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Callous–Unemotional Traits in Predicting the Severity and Stability of Conduct Problems and Delinquency

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The current study tests whether the presence of callous–unemotional (CU) traits designates a group of children with conduct problems who show an especially severe and chronic pattern of conduct problems and delinquency. Ninety-eight children who were selected from a large community screening of school children in grades 3, 4, 6 and 7 were followed across four yearly assessments. Children with conduct problems who also showed CU traits exhibited the highest rates of conduct problems, self-reported delinquency, and police contacts across the four years of the study. In fact, this group accounted for at least half of all of the police contacts reported in the sample across the last three waves of data collection. In contrast, children with conduct problems who did not show CU traits continued to show higher rates of conduct problems across the follow-up assessments compared to non-conduct problem children. However, they did not show higher rates of self-reported delinquency than non-conduct problem children. In fact, the second highest rate of self-reported delinquency in the sample was found for the group of children who were high on CU traits but without conduct problems at the start of the study.

KEY WORDS: callous–unemotional traits; stability; prospective longitudinal design; delinquency; conduct problems.

It is becoming increasingly clear that, within the group of children who show severe antisocial and aggressive behavior, there are important subgroups which differ on the severity and stability of their behavior problems (see Frick & Loney, 1999 for a review) and which exhibit distinct characteristics that could suggest different causal processes underlying their behavioral disturbance (see Frick & Ellis, 1999 for a review). Evidence for this heterogeneity within antisocial youth has led to a number of subtyping approaches in an attempt to capture these variations in severity and causes. Most of these approaches have focused on the severity or type of antisocial or aggressive behaviors manifested by the child (Crick & Dodge, 1996; Loeber et al., 1993; Stickle & Blechman, 2002) or on the timing of onset of these behaviors (American Psychiatric Association, 2000; Moffitt, 1993).

A notable exception is research that has attempted to extend the construct of psychopathy to understanding antisocial behavior in youth. The construct of psychopathy, rather than focusing on the severity or pattern of antisocial behavior, focuses on the person's affective (e.g., absence of guilt, constricted display of emotion), interpersonal (e.g., failure to show empathy, use of others for one's own gain), self-referential (e.g., views self as more important than others) and behavioral (e.g., acts in a careless and impulsive manner) style to designate a distinct subgroup of antisocial individuals (Hare 1998; Hart & Hare, 1997). Although much of the research on psychopathy has been conducted in adult samples, the presence of psychopathic features has proven to designate a subgroup of antisocial youth with more severe and more aggressive patterns of antisocial behavior in forensic (Caputo, Frick, & Brodsky, 1999; Kruh, Frick, & Clements, 2005) and mental health (Christian, Frick, Hill, Tyler, & Frazer, 1997) samples. Further, children with conduct problems who also show psychopathic traits show a number of distinct characteristics, such as showing a preference for novel, exciting,

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and dangerous activities (Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999), being less sensitive to cues of punishment, especially when a reward-oriented response set is primed (Barry et al., 2000; Fisher & Blair, 1998), and being less reactive to threatening and emotionally distressing stimuli (Blair, 1999; Loney, Frick, Clements, Ellis, & Kerlin, 2003). In addition, their conduct problems appear to be less strongly associated with dysfunctional parenting practices (Wootton, Frick, Shelton, & Silverthorn, 1997) and with deficits in verbal intelligence (Loney, Frick, Ellis, & McCoy, 1998) compared to children with conduct problems who do not show psychopathic traits.

Unfortunately, this research extending the construct of psychopathy to youth has largely been cross-sectional in nature. As a result, there is limited evidence for the predictive utility of psychopathic features prior to adulthood (Edens, Skeem, Cruise, & Cauffman, 2001). This limitation is unfortunate because one of the most important facets of psychopathy in adult samples is its utility for predicting antisocial outcomes, such as violence and aggression (Hart, Kropp, & Hare, 1988; Serin, 1993; Serin, Peters, & Barbaree, 1990). There are several notable exceptions in which the predictive utility of psychopathic traits has been tested in samples of institutionalized adolescents. These studies have documented that psychopathic features predict subsequent delinquency, aggression, number of violent offenses, and a shorter length of time to violent reoffending in antisocial youth (Brandt, Kennedy, Patrick, & Curtin, 1997; Forth, Hart, & Hare, 1990; Toupin, Mercier, Dery, Cote, & Hodgins, 1995). In one of the only studies to test the predictive utility of psychopathic features in a non-referred sample of children, Frick, Cornell, Barry, Bodin, and Dane (2003) reported that children with conduct problems who also showed psychopathic features showed more severe and more instrumental aggression and had higher rates of self-reported delinquent acts one year later compared to children with conduct problems but without these features. The current study focuses on this same sample of children using additional follow-up data.

These results are promising in suggesting that psychopathic features may designate an especially severe, aggressive, and chronic type of disturbance in antisocial youth. However, there are a number of limitations in this body of research. First, most studies have relied on clinic-referred or forensic samples (except Frick et al., 2003; Lynam, 1997) and focused on the adolescent age group (except Christian et al., 1997; Frick et al., 2003). Second, even the studies that have used prospective designs have had limited follow-up periods, typically with follow-up periods of one (Frick et al., 2003) to two (Brandt et al., 1997; Forth et al., 1990) years. Therefore, the utility of these traits for predicting antisocial behavior over longer periods of time has not been established. Third, it is not clear from this research which dimension or dimensions of the construct of psychopathy might be most important for predicting later antisocial and aggressive behavior.

In both child (Frick, Bodin, & Barry, 2000; Frick, O'Brien, Wootton, & McBurnett, 1994) and adult (Cooke & Michie, 2001; Hare, Hart, & Harpur, 1991) samples, factor analyses of psychopathic features result in multiple correlated dimensions. Further, there has been some debate as to which of these dimensions may be most important for distinguishing antisocial youth who fit more with traditional conceptualizations of psychopathy. For example, some studies have placed primary importance on the presence of impulsivity (Lynam, 1996), whereas others have emphasized the presence of callous and unemotional (e.g., lack of guilt and empathy) (CU) traits (Barry et al., 2000). In support of the latter conceptualization, Barry et al. (2000) reported that clinic-referred children with conduct problems and high levels of impulsivity only showed characteristics associated with the construct of psychopathy (e.g., fearlessness, a reward dominant response style) if they also showed high rates of CU traits. Further, in the sample that is the focus of the current study, Frick et al. (2003) reported that the presence of CU traits, but not impulsivity, predicted greater levels of aggression and particularly greater levels of instrumental and premeditated aggression at a one year follow-up in non-referred children with conduct problems. However, an important piece of information for informing this debate is to determine which of these dimensions more strongly predicts the stability of antisocial and aggressive behavior over a more extended period of time.

Based on these considerations, the main goal of the current study was to extend the findings of Frick et al. (2003) to determine the predictive utility of CU traits over a more extended (four year) follow-up period. Children with conduct problems, half of whom had high rates of CU traits and half of whom did not, were assessed at four yearly assessment points. The utility of CU traits for predicting the stability of conduct problems and delinquency was assessed. Further, the relative utility of these traits for predicting stability after controlling for impulsivity was investigated. Finally, the utility of CU traits was tested, not only for predicting the severity of antisocial behavior, but also for predicting different types of conduct problems (e.g., aggression, property destruction, and oppositional) and delinquent acts (e.g., violence, property offenses, status offenses, and drug offenses).

METHOD

Participants

There were several goals that guided sample recruitment. First, one goal was to obtain a community sample of youth with conduct problems to avoid potential referral biases that might be present in clinic-referred or forensic samples. Second, when obtaining a non-referred sample, it was also important to ensure that enough children with severe conduct problems were recruited and, even more importantly, that sufficient numbers of conduct problem youth with and without CU traits were recruited. Third, it was important to ensure that the oversampled groups were still representative of that group in the community from which they were sampled.

Based on these considerations, a two step stratified random sampling procedure was employed to recruit participants. In the first step, four thousand parents of children in the third, fourth, sixth, and seventh grades of two school systems in a moderate sized city in the southeastern United States received announcements about the study. The two school systems were chosen because one served the immediate urban area and the second served the surrounding region that was predominantly suburban and rural. Those parents who agreed to have their child participate in the study completed consent forms and a screening questionnaire used to assess the presence of DSM-IV symptoms of Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD; American Psychiatric Association, 2000) and CU traits (Frick & Hare, 2001). Following receipt of the parents' consent forms and rating scales, the child's teacher completed analogous questionnaires. For each child who participated in this initial phase of screening, his or her teacher received $ 10 for educational supplies for the classroom. This first phase yielded a sample of 1136 children that was 53% female, 77% Caucasian, 19% African-American, and 21% receiving special education services, all of which closely matched the overall demographics of the two school systems. The range of Duncan's Socioeconomic Index (SEI; Hauser & Featherman, 1977) was 0–92.3, with a mean of 47.20 ($SD = 23.8$) and with scores of 24 and 64 at the 1st and 3rd quartiles of the sample. This distribution indicates that the sample showed generally a normative range of socioeconomic status, given that middle class categories generally fall between 35 and 65 (higher scores indicating higher status categories) on this index.

In the second phase of recruitment, the sample of 1136 children was divided into four groups based on combined parent and teacher ratings of conduct problem symptoms and CU traits in the full sample. The first group was below the mean on both dimensions ($n = 225$), a second group was at or above the upper quartile on the conduct problem measure but below the mean on the measure of CU traits ($n = 66$), one group was at or above the upper quartile on the measure of CU traits but below the mean on the measure of conduct problems ($n = 77$), and the last group was above the upper quartile on both dimensions ($n = 128$). These four groups were then stratified on gender, ethnicity, and socioeconomic status. Next, 25 children in each of the four groups were recruited to participate in the four yearly follow-up assessments. These children were selected through a stratified random sampling procedure to ensure that the four groups matched the group in the community sample from which they were sampled on the three stratification variables. Also, the sampling ensured that approximately equal numbers of children were included from the younger (3rd and 4th grade) and older (6th and 7th) grade cohorts. Errors in data collection resulted in the loss of two participants from the group high on conduct problems but low on the measure of CU traits. Therefore, participants in this study were 98 children that fell into the four groups described above.

The screening took place in the Fall and Spring of the 1997–1998 school year and these children were assessed at four yearly follow-up assessments, ending in the fall of the 2002 school year. The mean length of time between the initial screening and the first follow was 12.99 ($SD = 4.67$) months, with intervals of 12.65 ($SD = 1.61$), 12.63 ($SD = 1.82$), and 13.38 ($SD = 2.82$) months occurring between the subsequent follow-up assessments. This led to an average interval between completion of the screening measures to form the study groups and the fourth follow-up assessment of 50.91 months ($SD = 4.4$) and an interval of 38.60 months ($SD = 2.90$) between the first and fourth follow-up assessments. The demographic characteristics of this sample are described in Table I. As evident from this table, there were differences across groups on some demographic variables, which reflect the characteristics of that group in the larger community sample. Specifically, the presence of CU traits was associated with lower socioeconomic status, lower intelligence, a lower percentage of girls, and a higher percentage of African-American children (which was the only minority status represented in the study sample). Also, both CU traits and conduct problems were associated with the number of impulsivity–hyperactivity symptoms of Attention Deficit Hyperactivity Disorder rated by parent and teacher at the screening. The mean number of ODD and CD symptoms for each group, also based on parent and teacher ratings at screening, are provided Table I. It is important to

Table I. Demographic Characteristics of the Sample at Initial Follow-up

	Low CU, low CP ($n = 25$)	High CU, low CP ($n = 25$)	Low CU, high CP ($n = 23$)	High CU, high CP ($n = 25$)	Effects	Total ($n = 98$)
Age	12.20 (1.55)	12.68 (2.01)	12.26 (2.71)	12.28 (1.67)		12.36 (1.73)
SES	53.49[a] (12.38)	42.10[ba] (22.46)	54.53[a] (19.95)	37.17[b] (19.10)	CU[a]	46.67 (19.96)
K-BIT	109.68[a] (11.13)	102.72[a,b] (14.55)	107.74[a] (11.48)	99.40[b] (12.10)	CU[b]	104.83 (12.88)
CU Traits	1.16[a] (.99)	7.28[c] (1.40)	3.13[b] (1.06)	7.76[c] (1.31)	CU[c], CP[d], CU X Cp[e]	4.92 (3.09)
ODD Symptoms	0 (0)	.04 (.20)	3.22 (2.21)	5.22 (2.36)		2.12 (2.77)
CD Symptoms	0 (0)	.28 (.46)	1.65 (1.15)	2.92 (1.19)		1.20 (1.44)
I-H Symptoms cohort	.20[a] (.82)	.48[a,b] (1.50)	1.86[b,c] (2.49)	3.28[c] (2.88)	CU[f], CP[g]	1.45 (2.39)
(% Young)	52	52	48	48		50
Ethnicity (% minority)	8	36	9	32	CU[h]	21
Gender (% Female)	68	40	48	36	CU[i]	47

Note. SES: Duncan's Socioeconomic Index (Hauser & Featherman, 1977); K-BIT = Composite Index from the Kaufman Brief Intelligence Test (Kaufman & Kaufman, 1990); I-H (Impulsive–Hyperactive), ODD and CD symptoms are based on parent and teacher ratings from the Child Symptom Inventory-4 (CSI-4; Gadow & Sprafkin, 1995). Effects are from either 2X2 ANOVA or 2X2 Logit Model analyses with level of CU traits and level of conduct problems, as the between groups factors; Effects could not be calculated for the ODD or CD symptoms because of the absence of variance in the control group on this variable.

[a] $F(3, 94) = 14.27$, $p < .001$.
[b] $F(1, 94) = 9.30$, $p < .01$.
[c] $F(1, 94) = 488$, $p < .001$.
[d] $F(1, 94) = 25.46$, $p < .001$.
[e] $F(1, 94) = 9.29$, $p < .01$.
[f] $F(1, 94) = 4.05$, $p < .05$.
[g] $F(1, 94) = 28.30$, $p < .001$.
[h] $X^2(df = 1, 98) = 8.29$, $p < .01$.
[i] $X^2(df = 1, N = 98) = 4.68$, $p < .05$.

note that the two conduct problem groups differed in their mean number of ODD symptoms (t ($df = 46$) $= 3.18$; $p < .01$) and in their mean number of CD symptoms ($t(df = 46) = 3.75$; $p < .001$) at screening.

Measures Collected at Screening for Group Formation

Antisocial Process Screening Device (APSD)

The APSD (Frick & Hare, 2001) is a 20-item behavior rating scale that was completed by each child's parent and teacher during the initial screening. Each item on the APSD is scored either 0 (Not at all true), 1 (Sometimes true), or 2 (Definitely true) and the 6-item Callous–Unemotional (CU) scale was used to form groups for the follow-up assessments. The CU dimension, which includes items such as "feels bad or guilty", "concerned about the feelings of others", and "does not show emotions" has proven to be the most stable dimension of the APSD across multiple samples (Frick, Bodin, & Barry, 2000). It had an internal consistency of .76 in the full screening sample. Parent and teacher ratings on the APSD CU scale were correlated $r = .38$ ($p < .001$).

Ratings from parents and teachers were combined by using the higher score from either informant for each item (Piacentini, Cohen, & Cohen, 1992). This method for combining ratings was used based on several considerations. First, the report of any single informant who may not see the child in multiple situations will be limited and, therefore, use of ratings of each informant individually would not provide the most accurate assessment of these traits. Second, there can be substantial motivation for persons to under-report a child's level of the traits assessed by the APSD, which are generally not socially desirable, but motivation for over-reporting of such behaviors appears less likely. Therefore, considering a trait as present only when multiple informants report it as present does not seem justifiable. Third, a child who is scored high by multiple raters may not be more extreme on these traits than a child who is scored high by only one rater. Discrepancies may be due to the fact that the situation in which one rater sees the child is not as likely to elicit these traits than another situation or it may be due to the fact that the child is able to mask such behaviors in certain situations. As a result, a simple summative or averaging approach to combining information across informants also did not seem justifiable.

Children's Symptom Inventory-4 (CSI-4)

The sections of the Children's Symptom Inventory-4 (CSI-4; Gadow & Sprafkin, 1995) assessing symptoms related to DSM-IV criteria for Oppositional Defiant Disorder (ODD), Conduct Disorder (CD), and Attention Deficit Hyperactivity Disorder (ADHD) were completed by parents and teachers at the initial community screening. The ratings for ODD and CD were used to form groups for the follow-up assessments. The impulsivity–hyperactivity (IH) symptoms of ADHD were used as a covariate in analyses to determine if differences in conduct problem trajectories could be accounted for by differences in IH symptoms across groups (see Table I). Consistent with the procedure used to combine informants on the APSD, a multi-informant composite was formed by using the highest rating of each symptom. The parent and teacher correlations in the community sample were $r = .29$ ($p < .001$) for the CD symptoms, $r = .35$ ($p < .001$) for the ODD symptoms, and $r = .50$ ($p < .001$) for Impulsive–Hyperactivity symptoms of ADHD. Using a combination of parent and teacher reports on the CSI-4, Gadow and Sprafkin (1995) reported good correspondence between CSI-4 scores and clinician diagnoses in a clinic sample of school-aged children ($n = 63$), with sensitivity rates for predicting the diagnoses of ODD and CD of .93 and a sensitivity rate of .87 for predicting the diagnosis of ADHD. To estimate the severity of conduct problems experienced by the two conduct problem groups, the percentage of children who met DSM-IV criteria based on the number of symptoms rated as "Often" or "Very Often" on the CSI-4 by either parent or teacher was determined. Based on this research criterion, 65% of the children with conduct problems who were low on CU traits and 92% of the children with conduct problems who were high on CU traits met this threshold for either ODD or CD at the initial community screening.

Repeated Measures: Antisocial Outcome

The NIMH Diagnostic Interview Schedule for Children-Version 4 (DISC-IV)

The DISC-IV (Shaffer & Fisher, 1996) was developed to correspond to the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000). The DISC-IV was used to assess all symptoms of ODD and CD at each of the four follow-up assessments based on child and parent report. The DISC-IV is a highly structured interview designed to be administered by lay interviewers with appropriate training. It has proven to be highly reliable on both the symptom and diagnostic level (Lahey et al., 1994). Interviewers were a licensed psychologist or advanced graduate students in psychology who were trained in standardized administration procedures for the DISC. Consistent with other measures, symptoms were considered present if endorsed by either the parent or child. The correlations between parent and child report of ODD/CD symptoms were $r = .25$, $r = .41$, $r = .29$, and $r = .36$ (all $p < .01$) at the four follow-up assessments, respectively. In addition to determining the number of conduct problems as an indicator of severity, the symptoms of ODD and CD were divided into three symptom types (Frick et al., 1993): Oppositionality, Aggression, and Property Violations. The meta-analyses by Frick et al. (1993) also designated Status Offenses as an important dimension of conduct problem behavior. However, the DSM-IV symptoms of the status offenses have an age requirement (e.g., truant from school prior to the age of 13) and, given that at each time point some of the children were younger than age thirteen and others were not, use of these symptoms in analyses was not appropriate. Table II provides the distribution of these conduct problem measures at each time point and their stability across follow-up assessments.

Self-Report of Delinquency Scale (SRD)

The SRD (Elliott & Ageton, 1980) assesses the child's self-report of 36 illegal juvenile acts. It was developed from a list of all offenses reported in the Uniform Crime Report with a juvenile base rate of greater than 1% (Elliott & Huizinga, 1984). Due to the relatively young age of the sample at the start of the study, the three items related to sexual behavior were omitted from this scale. Consistent with past uses of the scale (Krueger et al., 1994), a composite measure was created summing the number of delinquent acts committed (with a possible range of 0–33). This composite had a coefficient alpha of .74, .82, .83, and .85 across the four waves of data collection.

There are four additional subscales on the SRD assessing specific types of delinquent acts, including only more serious offenses. These include property offenses (7 items; e.g, "have you ever purposely damaged or destroyed property belonging to school"), status offenses (4 items; e.g., "have you ever taken a vehicle for a ride without the owners' permission"), drug offenses (9 items; e.g., "have you ever sold hard drugs such as heroin,

Table II. Distribution and Stability of Primary Antisocial Outcome Variables

	Mean	*SD*	Time 2	Time 3	Time 4
Time 1					
I. Total conduct problems	2.82	3.56	.74***	.79***	.72***
A. Aggressive symptoms	.60	1.15	.70***	.64***	.66***
B. Oppositional symptoms	1.73	1.94	.73***	.74***	.61***
C. Property destruction symptoms	.39	.78	.35***	.54***	.36***
II. Total delinquency	1.55	2.17	.71***	.58***	.57***
A. Violent offenses	.40	.72	.42***	.22*	.06
B. Property offenses	.33	.67	.46***	.47***	.36***
C. Status offenses	.30	.56	.53***	.53***	.33***
D. Drug offenses	.11	.45	.65***	.64***	.68***
Time 2					
I. Total conduct problems	2.26	3.33	1.00	.75***	.77***
A. Aggressive symptoms	.53	1.18	1.00	.72***	.69***
B. Oppositional symptoms	1.40	1.97	1.00	.70***	.63***
C. Property destruction symptoms	.28	.59	1.00	.68***	.38***
II. Total delinquency	1.46	2.51	1.00	.68***	.60***
A. Violent offenses	.37	.86	1.00	.59***	.42***
B. Property offenses	.30	.64	1.00	.37***	.33**
C. Status offenses	.32	.63	1.00	.49***	.42***
D. Drug offenses	.22	.63	1.00	.73***	.64***
Time 3					
I. Total conduct problems	2.00	3.00	—	1.00	.76***
A. Aggressive symptoms	.33	.94	—	1.00	.70***
B. Oppositional symptoms	1.31	1.84	—	1.00	.70***
C. Property destruction symptoms	.31	.61	—	1.00	.54***
II. Total delinquency	1.20	2.32	—	1.00	.74***
A. Violent offenses	.26	.26	—	1.00	.38***
B. Property offenses	.20	.52	—	1.00	.56***
C. Status offenses	.21	.51	—	1.00	.22*
D. Drug offenses	.32	.95	—	1.00	.79***
Time 4					
I. Total conduct problems	2.10	2.11	—	—	1.00
A. Aggressive symptoms	.36	.87	—	—	1.00
B. Oppositional symptoms	1.51	1.80	—	—	1.00
C. Property destruction symptoms	.21	.51	—	—	1.00
II. Total Delinquency	1.48	2.71	—	—	1.00
A. violent offenses	.34	.59	—	—	1.00
B. Property offenses	.28	.75	—	—	1.00
C. Status offenses	.19	.45	—	—	1.00
D. Drug offenses	.45	1.17	—	—	1.00

Note. Conduct problems were assessed using parent and child report on the DISC-IV. The division of symptoms into types was based on the meta-analysis of Frick et al. (1993). The delinquency variable is based on the child's report using the SRD.

* $p < .05$. ** $p < .01$. *** $p < .001$.

cocaine, and LSD") and violent offenses (8 items; "have you ever been involved in gang fights"). Importantly, the violent offense scale includes items that include threats of physical violence, as well as actual violence (e.g., "have you ever hit (or threatened to hit) a teacher or other adult at school"). Because the subscales included only more serious offenses, the range of scores on most of these measures was somewhat restricted in this community sample. The means and standard deviations and the stability coefficients for these scales are reported in Table II. Because of the few items on these scales and the low base rates of these offenses in the sample, the coefficient alpha of the subscales tended to be low. The coefficient alpha ranged from .36 to .64 across waves of data collection for property offenses. Similarly, coefficient alpha ranged from .21 to .42 for status offenses and from .32 to .65 for the violent offenses. The internal consistency of the drug offense scale was somewhat higher ranging from .56 to .82 across the four waves of data collection.

Number of Police Contacts

As a second measure of delinquent behavior, each child's parent was asked whether the child "had ever had contact with the police" (first follow-up assessment) or "had contact with the police within the past year" (follow-up assessments). A cumulative rate of police contact was determined for each child, with the lifetime rate of police contact ranging from 5% of the sample at the first follow-up assessment to 14% of the sample at the last wave of data collection.

Procedures

Using the stratified sampling procedure described above, parents and children who participated in the community-wide screening were contacted and invited to participate in a more comprehensive assessment that included the measures used in the current study (see Frick et al., 2003: Frick et al., 2003 for a more complete description of the full assessment procedures). Those who were contacted but refused to participate were replaced by someone in the same group with similar demographic characteristics until 25 participants were recruited for each group. Two participants were lost due to errors in data collection, and both came from the high conduct problem and low CU traits group. However, this did not effect the demographic representation of this group compared to the larger community sample (Frick et al., 2003). This led to four groups of children of approximately equal size who participated in the four follow-up assessments: a control group low on both CU traits and conduct problems, a group high on CU traits but without significant conduct problems, a group high on conduct problems but without significant CU traits, and a group high on both CU traits and conduct problems.

For the initial follow-up assessment of these four groups, participants were tested in two sessions with the procedures standardized for all participants. The first session started with an informed consent procedure conducted with the parent and child together. They were then separated and parents were administered a semi-structured interview to obtain demographic information and information on police contacts followed by the DISC-IV interview. In a separate room, the children were administered the K-BIT (Kaufman & Kaufman, 1990) as an intellectual screening, the youth version of the DISC-IV, and the SRD. All testers were blind to the child's groups status. Parents received $65.00 for their participation in the comprehensive assessment procedures and the youth received a $15.00 gift certificate to either a local music store or book store.

The remaining three follow-up assessments took place as close to the 1-year anniversary of the initial assessment as possible. To reduce attrition, all information collected during the follow-up assessments were completed by phone and mail. The DISC-IV was conducted in a phone interview conducted with each child's parent and the youth version of the DSIC-IV and the SRD were administered in phone interviews with each child participant by an interviewer who was blind to the child's groups status. Parents received $65.00 for their participation in each follow-up assessment and the youth received a $15.00 gift certificate to either a local music store or book store.

RESULTS

Attrition

The level of attrition across the follow-up periods was minimal in the sample. That is, 93 of the 98 participants (95%) completed at least three of four DISC interviews which allowed them to be included in analyses of the conduct problem trajectories, with 81 of these (83% of the sample) completing all four follow-up interviews. Similarly, 91 of the 98 participants (93%) completed three of the four self-reports of delinquency, with 79 participants (81% of the sample) providing data at all four follow-up assessments. Importantly, there did not appear to be differential attrition across the study groups. That is, across the four study groups, there were between 22 (group high on conduct problems only) and 24 (group high on CU traits only and group high on both CU traits and conduct problems) participants with at least three DISC interviews. Similarly, for the self-reports of delinquency, there were 22 participants in the group high on conduct problems only and 23 participants in the remaining three study groups with data from at least three follow-up assessments.

Although these results suggest that the retention rate was quite high in the sample and they suggest that attrition was fairly uniform across study groups, it was still possible that there was an interaction between group status and drop out rate for some of the outcome variables. That is, there may have been selective attrition within certain study groups. To test for this possibility, a series of 2 (missing at the last follow-up vs. not) $\times$ 2 (study group) ANOVA's were conducted for impulsive–hyperactive (IH) symptoms collected at the time of group formation and for the conduct problem and delinquency variables collected at the first follow-up assessment. There were no significant interactions between failure to complete the four assessments and group status for IH symptoms or for

any of the conduct problem variables. There was, however, a significant interaction between dropping out of the study and group status for the total delinquency variable ($F(3, 88) = 2.86$, $p < .05$) and for the status delinquency variable ($F(3, 88) = 4.00$, $p < .01$). The reason for this significant interaction was that, within the group high on CU traits but low on conduct problems, the four children who did not complete the final assessment reported significant higher rates of delinquency ($Mn = 4.5$, $SD = 2.65$) and status offenses ($Mn = 1.25$, $SD = 1.26$) than those who remained in the study ($Mn = 1.48$, $SD = 2.06$; and $Mn = .29$, $SD = .47$, respectively). For all other variables and groups, the level of delinquency was quite similar for those who dropped out of the study and those who completed the final follow-up assessment.

Overview of Data Analytic Strategy

Random-effects regression models were used to assess antisocial trajectories across study groups using the Proc Mixed procedure in SAS (Littell, Milliken, Stroup, & Wolfinger, 1996). Random effects regression was chosen for these analyses because it (a) permits the estimation of both group and individual level growth trajectories, (b) allows for tests of differences in these growth trajectories across the study groups, and (c) allows for these tests to be conducted both with and without controlling for covariates (i.e., a child's level of impulsive–hyperactive (IH) symptoms and demographic variables). Further, this procedure accommodates missing data in repeated measures analyses, rather than using listwise deletion, as long as the there are at least three data points on which to compute growth trajectories. Therefore, only participants with data from at least three of the four follow-up assessments were used in these analyses.

These analyses address the study questions by determining whether the antisocial trajectories across the follow-up assessments differed for the four study groups and whether this could be accounted for by differences in the level of IH symptoms or demographic variables. The groups differed significantly on parent and teacher IH symptoms at the time of group formation ($F(3, 94) = 11.61$, $p < .01$) with the group high on CU traits and conduct problems showing significantly higher levels of IH symptoms ($Mn = 3.28$; $SD = 2.87$) than the control group ($Mn = 20$; $SD = .82$) and the group high on CU traits only ($Mn = .48$; $SD = 1.50$), based on pairwise comparisons using Tukey's procedure (see Table I). The group high on conduct problems but without CU traits had an intermediate level of IH symptoms ($Mn = 1.87$; $SD = 2.5$) and differed significantly only from the control group. Demographic differences across groups are reported in Table I. Given these differences, it was important to conduct analyses controlling for IH symptoms and demographic variables to determine if any group differences were due to group membership or to the differing levels of these variables.

When modeling growth trajectories, two parameters are estimated that describe the trajectory of the repeated dependent measure across time points. The first parameter is the intercept, which for these analyses, was set to represent the initial level of severity for the growth curve. The second parameter is the slope, which represents the shape of the growth curve after this initial starting point. As a result, associations between group and the intercept parameter indicate that the groups differed on the initial severity of the dependent measure. Associations between group and the slope parameter indicate that group membership was associated with increasing (positive associations) or decreasing (negative associations) levels of the dependent measure across time. All of the random-effects regressions estimated a linear slope, as change over time on the dependent variables was well described by a linear function. Although not central to the study questions, these growth models also provide an overall estimate of the effects of time, indicating whether or not the level of the dependent variables changed across data collection points.

Random-Effects Regression Models of Conduct Problem Trajectories

The first set of random-effects regression models used the parent and child reported level of conduct problem behavior as the repeated dependent measure. For the level of total conduct problems symptoms ($F(1, 89) = 13.28$, $p < .001$), for the level of aggressive symptoms ($F(1, 89) = 13.39$, $p < .001$), and for property destruction symptoms ($F(1, 89) = 6.84$, $p < .001$), there were significant time effects. There was a trend for a time effect for the oppositional symptoms ($F(1, 89) = 3.40$, $p < .07$). In each case, there was an overall decrease in conduct problem symptoms across the waves of data collection, with this being strongest for the aggressive conduct problem symptoms. The effects for group membership on the intercept and slope parameters for these dependent measures are provided in Table III. The overall tests for fixed effects indicated significant effects for group on both the intercept and slope parameters for each of the conduct problem measures, with the exception that group membership did not have a significant effect on the slope of the growth trajectory for oppositional conduct problems.

Table III. Random Effects Regression Models of Conduct Problem Trajectories

	No covariates				Covarying impulsivity–hyperactivity Symptoms.			
	Intercept		Slope		Intercept		Slope	
Dependent variable	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Total conduct problems test of fixed effects	F (3, 174) = 22.43^{***a}		F (3, 174) = 5.73^{***a}		F (3, 174) = 11.19***		F (3, 174) = 1.66	
CU-only	1.24	.85	−.33	.21	.33	.26	−.09	.07
CP-only	3.15^{***a}	.87	−.46^{*a}	.22	.72**	.27	−.08	.07
CU X CP	6.53^{***a}	.85	−.87^{***a}	.21	1.55***	.28	−.15*	.07
Aggressive conduct test of fixed effects	F (3, 174) = 16.68^{***a}		F (3, 174) = 5.51***		F (3, 174) = 7.96***		F (3, 174) = 1.65	
CU-only	.06	.30	−.01	.08	.02	.28	.01	.08
CP-only	.57^{***a}	.31	−.07	.08	.32	.29	−.01	.08
CU X CP	1.86^{***a}	.30	−.28***	.08	1.27***	.30	−.14	.07
Property conduct test of fixed effects	F (3, 174) = 7.42^{***a}		F (3, 174) = 3.13^{*a}		F (3, 174) = 3.97**		F (3, 174) = 2.46	
CU-only	.41^{*a}	.20	−.10	.06	.60*	.31	−.14	.10
CP-only	.63^{**a}	.21	−.19^{**a}	.06	.82**	.32	−.26**	.10
CU X CP	.92^{***a}	.20	−.13^{*a}	.06	1.08***	.33	−.07	.10
Oppositional conduct test of fixed effects	F (3, 174) = 17.31^{***a}		F (3, 174) = 2.04		F (3, 174) = 10.30***		F (3, 174) = 1.24	
CU-only	.66	.51	−.20	.15	.31	.26	−.10	.08
CP-only	1.93^{***a}	.52	−.19	.15	.83**	.27	−.08	.08
CU X CP	3.40^{***a}	.51	−.35^{**a}	.14	1.46***	.28	−.15*	.08

Note. Results are based on a random effects regression with conduct problems, assessed by parent and child report on the DISC-IV at the four follow-up assessments, as the repeated dependent measure. Individual group parameters reported in the body are the understandardized estimates, and standard error (*SE*) of these estimates, showing the effects for Group (Intercept) and the Group X Time interaction (Slope) for each group relative to the control group of children low on Callous-unemotional Traits (CU) and Conduct Problems (CP) at the initial screening. Level of impulsive-hyperactive symptoms (Sxs) was assessed by parent and teacher report on the CSI-4 at the initial screening. This variable was centered before using it as a covariate in the regression analyses.

[a]Remained significant after controlling for sex, ethnicity, intelligence, and socioeconomic status.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

To assess which study groups contributed to these overall fixed effects and to determine the direction of these effects, unstandardized estimates (beta) showing the intercept and slope parameters for the three groups high on CU traits and/or conduct problems relative to the growth trajectory for the control group are reported in Table III. As evident for each of the conduct problem variables, the two groups high on conduct problems at study entry showed higher initial levels on each of the measures compared to the control group, with the intercept being highest for the group high on both conduct problems and CU traits for each variable. The only estimate of intercept that was significant for the group high on CU traits-only was for predicting the severity of property destruction symptoms ($\beta = .41$, $p < .05$). The group high on CU traits and conduct problems showed the greatest decline in conduct problems (i.e., negative slope to the growth trajectory) across time relative to the control group followed by the group high on conduct problems without CU traits. However, even with the decline across time, the level of conduct problems in both conduct problem groups exceeded that of other two groups at each assessment point. This pattern is illustrated in Fig. 1a which shows a plot of the mean level of total conduct problems for each group at each assessment point.

The random-effects regression analyses for conduct problem symptoms was repeated using the level of teacher and parent reported IH symptoms assessed at the time of group formation as a covariate. The results of these analyses are also reported in Table III. Controlling for these symptoms had only a minimal influence on the significant group effects on the intercepts of the growth trajectories. The only change in significance was for the effect of the conduct problem-only group on the intercept for the aggressive conduct symptoms, which was no longer significant. There were more dramatic differences, however, on the association between group membership and the slope of the growth trajectories. That is, none of the overall fixed effects for slope were significant and only three of the slope parameters for the individual group effects remained significant after controlling for IH symptoms. This pattern of results suggests that, after controlling for the level of IH symptoms, there was less of a decline in symptoms over time for the study groups.

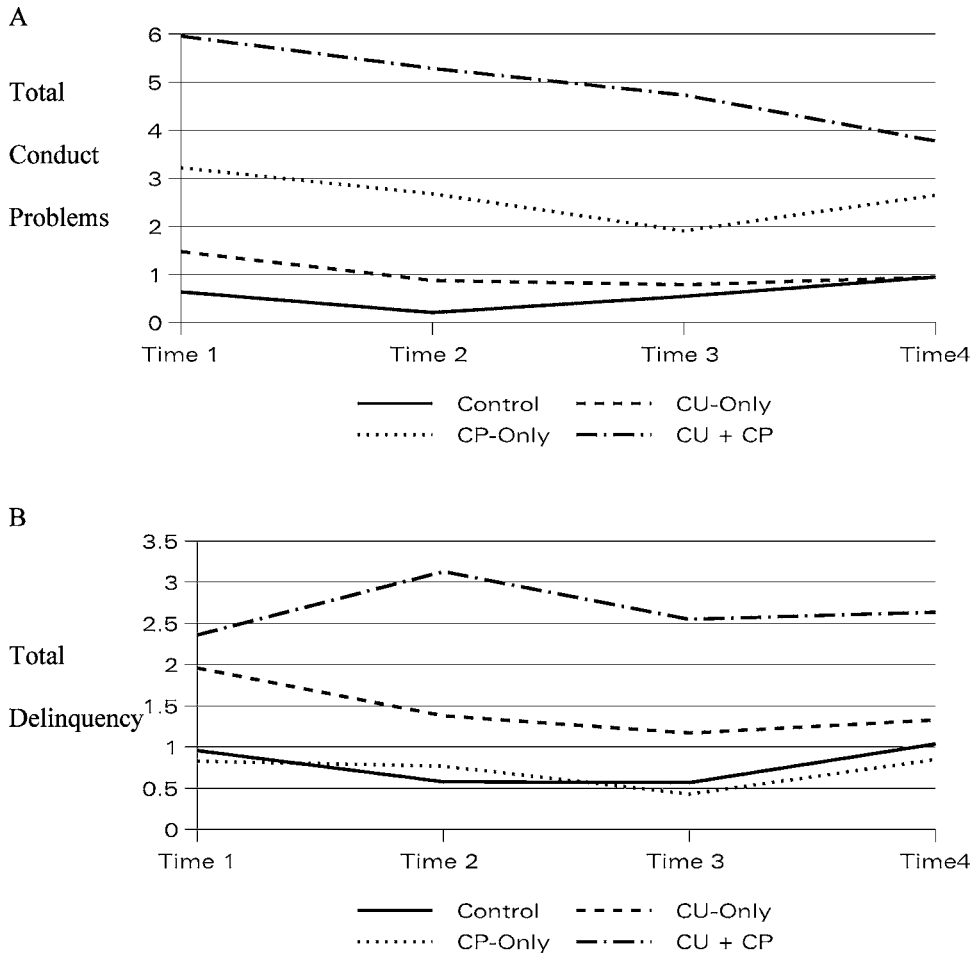

Fig. 1. The growth trajectories for total conduct problems (A) and self-reported delinquency (B) for each study group.

A final set of random-effects regression analyses for conduct problem symptoms was conducted, using child sex, ethnicity, intelligence, and socioeconomic status as covariates. Including these variables in the random-effects regression analyses resulted in almost identical results as indicated in Table III. For example, the overall tests of fixed effects for the total conduct problem variable still revealed a significant effect for the intercept ($F(3, 174) = 21.22$; $p < .001$) and slope ($F(3, 174) = 5.73$; $p < .001$). Further, group effects for the conduct problems-only and the combined conduct problems and CU traits groups remained significant for both the intercept ($\beta = 3.16$, $p < .001$; $\beta = 6.65$, $p < .001$) and the slope ($\beta = -.46$, $p < .05$; $\beta = -.87$, $p < .001$) parameters. Of the 20 significant effects reported in Table III without any covariates, only 2 were no longer significant after controlling for demographic variables. The two effects that were no longer significant included the overall effect for slope and the stronger negative slope for the group with both CU traits and conduct problems for the aggressive conduct problem variable.

Random-Effects Regression Models of Self-Reported Delinquency Trajectories

A second set of regression analyses were conducted using the child's self-report of delinquent behavior as the repeated dependent variable. Unlike the previous analyses, there were no consistent fixed effects for time. The time parameters for total delinquency, violent delinquency and property delinquency measures were all non-significant. There were significant time effects for status delinquency ($F(1, 87) = 5.06$, $p < .05$) and drug delinquency (($F(1, 87) = 11.56$, $p < .001$), but the direction of these effects was different. The level of status delinquency showed an overall decrease across time and the

level of drug delinquency showed an overall increase across time.

The effects for group on both the intercept and slope of the repeated delinquency measures are provided in Table IV. These analyses revealed rather consistent results across the delinquency measures. Overall, group membership had significant effects on the intercept but not the slope of the growth trajectories for the delinquency variables. Further, these effects were largely due to the much higher rate of delinquency in the group high on both CU traits and conduct problems at the time of group formation. As also illustrated in Table IV, controlling for the effects of IH symptoms did not substantially influence this pattern of results. When these analyses were repeated controlling for the effects of demographic variables, all of the significant effects for the group high on both CU Traits and conduct problems remained significant and all but one of the significant fixed effects for the intercept parameter remained significant.[3]

To illustrate the trajectories for the delinquency variables, the mean level of total delinquency across the four groups at each time point is presented in Fig. 1b. Besides the consistent high level of self-reported delinquency for the group high on both CU traits and conduct problems, Fig. 1b also illustrates that the group high on conduct problems without CU traits was indistinguishable from the control group on their level of delinquency at each time point. In fact, the group that consistently had the second highest rate of self-reported delinquency was the group high on CU traits but without conduct problems at the time of group formation. Interpreting the growth trajectories of this group of children needs to made cautiously due to the nonsignificant parameters which emerged in the regression models. However, the rate of delinquency may have been underestimated for this group given the selective attrition that was identified for this group, in which members with the highest initial rate of delinquency were more likely to drop out of the study. The higher rate of delinquency for this group was more pronounced on some types of delinquency than others. That is, the group high on CU traits but without conduct problems was consistently higher than the control and conduct problem-only groups on the drug and property delinquency variables. This pattern is illustrated in Fig. 2a for property delinquency. Like the overall effects for delinquency, the group high on CU traits consistently showed the second highest level of delinquency in the sample at each time point. In contrast, and as illustrated in Fig.2b, the only group to show a clearly distinct trajectory from the control group on level of violent delinquency was the group high on both CU traits and conduct problems.

[3]The method of forming the composite of self-reported delinquency was based on a simple summing of the number of delinquent acts, with no distinction made for the severity of the act. Another method for assessing overall severity of delinquent behavior was to limit the composite to only the more severe acts that are included in the four subscales of the SRD and to determine how many different domains of delinquent behaviors were reported by the child, which could range from 0 to 4. This measure of the variety of delinquent acts was highly correlated with the simple summing composite ($r = .89$, $p < .001$) and the results of the random effects of regression using the variety composite were almost identical to those reported in Table IV for the total delinquency variable.

Cumulative Rates of Police Contacts Across Groups

The final measure of antisocial behavior that was collected in the sample was whether the child had contact with the police according to parental report. The cumulative hazard curve for the rate of police contact across assessment points is provided in Fig. 3. As evident from this figure, the group high on CU traits and conduct problems showed the highest rate of police contact at each assessment point, with a steadily increasing rate of police contact across assessment points. In fact, at time 1 this group accounted for 40% of the reported police contacts in the sample, and this increased to 50%, 56%, and 50% of the police contacts at the last three time points, respectively. Interestingly, the other three groups had uniformly low levels of police contact at the first three assessment points. However, at the fourth assessment point, the group of children who were high on conduct problems but low on CU traits had an increase in police contacts (19%), although this was still lower than the 32% rate of the group high on both CU traits and conduct problems. The Mantel-Haensel Chi-Square for the rate of police contact across groups at the final wave of data collection was significant (X^2 $(df = 1) = 6.84$, $p < .01$).

DISCUSSION

The current results extend previous findings in clinic-referred (Christian et al., 1997) and forensic (Caputo et al., 1999; Kruh et al., 2005) samples in suggesting that children with conduct problems who also show CU traits show a more severe and chronic pattern of antisocial behavior. In a previous publication with this same non-referred sample, we reported that children with conduct problems and high rates of CU traits showed more severe conduct problems, more aggression, and greater rates of delinquency at a 1-year follow-up (Frick et al., 2003). In the current study, conduct problems and delinquency were assessed at three additional yearly follow-up

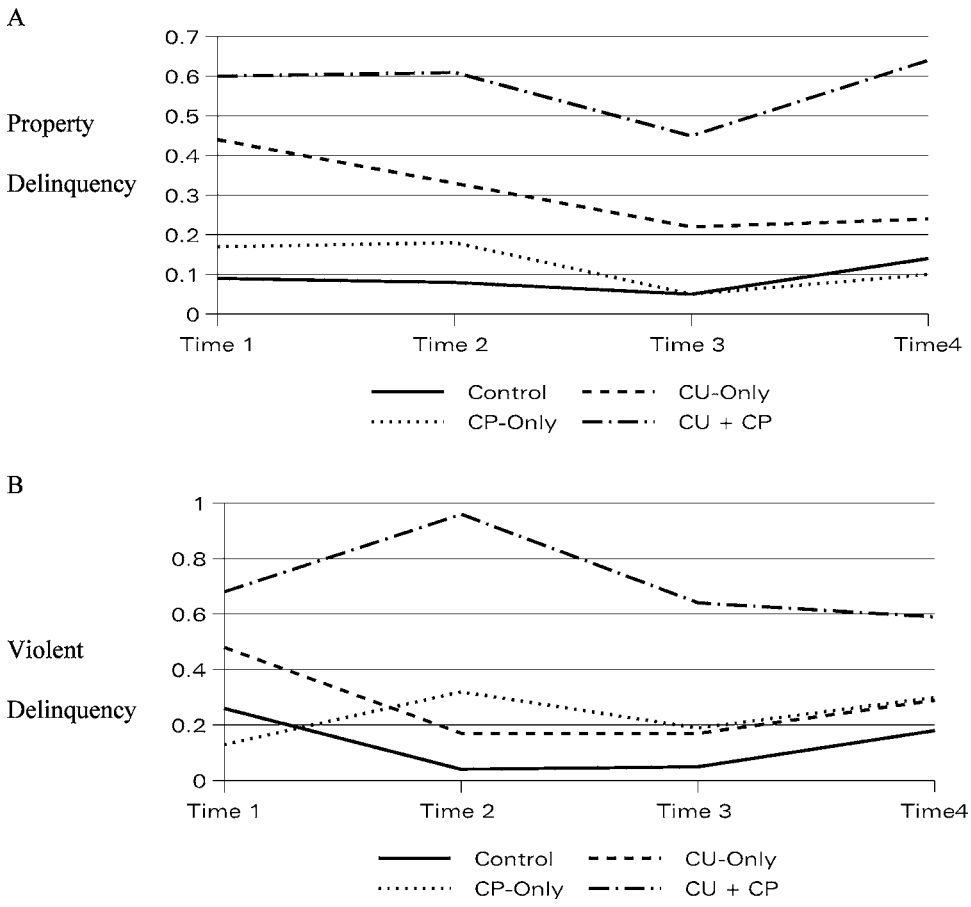

Fig. 2. A comparison of the trajectories for self-reported violent (A) and property (B) delinquency.

sessions, thereby providing a test of the predictive utility of CU traits over approximately four years. At each of the follow-up assessment points, children with CU traits and conduct problems showed the highest rates of conduct problems, self-reported delinquency, and parent-reported police contacts in the sample.

The divergence between the two conduct problem groups was most evident on the self-reports of

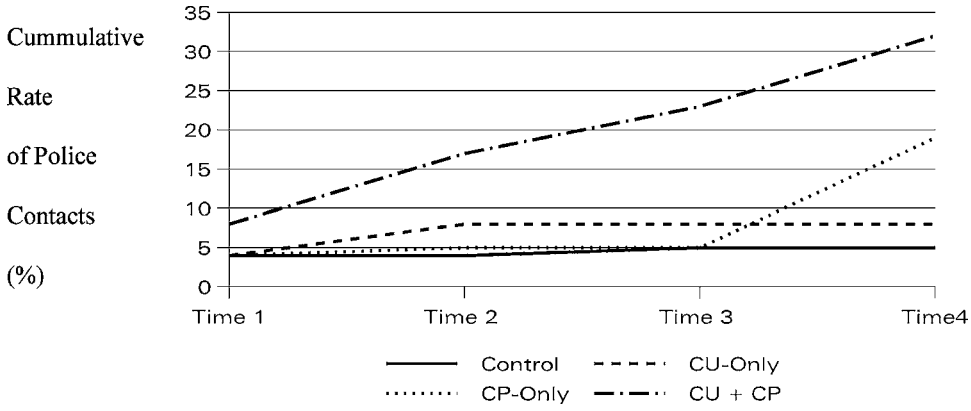

Fig. 3. Cummulative rate of parent-reported police contact in each study group.

Table IV. Random Effects Regression Models of Delinquency Trajectories

	No covariates				Covarying impulsivity–hyperactivity symptoms			
	Intercept		Slope		Intercept		Slope	
Dependent variable	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Total delinquency test of fixed effects	F (3, 170) = 3.76^{**a}		F (3, 170) = .04		F (3, 170) = 3.81**		F (3, 170) = .12	
CU-only	.85	.69	−.06	.22	.38	.30	−.03	.09
CP-only	.10	.69	−.07	.23	.02	.31	−.02	.09
CU X CP	2.04^{**a}	.69	−.05	.22	.91**	.32	−.05	.09
Violent delinquency test of fixed effects	F (3, 170) = 4.23^{**a}		F (3, 170) = .68		F (3, 170) = 2.63*		F (3, 170) = .53	
CU-only	.23	.23	−.04	.08	.27	.32	−.03	.11
CP-only	−.05	.23	−.06	.08	−.17	.33	.11	.11
CU X CP	.69^{**a}	.23	−.04	.08	.69*	.33	.04	.11
Property Delinquency Test of Fixed Effects	F (3, 170) = 3.03*		F (3, 170) = .22		F (3, 170) = 2.95*		F (3, 170) = .21	
CU-only	.34	.20	−.05	.07	.51	.32	−.07	.11
CP-only	.16	.21	−.05	.07	.25	.33	−.07	.11
CU X CP	.59^{**a}	.20	−.04	.07	.94**	.33	−.06	.11
Status delinquency test of fixed effects	F (3, 170) = 1.81		F (3, 170) = .21		F (3, 170) = .85		F (3, 170) = .09	
CU-only	.20	.18	−.04	.06	.32	.34	−.05	.10
CP-only	.14	.18	−.03	.06	.16	.35	−.04	.10
CU X CP	.42^{*a}	.18	−.04	.06	.53	.35	−.02	.10
Drug delinquency test of fixed effects	F (3, 170) = .36		F (3, 170) = 1.88		F (3, 170) = .21		F (3, 170) = 1.67	
CU-only	−.09	.15	.10	.10	−.03	.31	.08	.08
CP-only	−.03	.15	−.08	.10	−.24	.32	.01	.08
CU X CP	−.14	.15	.14	.10	−.09	.34	.15*	.08

Note. Results are based on a random effects regression with self-reported delinquency as the repeated dependent measure. Individual group parameters reported in the body are the understandardized estimates, and standard error (*SE*) of these estimates, showing the effects for Group (Intercept) and the Group X Time interaction (slope) for each group relative to the control group of children low on Callous–unemotional Traits (CU) and Conduct Problems (CP) at the initial screening. Level of impulsive-hyperactive symptoms was assessed by parent and teacher report on the CSI-4 at the initial screening. This variable was centered before using it as a covariate in the regression analyses.

[a]Remained significant after controlling for sex, ethnicity, intelligence, and socioeconomic status.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

delinquency. As illustrated in Fig. 1b, children with conduct problems and CU traits showed a high and stable rate of delinquency. In contrast, the trajectory of self-reported delinquency for the group of children with conduct problems but without CU traits was indistinguishable from the control group. This pattern of findings is similar to the cross-sectional results reported by Christian et al. (1997) in a clinic-referred sample, in which children with severe conduct problems only showed higher rates of police contact compared to non-conduct problem children if they also showed CU traits. Taken together, these findings suggest that pre-adolescent children who show conduct problems and CU traits, whether from a clinic-referred or community sample, appear to be at particularly high risk for showing delinquent behaviors and, thus, they should be the focus of interventions designed to reduce a child's involvement in illegal behaviors (Frick, 2001).

These results were supported by the findings of parent-reported police contacts, thereby providing support for the increased risk of delinquency for children with CU traits across two methods of assessment (i.e., self-report and parent-report). At each assessment point, children with conduct problems and CU traits accounted for the majority of police contacts in the sample. Interestingly, children with conduct problems without CU traits did show an increase in police contacts at the last assessment point (see Fig. 3). Given that this was the last time period for which data were available, it is not clear if this increase represents a stable trend for this group. However, it could suggest that the difference in police contacts for the two groups of conduct problem children may be in the timing of their involvement in illegal activities, with the involvement of the group without CU traits starting later. If this possibility is supported in future research, it still supports the importance of intervening early and intensively for children with CU traits because of the consistent associations between early involvement with the legal system and more severe adjustment problems in adulthood (Moffitt & Caspi, 2001; Robins, 1966).

Based on past research, it was predicted that the group of children high on CU traits would be especially likely to show violent and aggressive behavior, given the high rate of violent and aggressive behavior reported in adjudicated adolescents with psychopathic traits (Brandt et al., 1997; Forth et al., 1990; Toupin et al., 1995). This prediction was supported in this community sample. The group of conduct problem children with CU traits was the one group that was clearly different from the control group in their rate of actual or threatened violence against others (see Table IV and Fig. 2a). However, it is important to note that the self-reported involvement in delinquent behaviors of this group was not limited to aggressive or violent behaviors. Instead, this group showed the highest level of most types of delinquent behavior, thus supporting research in suggesting that the most severe and most aggressive juvenile offenders tend to show a range of antisocial behaviors of both an aggressive and non-aggressive nature (Farrington & Loeber, 2000). It is also important to note that the assessment of aggressive delinquency did not distinguish between reactive (e.g., an angry response to provocation) and instrumental aggression (e.g., as a means for obtaining some goal) (Crick & Dodge, 1996). In the first year follow-up assessment, a measure that assesses a broader range of aggressive behaviors was included and the group of children with conduct problems without CU traits did have a somewhat elevated risk for showing reactive forms of aggression (Frick et al., 2003). Therefore, it may be that the measure of self-reported delinquency used in the repeated follow-up assessments was not sensitive to the types of aggression displayed by this group of children. In support of this possibility, children with conduct problems but without CU traits did show a somewhat elevated level of aggressive conduct problems compared to the control group (see Table III), although their level of aggression did not reach the level of severity displayed by the group of conduct problem children with CU traits.

An interesting and provocative finding reported at the first follow-up assessment of this sample was that children with CU traits but without conduct problems also reported high rates of delinquency (Frick et al., 2003). This was an important findings because the risk for antisocial behaviors in this group, who did not show significant conduct problems at the time of sample recruitment, has not been considered in past research that has largely relied on clinic-referred or forensic samples (e.g., Christian et al., 1997). The results across follow-up time periods for this group were inconclusive. This group consistently showed the second highest rate of self-reported delinquent behavior in the sample and this was most evident for nonviolent offenses, such as property destruction and drug offenses (see Fig. 2b). However, the growth curves for this group did not differ significantly from the control group on any of the measures of self-reported delinquency in the random-effects regression models. The risk for this group of children high on CU traits but low on conduct problems may have been underestimated, since there was evidence for differential attrition in this group. That is, the small group of children ($n = 4$) in this group who did not complete the last follow-up assessment had significantly higher rates of self-reported delinquency at the first assessment than those who completed the study. As a result, more research is needed on children with CU traits who do not have significant conduct problems to more clearly determine their level of risk for later antisocial and delinquent behavior.

The findings on the growth trajectories for conduct problem behavior for the four study groups were not as clear as the findings on delinquency. Both groups of children with conduct problems had higher rates of all types of conduct problem behavior than the control group across all four follow-up assessments. Consistent with past research in a clinic-referred sample (Christian et al., 1997), the group that was also high CU traits exhibited the highest level of problem behavior at each assessment point. Overall in the sample, there was a negative slope to the trajectory of conduct problems indicating decreasing level of problems across time. This is consistent with past longitudinal research showing a decrease in conduct problems and aggression across later childhood and into adolescence (Broidy et al., 2003). However, contrary to expectations, the decrease in conduct problem behavior across time was greatest in the group high on CU traits. This decrease in severity of problem behavior across time was not large enough to change the fact that this group still had the greatest number of conduct problems at the final assessment point (see Fig. 1a). However, if this decline continued over time, it would change their status as the most severely disturbed group. One explanation for this finding is regression to the mean. That is, both groups with conduct problems were selected based on their high scores on measures of problem behavior and it was these groups that showed the greatest declines in behavior across time. Therefore, regression to the mean, combined with the normative decline in conduct problem behaviors across development, may have led to the greater negative slope for these groups. However, other potential moderators of stability (e.g., peer group characteristics, family functioning) were not tested and, as a result, other reasons for this decrease in severity over time could not be ruled out.

Interestingly, and also somewhat unexpectedly, the decline in conduct problems for all groups weakened after controlling for the level of impulsive-hyperactive

(IH) symptoms. This findings seems to contradict a rather large body of literature indicating that the presence of IH symptoms typically leads to a more severe and chronic pattern of conduct problems in children (Frick & Loney, 1999; Lynam, 1996). However, overall in the sample, the groups high on conduct problems had significantly higher rates of IH symptoms which would be consistent with this research. Our results indicate that group membership was associated with more stability in conduct problem behavior after these differences in IH symptoms were controlled. One explanation for this finding is that some of the associations between IH and stability found in past research may have been the result of a high rate of IH in children with CU traits (Christian et al., 1997; Frick, Bodin, & Barry, 2000). More importantly, it suggests that, although a large number of children with significant conduct problems show IH symptoms, those who do not may show a more severe and chronic pattern of antisocial behavior, especially if they also show CU traits. This would be consistent with past findings showing that children with conduct problems and IH symptoms who do not show CU traits are more distressed by the problems caused by their behavior then children with IH symptoms, conduct problems, and CU traits (Frick et al., 1999; Frick et al., 2003; Pardini, Lochman, & Frick, 2003).

Importantly, controlling for IH symptoms did not influence the different trajectories of delinquent behavior across study groups. That is, the high rate of self-reported delinquency in the group of children with conduct problems and CU traits was not changed by controlling for IH symptoms. This finding is important because both CU traits and impulsivity have been considered important dimensions of the construct of psychopathy (Cooke & Michie, 2001; Frick, Bodin, & Barry, 2000; Hare et al., 1991) and some extensions of the construct to youth have suggested that it is the impulsivity dimension that is most important for designating a subgroup of youth with conduct problems who fit with the construct of psychopathy (Lynam, 1996). However, our results are consistent with past findings in suggesting that it is the presence of CU traits, and not impulsivity alone, that designates a group of youth that show characteristics often associated with psychopathy (Barry et al., 2000). This is not to say that impulsivity may not be an important aspect of the construct of psychopathy but it suggests that impulsivity may not be specific to psychopathy. Instead, it may be more broadly associated with early-onset conduct problems (Frick et al., 2003).

While these results are important for demonstrating the utility of CU traits for predicting antisocial behavior over an extended follow-up period, there are a number of limitations that deserve note. First, and probably most importantly, the sample was relatively small for studying growth trajectories. At the start of the study, there were only 25 children in each of four study groups, albeit groups carefully screened from a large a community sample. Growth trajectories in such small samples can be influenced by the data of only a few participants. In addition, the small sample did not allow for tests of potential moderators of the growth trajectories within these study groups (e.g., sex or ethnicity of child). Such tests are especially important for sex, given that the correlates to psychopathy may differ for boys and girls (Cale & Lilienfeld, 2002). Second, while the sample was recruited to be "high-risk," in that over half the sample showed high rates of conduct problems at the time of group formation, the rate of delinquent and antisocial behavior was still somewhat low in this non-referred sample. The combination of small sample size and low base rates of outcome may have further reduced our power to detect important differences in the antisocial trajectories across groups. Third, in oversampling children high on CU traits and conduct problems, a sample dependent cut-off was used (e.g., above the upper quartile) which may not have resulted in the same level of severity found in clinic-referred and forensic samples for either of these dimensions. This moderate cut-off was used to ensure sufficiently large groups from which to recruit subjects for the follow-up assessments. However, use of this sample dependent cut-off may explain why the majority of children with conduct problems were high on CU traits, whereas in a clinic-referred sample, only a minority of children with severe conduct problems exhibited high levels of the traits (Christian et al., 1997). However, this methodology likely made the analyses more conservative in that, if the outcomes were studied for only those with the highest rate of CU traits (e.g., above the 90th percentile), the results may have shown even more impaired outcomes for these children. Fourth, while attrition was low overall in the sample and the evidence for selective attrition across groups was minimal, the one exception was the evidence for selective attrition on the delinquency measures within the group high on CU traits but low on conduct problems. As mentioned previously, the loss of subjects within this group who showed high rates of delinquency at the initial assessment may have underestimated the degree of risk for delinquency in this group. Fifth, the two conduct problem groups differed in their initial level of severity of conduct problem symptoms. It was not justifiable to equate these groups on their initial level of conduct problems, either by design or by statistical control, because this would have overestimated the initial level of conduct problems for the group low on CU traits and/or underestimated the level of conduct problems for the group with CU traits. That is, the different starting

points seem to reflect actual differences in the severity of behavior shown by these two groups that, as shown by the trajectories provided in Fig. 1a, are maintained over time. However, this methodology makes it unclear if simply selecting groups based on differing levels of conduct problem severity at the screening would have produced similar differences in trajectories over time.

Clearly, given these limitations, additional tests of the predictive utility of CU traits are needed. However, these findings begin to address one of the major limitations in the existing literature extending the construct of psychopathy to youth (Edens et al., 2000). Specifically, few studies have attempted assess the predictive utility of these traits over extended follow-up periods. If our results are replicated and extended, it does suggest that the construct of psychopathy and, even more specifically, the callous and unemotional dimension of the construct, may be important for predicting a more severe and chronic pattern of antisocial behavior. When this is combined with research suggesting that the causes of antisocial behavior may also be different in this group of youth with conduct problems (see Frick, Barry, & Bodin, 2000; Frick et al., 2003; Loney et al., 2003), it suggests that CU traits designates a group of youth who are in critical need of effective intervention, yet who may require an approach to intervention that differs from what has been found to be effective for other antisocial youth (Frick, 1998, 2001; Stickle & Frick, 2002). In short, CU traits seem to designate an important subgroup of antisocial youth who warrant further study in an effort to better understand the causal processes leading to their severe antisocial and aggressive behavior, which will hopefully lead to more effective intervention strategies for this severely impaired group of children.

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