once one has reached adulthood and is more practiced at manipulation and deceit. It may also be the case that the Factor 2 items are not as diagnostic at a young age because of issues related to developmental time lines. One last point to be made here is that the PCL-YV is typically used with adolescent boys (Forth et al., 1990), and the average age of the boys in this sample was only 12 years old.

This study has several strengths, the first being that the sample consists of boys from community schools and can be considered relatively uncensored. Second, the reports of antisocial behaviors were concurrent rather than retrospective. Both of these points also address criticisms that could be made about the Harris et al. (1994) study. Finally, these self-reports may be particularly sensitive because they were taken when the boys were in early adolescence when serious antisocial behaviors are more evident than in early childhood. Despite the strengths of this study, particularly the uncensored nature of the sample and the convincing taxometric results, it was not without methodological limitations. A limitation of this study was its sole reliance on an already established database that was not originally designed to address this research question. There were also limitations due to the self-report nature of the data. With respect to the first point, the reliance on already available variables meant that several items from the various scales could not be scored. In particular, there were several items missing from the PCL-YV (5 of 18). In addition, all the variables were obtained from self-reports, not the typical method used to score the CD or PCL-YV measures. These methodological issues limit our ability to make definitive statements with regard to the relationship between the PCL-YV and the CD criteria. However, there is no reason to believe that these scoring issues would have had an impact on the validity of the taxometric results themselves.

Replication of these results in future studies using different samples of children, including both clinical and nonclinical samples, will provide a test of the validity of these taxometric results. Further research will also test the ability of these taxometric findings to accurately identify high-risk individuals and to predict future violence.

In conclusion, this study showed that a distinct group of boys who already report engaging in serious antisocial behavior can be identified early in life, and the data suggest that the serious antisociality construct can be indexed by items similar in content to both a measure of psychopathy, the PCL-YV, and serious antisocial behavior in children as indexed by the *DSM-IV* CD criteria and the CATS items. Furthermore, the base-rate calculations from this study provide us with the first empirical estimates of what proportion of the population might belong to this antisociality class. These findings raise many important questions, for example, What proportion, if any, of taxon members later desist from their seriously antisocial behavior? And what behavioral and personality characteristics would desisting taxon members exhibit in early childhood and late adolescence? Longitudinal studies are needed to answer these questions and to determine which set of indicators are the best predictors of a lifelong pattern of antisocial behavior.

Many beds in forensic psychiatric and correctional facilities are occupied by people who are persistently antisocial (Wong, 1988), and these offenders commit a disproportionately large number of nonviolent and violent crimes (e.g., Hare & McPherson, 1984; Harris, Rice, & Cormier, 1991). A more complete understanding of these antisocial traits in this group of high-risk boys has implications for the early identification and/or prevention of these problems in children and the potential for preventing a great deal of victimization if these children truly are on the road to lifelong persistent antisociality.

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