

Journal of Abnormal Psychology

Early Starting, Aggressive, and/or Callous-Unemotional? Examining the Overlap and Predictive Utility of Antisocial Behavior Subtypes

Luke W. Hyde, S. Alexandra Burt, Daniel S. Shaw, M. Brent Donnellan, and Erika E. Forbes
Online First Publication, January 19, 2015. <http://dx.doi.org/10.1037/abn0000029>

CITATION

Hyde, L. W., Burt, S. A., Shaw, D. S., Donnellan, M. B., & Forbes, E. E. (2015, January 19). Early Starting, Aggressive, and/or Callous-Unemotional? Examining the Overlap and Predictive Utility of Antisocial Behavior Subtypes. *Journal of Abnormal Psychology*. Advance online publication. <http://dx.doi.org/10.1037/abn0000029>

Early Starting, Aggressive, and/or Callous–Unemotional? Examining the Overlap and Predictive Utility of Antisocial Behavior Subtypes

Luke W. Hyde
University of Michigan

S. Alexandra Burt
Michigan State University

Daniel S. Shaw
University of Pittsburgh

M. Brent Donnellan
Texas A&M University

Erika E. Forbes
University of Pittsburgh Medical Center

Antisocial behavior (AB) in adolescence predicts problematic outcomes in adulthood. However, researchers have noted marked heterogeneity within the broad group of youth engaging in these destructive behaviors and have attempted to identify those with distinct etiologies and different trajectories of symptoms. In the present study, we evaluate 3 prominent AB subtyping approaches: age of onset, presence of callous–unemotional (CU) traits, and aggressive versus rule-breaking symptoms. We examined the overlap of these subtypes and their predictive validity in a diverse sample of 268 low-income young men followed prospectively from adolescence into emerging adulthood. We found that those with early starting AB were uniquely high on aggressive symptoms but not on CU traits. Early starting AB and both aggression and rule breaking measured during adolescence predicted most subsequent psychiatric and AB outcomes in early adulthood in univariate models, whereas CU traits were only predictive of adolescent arrests, later substance dependence diagnosis, and later CU traits. Finally, after accounting for shared variance among predictor variables, we found that aggressive symptoms explained the most unique variance in predicting several later outcomes (e.g., antisocial personality disorder) over and above other subtyping approaches. Results are discussed in relation to the use of existing subtyping approaches to AB, noting that aggression and age of onset but not CU traits appear to be the best at predicting later negative outcome.

Keywords: youth antisocial behavior, conduct disorder, psychopathy, crime, longitudinal, development

Supplemental materials: <http://dx.doi.org/10.1037/abn0000029.supp>

Antisocial behavior (AB) is a prevalent and pervasive problem in youth (Nock, Kazdin, Hiripi, & Kessler, 2006), with dramatic consequences for perpetrators, victims, their families, and society more generally (Foster & Jones, 2005). This heterogeneous group of behaviors includes physical and sexual aggression, destruction

of property, theft, and violation of rules. It is diagnosed in the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition (DSM–IV) and fifth edition (DSM-5) as conduct disorder (CD) in youth and antisocial personality disorder (APD) in adults (American Psychiatric Association, 1994, 2013). However, over the last several decades there has been increasing evidence that both AB clinical diagnoses encompass a notably heterogeneous group of behaviors and individuals, likely with a variety of distinct etiologies (Frick & Ellis, 1999; Loeber & Hay, 1997; Moffitt et al., 2008).

Although many schemes for parsing this heterogeneity have been proposed over the years (e.g., Frick & Nigg, 2012; Lahey et al., 1998), researchers have largely focused on three schemes for subtyping AB: age of onset of AB (Moffitt, 1993), presence or absence of callous–unemotional (CU) traits (Frick & White, 2008), and a predominance of overt–aggressive versus covert–nonaggressive rule-breaking behaviors (Burt, 2012; Loeber & Stouthamer-Loeber, 1998). Each of these approaches has generated large empirical literatures that have been useful in identifying youth with different risk profiles and likely distinct etiologies (e.g., Frick & White, 2008). Critically, however, comparatively little

Luke W. Hyde, Department of Psychology, Center for Human Growth and Development, Survey Research Center at the Institute for Social Research, University of Michigan; S. Alexandra Burt, Department of Psychology, Michigan State University; Daniel S. Shaw, Department of Psychology, University of Pittsburgh; M. Brent Donnellan, Department of Psychology, Texas A & M University; Erika E. Forbes, Department of Psychiatry, University of Pittsburgh Medical Center.

This research was supported by National Institute on Drug Abuse Grants DA25630 and DA26222 awarded to Daniel S. Shaw and Erika E. Forbes and DA036468 to Luke W. Hyde. We thank the staff of the Pitt Mother and Child Project and the study families for making the research possible.

Correspondence concerning this article should be addressed to Luke W. Hyde, Department of Psychology, University of Michigan, 2251 East Hall, 530 Church Street, Ann Arbor, MI 48109. E-mail: lukehyde@umich.edu

research has simultaneously examined the overlap of these schemes or clarified differences in their predictive use, particularly from adolescence into emerging adulthood in samples at high risk for serious AB, such as low-income, urban male individuals (Farrington & Loeber, 2000; Murray, Irving, Farrington, Colman, & Blossom, 2010). Exploring these issues is critical, not only for integrating these disparate research traditions but also for refining our understanding of the best approach for predicting specific outcomes from adolescence into emerging adulthood. For example, are most youth high on CU traits also early starters? Are aggressive youth higher on CU traits than are those with nonaggressive AB? Moreover, does each subtyping scheme measure unique sets of behaviors and youth with different trajectories and outcomes in emerging adulthood? The degree of overlap between these schemes and differential prediction of future outcomes has key implications for the integration of the various research findings and their clinical implications (i.e., do the various lines of research inform one another?).

Age of Onset

Building on Moffitt's seminal taxonomy (Moffitt, 1993), DSM-IV and DSM-5 both subdivide youth by age of AB onset: "early starters" (before age 10) and "late starters" (Aguilar, Sroufe, Egeland, & Carlson, 2000; American Psychiatric Association, 1994, 2013; Moffitt, 1993). Early starting problems have been linked to a larger set of child and family risk factors, including neurocognitive deficits, harsher parenting, more difficult temperament, and higher comorbidity (Moffitt, Caspi, Harrington, & Milne, 2002; Patterson, Reid, & Dishion, 1992). Early starters are also known to have a more chronic and escalating trajectory of behavior (Shaw & Gross, 2008) as well as worse outcomes in adulthood, such as higher rates of antisocial personality disorder and depression, greater time spent unemployed, and greater continued involvement in crime (Moffitt et al., 2002). Late starting AB, by contrast, has been linked to deviant peer affiliation (Dishion, Patterson, Stoolmiller, & Skinner, 1991), fewer proximal family risks, and a less elevated and less chronic trajectory of AB (Moffitt, Caspi, Dickson, Silva, & Stanton, 1996). Late starters appear to have less problematic outcomes in adulthood compared with early starters; however, recent studies have demonstrated that the late starting group is elevated when compared with low AB groups on drug and property offenses and self-reported mental health and drug problems (Moffitt et al., 2002; Nagin, Farrington, & Moffitt, 1995; Roisman et al., 2010).

CU Traits

A second major subtyping scheme in the study of AB has focused on the presence or absence of CU traits (Frick, Cornell, Bodin, et al., 2003). The presence of CU traits has recently been added as a specifier (subgrouping scheme) in the diagnosis of AB disorders in the DSM-5 (American Psychiatric Association, 2013), categorized as "limited prosocial emotions" (Frick & Moffitt, 2010; Moffitt et al., 2008) and thus is now an especially important subgrouping approach to consider. Theoretically, CU traits are a downward extension of the shallow affect and lack of empathy seen in the affective and interpersonal components of adult psychopathy (Burke, Loeber, & Lahey, 2007). Beginning as early as

the preschool period (e.g., Hyde et al., 2013), when compared with AB without CU traits, AB in the presence of these traits has been shown to predict a more severe course of AB that is more stable, more highly heritable, and linked to a distinct set of emotional, cognitive, and personality characteristics (Frick, Ray, Thornton, & Kahn, 2014; Frick & White, 2008). Finally, CU traits have been associated with earlier starting AB (Dandreaux & Frick, 2009; Silverthorn, Frick, & Reynolds, 2001) and higher levels of aggression, particularly proactive aggression (Cornell et al., 1996; Frick, Cornell, Barry, Bodin, & Dane, 2003).

Aggression Versus Rule Breaking

A third major approach to understanding the heterogeneity within antisocial behavior relates to the specific behaviors that characterize the manifestation of AB within each individual—namely, the tendency to preferentially engage in physically aggressive or overt (e.g., fighting, bullying) as compared to nonaggressive rule-breaking or covert (e.g., theft, vandalism) antisocial behaviors (Quay, 1986). Qualitative literature reviews and factor analyses have consistently supported this distinction (Burt, 2012; Frick et al., 1993; Loeber & Schmalzing, 1985; Loeber & Stouthamer-Loeber, 1998), despite that the two dimensions are typically correlated in the 0.4–0.6 range (see Burt, 2012, for a discussion of their overlap). For instance, separate but correlated aggressive and rule-breaking dimensions have been observed in factor analyses of CD symptoms (Burt, Donnellan, Iacono, & McGue, 2011; Tackett, Krueger, Iacono, & McGue, 2005), behavioral rating scales (Achenbach & Rescorla, 2001), and naturalistic observations and observer ratings (Hinshaw, Simmel, & Heller, 1995). Other work has highlighted the presence of substantive etiologic, cognitive, and personological distinctions between aggression and rule breaking (see Burt, 2012, for a review). For example, aggression is more heritable, emerges in early childhood, and is linked to more emotion dysregulation, negative emotionality, and executive dysfunction than rule breaking. Although the frequency of aggressive behaviors decreases over the course of development, those who are most aggressive early in life commit the majority of aggressive acts as adults. Conversely, rule breaking appears to be less heritable and less stable over time, is specifically tied to impulsivity, and is most frequent during adolescence (Burt, 2012).

Overlap of Schemes

Each of these approaches appears to identify a "highest risk" group—early starters, those high on CU traits, and those high on aggression—and one intriguing possibility is that these schemes may in fact be identifying a common subset of youth (e.g., early starters are also those who are high on CU traits and highly aggressive). Indeed, some have argued that youth high on aggression represent the same youth categorized as early starters (Burt, 2012; Lahey et al., 1998). Similarly, many early starters have been shown to be high on callousness compared with late and never-starting youth during both adolescence (Dandreaux & Frick, 2009) and early adulthood (Moffitt et al., 2002), leading to the assertion that CU traits are most prominent within early starting AB (Frick & Viding, 2009). Moreover, some studies argue that CU traits are more highly correlated with aggressive behavior than rule breaking (Poythress, Dembo, Wareham, & Greenbaum, 2006).

However, these results are far from consistent across studies, and evidence of high levels of overlap between aggression, early starting AB, and CU traits is far from conclusive. For instance, although some studies report that CU traits are correlated more strongly with aggression, other studies have found that CU traits are not differentially associated with aggression versus rule breaking (Edens, Marcus, & Vaughn, 2011; Kimonis et al., 2008). Moreover, available factor analyses (Frick, Cornell, Bodin, et al., 2003; Patrick, 2007) and twin studies (Larsson et al., 2007; Taylor, Loney, Bobadilla, Iacono, & McGue, 2003) have highlighted critical differences between CU traits and early aggressive behaviors (Burt, 2012), and in some studies the overlap between CU traits and early starting AB has been modest at best (e.g., Edens et al., 2011). Moreover, sample sizes for many of the studies in this area have been small (i.e., *N*s of less than 80) and in some cases, the studies are retrospective in nature (e.g., Dandreaux & Frick, 2009; Silverthorn et al., 2001). Additionally, few studies have compared rule breaking with aggression in early starting youth (Burt, 2012), and most have focused specifically on proactive versus reactive aggression rather than aggression versus rule breaking (Frick & Ellis, 1999), leading to a murky picture in regard to the overlap among all of these constructs. Given this lack of clarity, more research is needed to examine the extent to which all these approaches to subtyping identify the same at-risk youth, particularly during late adolescence when crime begins to peak and we have the ability to identify early versus late starters.

Prediction of Adult Outcomes

In addition to clarifying these issues of overlap in adolescence, it is also critically important to evaluate whether and how the different subtyping schemes predict criminal and mental health outcomes in emerging adulthood. For example, early starting AB has been linked to later antisocial personality disorder (APD) and depression in early adulthood, whereas late starting has been more consistently linked to substance use than APD (Moffitt et al., 2002). Those with CU traits are also at higher risk for substance use (Poythress et al., 2006) and antisocial personality disorder (Loeber, Burke, & Lahey, 2002) but appear protected from depression (Patrick, 2007; Poythress et al., 2006). However, very few studies have directly compared the predictive utilities and specificity of prediction of each subtyping scheme, especially the unique variance each scheme may contribute over and above the predictive power of another scheme to a variety of AB and mental health outcomes. In one of the few such studies available, Burt and Hopwood (2010) examined a cross-sectional sample of 1,726 adults in treatment for alcoholism. As expected, those with early starting AB evidenced far higher rates of aggressive and nonaggressive AB (particularly aggressive AB), as well as higher rates of anger and alcohol dependency, than those with late-starting AB or those without AB. However, when aggression, rule breaking, and age of onset were examined simultaneously, age of onset did not contribute unique variance to the prediction of anger and alcohol dependence (see also Burt et al., 2011), indicating that aggression and rule breaking may capture much of the predictive variance explained by age of onset.

Research comparing CU traits to CD symptoms (e.g., encompassing aggression and rule breaking) has suggested that CU traits contribute unique variance to a variety of antisocial outcomes

(Frick et al., 2014; McMahon, Witkiewitz, Kotler, & the Conduct Problems Prevention Research Group, 2010). However, no study has compared the predictive use of all three subtyping schemes. Research that compares these approaches can help identify which subtypes (e.g., early starters vs. those high on CU traits) are most predictive of which outcomes (e.g., antisocial personality disorder vs. substance use disorders), and which of these links are unique to specific subtypes while accounting for the overlapping variance explained by other subtypes.

One final if sometimes overlooked issue is the extent to which these subtyping constructs are used in a categorical versus dimensional way in actual research. Although all of these variables could be examined from either perspective (e.g., by treating age of onset as a continuous variable), the approach used to test these constructs has grown increasingly important because diagnostic manuals focus on categories, whereas most recent research focuses on the dimensional nature of psychopathology (Edens, Marcus, Lilienfeld, & Poythress, 2006; Krueger & Markon, 2011). Whereas age of onset approaches are typically measured categorically in research and practice, CU traits have been examined both dimensionally and categorically, and aggression versus rule-breaking approaches have largely been examined dimensionally in research and in practice (e.g., through the Child Behavior Checklist, symptoms on diagnostic interviews). An advantage to the categorical nature of the age of onset approach is that it is most easily applicable to clinical diagnoses by virtue of the ease at identifying age, particularly within two categories (i.e., before age 10 or after age 10). This highlights one of the values of using a person-centered approach in research that can inform translational goals. However, conceptualizations of psychopathology have moved to more dimensional accounts that better capture the distribution of normative and psychopathological behaviors (Krueger & Markon, 2011) and much research in this area has increasingly focused on dimensional conceptions of these constructs. Hence, it would be important to compare schemes that are categorical versus dimensional, using both person-centered and variable-centered analyses, especially in assessing how these approaches best capture youth at highest risk and best predict adult outcomes.

Goals of the Current Study

This study aims to address gaps in the literature concerning subtypes of AB by (a) examining the overlap of different subtyping schemes using dimensional and person-centered approaches and (b) examining the prediction of key adult outcomes, including criminal and antisocial behavior, as well as relevant psychiatric diagnoses such as depression and substance use. First, we examined the overlap of these subtypes using a person-centered approach with the hypothesis that most youth classified as having CU traits would also be early starters and engage in high levels of aggression during adolescence. Second, we examined the overlap of these subtypes using a variable-centered approach where we hypothesized that early onset, CU traits, and aggression (vs. rule breaking) would be most highly correlated with each other and predict the highest likelihood of arrest across adolescence. Third, we examined the prediction of later outcomes in emerging adulthood with the hypothesis that early onset, CU traits, and aggressive behaviors would all predict diagnoses of APD and self-reported delinquency. In terms of specificity, we hypothesized that rule

breaking, late starting AB, and CU traits would more strongly predict drug abuse and dependence than aggression and early starting. Further, we expected CU traits to specifically positively predict later measures of CU traits but negatively predict depression, which we hypothesized would be predicted by early starting and aggressive behavior. We evaluated these hypotheses using a longitudinal study of 310 low-income urban males followed from early childhood through early adulthood. This sample is well characterized by standard diagnostic interviews, self-report, and court records so that we can use multimethod data to test hypotheses. We focused specifically on two key age periods: late adolescence, when early and late starters can be separated and when both aggression and rule breaking are expected, and early adulthood, when we could assess the persistence and growth of these subtypes into adult behaviors and diagnoses.

Method

Participants

Participants in this study are part of the Pitt Mother and Child Project (PMCP), an ongoing longitudinal study of child vulnerability and resiliency in low-income families. In 1991 and 1992, 310 infant boys and their mothers were recruited from Allegheny County Women, Infant, and Children Nutrition Supplement Clinics when the boys were between 6 and 17 months old (Shaw, Gilliom, Ingoldsby, & Nagin, 2003). At the time of recruitment, 53% of the target children in the sample were European American, 36% were African American, 5% were biracial, and 6% were of other races (e.g., Hispanic American or Asian American). Two thirds of the mothers in the sample had 12 years of education or less. The mean per capita income was \$241 per month (\$2,892 per year), indicative of a working class to impoverished and economically distressed sample. Thus, a large proportion of the participants could be considered at high risk for antisocial outcomes because of their socioeconomic standing.

Retention rates have generally been high at each of the time points from age 1.5- to 20-years old, with sufficient data from ages 10–17 for trajectory analyses on 268 participants (86%; see Shaw, Hyde, & Brennan, 2012) and some data available on 248 participants (80%) at age 17 and 256 participants (83%) at age 20. When compared with those who dropped out at earlier time points, participants who remained in the study at ages 17 or 20 or had trajectory analysis data did not differ on the CBCL externalizing scores at ages 2, 3.5, or 5, maternal age, income, or educational attainment (most $ps = .20-.93$, except that those missing data at age 17 had younger mothers and greater early maternal depression scores; $ps = .07$).

Visit Procedures

Target children and their mothers were seen for 2- to 3-hr visits almost every year from age 1.5–20. Data were collected in the laboratory (ages 1.5, 2, 3.5, 6, 11, 20), on the phone (age 16), at home (ages 2, 5, 5.5, 8, 10, 12, 15, 17), or both in the lab and at home. Target children (now adults) also participated in a lab assessment at age 20 alone. During home and lab assessments, parents and adolescents completed questionnaires regarding sociodemographic characteristics, family issues, child behavior, and

diagnostic interviews. Participants were reimbursed for their time at the end of each assessment. All assessments and measures have been approved by the Institutional Review Board of the University of Pittsburgh.

Measures

Note that many of the variables computed for this study have overlapping content because of the wide variability in subtypes of youth with disruptive and antisocial behavior (e.g., there are several measures focusing on overlapping but different dimensions of externalizing problem behavior). Thus great care was taken to use both diagnostic and self-report measurement and to construct dimensions or categories that are consistent with previous work in this area and current clinical practice (e.g., DSM-5 approaches), as well as the use different types of measurement (e.g., self-report vs. interview).

Demographics (age 1.5). Demographics were collected at the beginning of each visit with the family and included asking families about the target child's race–ethnicity (coded 0 = White, 1 = non-White, in this study) and the family socioeconomic status (SES) measured through Hollingshead scores (Hollingshead, 1975).

Aggressive and rule-breaking symptoms (age 17). Primary caregivers and their sons were administered the Schedule for Affective Disorders and Schizophrenia for School-age children—Present and Lifetime version (K-SADS-P; Kaufman et al., 1997) by a trained examiner. The K-SADS is a semistructured diagnostic interview assessing *DSM-IV* psychiatric disorders and symptoms over the last year in which an examiner privately interviewed the primary caregiver and then the adolescent about symptoms of psychiatric disorders, and reports were combined by using a clinical decision-making process to determine when symptoms met *DSM* thresholds through discussion in regular clinical supervision meetings (see Shaw et al., 2012, for more details on the extensive procedures for training, reliability, and oversight of examiners). For this study, five aggressive items (i.e., bullies, initiates physical fights, uses weapon, physically cruel to people, stolen while confronting victim) and seven rule-breaking items (i.e., vandalism, breaking and entering, lies, stolen nontrivial items without confrontation, stays out late at night, runs away overnight, truant) were identified within the symptoms of CD in the *DSM-IV*. These items are consistent with past research on aggressive versus rule-breaking behaviors (Burt, 2012; Burt, Donnellan, Iacono, & McGue, 2011) and were found in this sample to have high specific loadings to one factor (e.g., AGG; $>.6$) and relatively low loadings on the other factor (e.g., rule breaking) using an exploratory and then confirmatory factor analysis with WLSMV estimation in Mplus 5. The two factor model fit the data well, $\chi^2(53) = 64.9$, $p = .13$ (comparative fit index [CFI] = .98, root-mean-square error of approximation [RMSEA] = .03) and better than a one-factor model, $\chi^2_{diff}(1) = 10.1$, $p < .005$, thus, attesting to the utility of these two dimensions. These items (0 = not present, 1 = present) were therefore summed within each factor to create composite symptom counts of aggressive and rule-breaking behaviors, respectively.

Structured Clinical Interview for DSM-IV (SCID-I & II; age 20). Lifetime clinical diagnoses of major depression, substance abuse, and substance dependence were made at age 20

through interviews of the young men by a trained examiner using the SCID-I Research Version (First, Spitzer, Gibbon, & Williams, 1996). Symptoms and diagnosis of APD were made using the SCID-II (First, Gibbon, Spitzer, Williams, & Benjamin, 1997). The SCID-I and SCID-II are structured interviews that assess *DSM-IV* adult psychiatric symptoms at present (during the past month) and across the lifetime (lifetime scores were used in the present report given low rates of current diagnoses and because APD diagnoses require a longer history). Training, reliability, and oversight of interviewers was similar to the K-SADS. Of the 254 participants with diagnostic data available, 26 (10%) met current or lifetime criteria for major depression, 66 (26%) for substance abuse (mostly cannabis), 39 (15%) for substance dependence (mostly cannabis), and 34 (13%) for APD.

Self-reported delinquency (ages 10–17, 20). Delinquency was assessed based on boys' self-report using the Self-Report of Delinquency Questionnaire (Elliott, Huizinga, & Ageton, 1985) at age 10, 11, 12, 15, 16, 17, and 20. The Self-Report of Delinquency is a semistructured interview that contains 33 items (at age 10, 11, 12) or 62 items (at age 15, 16, 17, 18) and assess the frequency with which an individual has engaged in aggressive and delinquent behavior, alcohol and drug use, and related offenses. Using a 3-point rating scale (1 = *never*, 2 = *once/twice*, 3 = *more often*), youth rate the extent to which they engaged in different types of antisocial activities (e.g., stealing, throwing rocks at people, drug use). These item responses were summed to create a composite reflecting variety (i.e., number of different acts endorsed) and severity (i.e., whether the act was once–twice vs. more often) of AB. Across ages 10–17, internal consistency was high ($\alpha = .79-.92$; Shaw et al., 2012). At age 20, the measure was reduced to 53 items by removing content that was inappropriate for adults (e.g., have you smoked a cigarette?) with continued high internal consistency ($\alpha = .90$).

Trajectories of delinquency–age of onset (age 10–17). Using the above described Self-Report of Delinquency, trajectories were generated across adolescence (ages 10–17) using Nagin's semiparametric group based Proc TRAJ in SAS 9.2 (Nagin, 2005). We selected the best model using Bayesian Information Criteria (BIC), considering posterior probabilities for group membership and the overall size of the groups (i.e., we avoided groups smaller than 4% of the sample). These trajectory groups were based on the Self-Report of Delinquency from age 10–17 (described above), although a mean score at each age was used in these analyses to address the smaller item pool measured at age 10–12 (33 items) versus age 15–17 (62 items; for more details on group creation and estimation see Shaw et al., 2012).

The trajectory analyses yielded four distinct groups: a low group with very little AB across adolescence ($n = 171$; 63%), a late-starting moderate group with initially low levels of AB, increasing from age 15–17 ($n = 54$; 20%), a desisting group with very high levels at age 10 and decreasing across adolescence ($n = 15$; 6%), and an early–high group with initially high levels of AB that increased dramatically across adolescence ($n = 28$; 10%). These trajectory groups have previously been shown to be valid in this sample as they discriminated both court involvement and behavior disorder diagnosis at age 17 (Shaw et al., 2012). In univariate analyses, these groups were treated as categorical and used in ANOVAs as the grouping variable. To test for age-of-onset group differences in a meaningful way (and avoid assumptions of

linearity) in regressions with multiple predictors, it was necessary to use contrast codes for the regression analyses (Cohen, Cohen, West, & Aiken, 2003). For the first contrast code, to compare those in AB versus non-AB trajectories, the low group was coded as a -3 , and each of the AB groups (late starting, desisting, early–high) were coded 1. For the second contrast code, to specifically compare early versus late-starting groups consistent with past research (Burt & Hopwood, 2010; Moffitt et al., 2002), the low and desisting groups were coded a 0, the late-starting group was coded -1 , and the early–high group was coded as 1.

Callous–unemotional traits (age 17 and 20). Callous–unemotional traits were measured through self-report at ages 17 and 20, using five items from the six-item CU factor from the Antisocial Process Screening Device (APSD; Frick, Bodin, & Barry, 2000). These five items from the APSD assess lack of empathy and affect, and callousness (e.g., “you are concerned about the feelings of others”) on a 3-point rating scale (1 = *not at all true*, 2 = *sometimes true*, 3 = *definitely true*). At ages 17 and 20, exploratory and confirmatory factor analyses with WLSMV estimation in Mplus 5 (as described above) supported the six original CU items loading on one factor. However, one item (“you hide your emotions from others”) had poor loadings, particularly at age 20 (age 17 = $-.48$; age 20 = $-.11$), and was excluded from consideration, leading to a consistent five-item factor at both ages with moderately acceptable internal consistency at ages 17 ($\alpha = .73$) and 20 ($\alpha = .60$), consistent with internal consistency of this measure in past studies (see Dillard, Salekin, Barker, & Grimes, 2013).

Although this scale formed a dimensional measure of CU traits at both ages, we were also interested in examining diagnostic categories and thus created a measure of DSM-5 CD diagnosis with the “limited prosocial emotions” specifier, which is based on measures of CU traits (Frick & Moffitt, 2010). To create these categories, consistent with research done on the DSM-5 specifier (Kahn, Frick, Youngstrom, Findling, & Youngstrom, 2012), we used the four items from the APSD that most closely overlap with four DSM-5 items within the limited prosocial emotions specifier (i.e., lack of remorse/guilt, callousness/lack of empathy, unconcerned about school performance, shallow/deficient affect). We recoded these items into present (1 = *definitely true*) or absent (0 = *not true at all or sometimes true*). Consistent with the DSM-5 scheme, we classified CD+CU+ participants as those who endorsed two or more of these items in addition to a diagnosis of CD on the K-SADS at age 17. Thirty-five of 250 (14%) individuals within the sample with K-SADS data were diagnosed with CD. Of those with CD, 14 (40%; 6% of the total sample) met criteria for the CU specifier, whereas the other 21 boys were diagnosed with CD but did not meet the CU specifier (60%; 8% of the total sample). Whereas the rates of CU trait diagnosis within CD diagnoses may appear high, they are consistent with previous studies using this same methodology (Frick et al., 2014; Kahn et al., 2012).

Court records (ages 15–18 & 18–22). To assess each boy's involvement with the legal system during adolescence and then during adulthood as an outcome of interest, with written permission from primary caregivers, juvenile court records were obtained annually from the primary county where the participants resided (Allegheny, PA) and when available, other coun-

ties where participants lived. Petitions were coded dichotomously into whether the boy had ever had a petition against him. Of the boys included in these analyses, 241 had court data available during the juvenile period, and of these boys, 84 (35%) had at least one petition against him. For arrest records in the adult years, we used the Pennsylvania state public court records Web site to search for the child's (now young man's) name and date of birth. These records were last checked in February 2014 when almost all boys were at least 21 years old (and up to 24 years old). Of the full cohort that was searched, 91 young men (29%) had at least one arrest, and the probabilities of arrest during adolescence and adulthood were moderately correlated ($r = .22$). As the juvenile and adult records were obtained through different methods and are adjudicated in different ways, we report separately on petitions during the adolescent years and adult years, which also allows for analysis of relatively concurrent records during adolescence and prospective outcomes through adult records.

Data Analytic Plan

Primary analyses were computed in SPSS v.20. As there was missing data across ages, multiple imputation using a Markov Chain Monte Carlo approach was used to create five data sets (Rubin, 1996). All variables were imputed except trajectory group membership, which was taken from Shaw et al. (2012), leading to an effective sample size of 289 participants that had some data at either time point (age 17 and 20), and 267 for analyses involving trajectory group consistent with Shaw et al. (2012). Statistics presented throughout the article are the pooled estimates across the five datasets unless otherwise specified. In the case of analysis of variance (ANOVA), chi-square, and Fisher's exact tests, pooled estimates were not available in

SPSS; thus, the estimates from the first imputed dataset are presented. Note that for all results presented, outcomes and patterns of results were almost identical across each imputed dataset and when using listwise deletion with the original dataset. Finally, for variables with (expected) high levels of skew (i.e., self-reported delinquency, aggressive and rule-breaking symptoms, APD symptoms), the variables were transformed using a natural log transformation when they were used as dependent variables.

Results

Zero-order correlations and descriptive statistics are presented in Table 1. Tables 2 and 3 present analyses based on age of onset and CD-CU groups, respectively. Note that for clarity the tables present data by *analysis type* (i.e., ANOVA vs. regression) and the following sections present results by *specific hypothesis-research question* (i.e., by construct and question).

What Is the Overlap Between Subtyping Schemes at Age 17?

Are early starters high on CU traits and more likely to be diagnosed with CD-CU? Youth who met criteria for CD were overrepresented in the early starting trajectory group (Fisher's exact test = 51.2, $df = 6$, $p < .001$); however, those with CD+CU+ were not more common in the early starting group: 44% (11 of 25) of the early starting group met for CD+CU-, and 16% (4 of 25) of the early starting group met for CD+CU+. Instead, those with CD+CU+ appeared to be overrepresented in the late starting group: 6% (3 of 52) of the late starting group met for CD+CU-, and 10% (5 of 52) of the late

Table 1
Correlations of Study Variables

Variable	<i>M</i> (<i>SD</i>)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Early SES	23.3 (9.2)	—														
2. Race (0 = White; = non-White)	.49 (.5)	-.13*	—													
Adolescent variables																
3. CD diagnosis	.14 (.35)	-.15*	-.04	—												
4. CU traits (age 17)	3.9 (2.5)	-.16*	.06	.21	—											
5. Aggressive symptoms	.31 (.83)	-.13†	.05	.60**	.20**	—										
6. Rule-breaking symptoms	.75 (1.2)	-.11†	.07	.35**	.16*	.37**	—									
7. Any adolescent arrest record?	.34 (.48)	-.23**	.17**	.34*	.17**	.33**	.31**	—								
Adult outcomes																
8. APD symptoms	.77 (1.6)	-.09	.10†	.31**	.09	.40**	.31**	.27*	—							
9. APD diagnosis	.13 (.34)	-.10	.05	.24*	.06	.33**	.17†	.19†	.74**	—						
10. Depression diagnosis	.10 (.30)	.01	.03	.17*	-.05	.20**	.12	.07	.20**	.09	—					
11. Substance-abuse diagnosis	.26 (.44)	-.02	-.01	.10	.12	.23**	.26**	.15†	.40**	.27**	.11	—				
12. Substance-dependence diagnosis	.15 (.36)	.01	-.03	.23**	.14*	.29**	.23**	.16*	.33**	.29**	.15†	.64**	—			
13. CU traits (Age 20)	2.6 (1.7)	-.18**	.18**	.15*	.41**	.14*	.23*	.18*	.13*	.13†	-.01	.15*	.18**	—		
14. Self-reported delinquency	10.5 (8.8)	.11	-.02	.18†	.05	.19**	.24**	.15†	.41**	.37**	.10	.37**	.33**	.14*	—	
15. Any adult arrest record?	.29 (.46)	-.02	.22**	.12†	.09	.17**	.20**	.22**	.22**	.12†	.09	.26**	.14*	.17**	.25**	—

Note. $N = 289$. Variables with high skew (aggression, rule breaking, self-reported delinquency, antisocial personality disorder [APD] symptoms) were transformed with a natural log transformation prior to computing correlations. Means and *SD* are presented on nontransformed variables and on original data before imputation. SES = socioeconomic status; CD = conduct disorder; CU = callous-unemotional.

† $p < .10$, two-tailed. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.

Table 2
Concurrent and Prospective Relationships Between Age of Onset and Outcomes

Variable	Omnibus test	1. Low AB (n = 170) M (SD)	2. Desisting (n = 15) M (SD)	3. Late starting moderate (n = 54) M (SD)	4. Early starting–high (n = 28) M (SD)	Significant group differences
Concurrent relationships (age 17)						
Aggressive symptoms	$F = 20.17, p < .001$	0.18 (0.52)	0.69 (0.81)	0.28 (0.64)	1.4 (1.6)	1 < 2,4; 3 < 4
Rule-breaking symptoms	$F = 31.48, p < .001$	0.34 (0.87)	1.2 (1.3)	1.1 (1.2)	2.0 (1.6)	1 < 2,3,4; 3 < 4
CU traits (age 17)	$F = 2.0, p = .12$	3.7 (2.5)	5.2 (2.8)	3.8 (2.5)	4.4 (1.8)	
Arrest record (adolescent)	$\chi^2 = 24.5, p < .001$	22% (0.42)	60% (0.51)	42% (0.50)	71% (0.46)	1 < 2,3,4; 3 < 4
Prospective relationships (age 20)						
Self-reported delinquency	$F = 24.04, p < .001$	8.1 (7.4)	14.0 (11.9)	16.3 (8.9)	20.7 (9.8)	1 < 3,4; 2 < 4
APD symptoms	$F = 41.0, p < .001$	0.37 (1.0)	2.7 (2.1)	1.2 (1.6)	2.5 (1.8)	1 < 2,3,4; 3 < 2,4
APD diagnosis (%)	$\chi^2 = 26.9, p < .001$	11% (.31)	47% (.51)	20% (.41)	43% (.50)	1 < 2,3,4; 3 < 4
Depression diagnosis (%)	$\chi^2 = 20.1, p = .001$	4% (.20)	13% (.35)	20% (.41)	25% (.44)	1 < 3,4
Substance-abuse diagnosis (%)	$\chi^2 = 30.1, p < .001$	18% (.39)	47% (.52)	33% (.48)	64% (.49)	1 < 2,3,4; 3 < 4
Substance-dependence diagnosis (%)	$\chi^2 = 31.0, p < .001$	11% (.32)	33% (.49)	22% (.42)	54% (.51)	1 < 2,3,4; 3 < 4
CU traits (age 20)	$F = 5.42, p = .001$	2.2 (1.6)	2.8 (2.3)	3.1 (1.9)	3.5 (1.6)	1 < 3,4
Arrest record (adult)	$\chi^2 = 33.1, p < .001$	20% (.41)	60% (.50)	33% (.48)	68% (.48)	1 < 2,4; 3 < 4

Note. $N = 268$ for all analyses. Statistical comparisons of the means were conducted using analysis of variance (ANOVA) on the log-transformed data (for aggressive, rule breaking and self-reported delinquency), as they better approximate normality. However, the corresponding raw symptom counts are presented in here and discussed in the text to promote ease of understanding. Post hoc group differences were tested using a Tukey test (for ANOVAs with continuous outcomes) and individual chi-square tests (for binary outcomes) and are marked if $p < .05$. Results with binary outcomes are presented with chi-square tests but were similar in terms of significance when using Fisher exact tests or ANOVAs. AB = antisocial behavior; CU = callous–unemotional; APD = antisocial personality disorder.

starting group met for CD+CU+. An ANOVA examining dimensional measures of CU traits separated by trajectory group was also consistent with this conclusion (see Table 2); none of the groups were statically different in their levels of CU traits (although the mean of the desisting group was the highest). In sum, there was little evidence of overlap between those

high on CU traits and those who are classified as early starting youth using either dimensional or person-centered measures of CU traits.

Are early starters higher on aggression versus rule-breaking symptoms? As shown in Table 2, when examining aggression and rule breaking as outcomes by trajectory group using ANOVAs and

Table 3
Concurrent and Prospective Relationships Between Conduct Disorder–Callous–Unemotional (CD/CU) Groups and Outcomes

Variable	Omnibus test	1. No CD diagnosis (n = 215) M (SD)	2. CD–CU (n = 21) M (SD)	3. CD+CU (n = 14) M (SD)	Significant group differences
Concurrent relationships (age 17)					
Aggressive symptoms	$F = 146.4, p < .001$	0.07 (0.28)	1.8 (1.5)	1.8 (1.3)	1 < 2, 3
Rule-breaking symptoms	$F = 99.1, p < .001$	0.40 (0.71)	2.9 (1.3)	3.0 (1.8)	1 < 2, 3
Arrest record (adolescent)	$\chi^2 = 46.5, p < .001$	24% (.43)	89% (.31)	92% (.29)	1 < 2, 3
Prospective relationships (age 20)					
Self-reported delinquency	$F = 6.41, p < .01$	10.6 (8.8)	19.6 (12.8)	11.1 (5.7)	1, 3 < 2
APD symptoms	$F = 16.3, p < .001$	0.68 (1.4)	2.0 (1.5)	2.0 (1.9)	1 < 2, 3
APD diagnosis (%)	$\chi^2 = 18.8, p < .001$	13% (.34)	43% (.51)	43% (.51)	1 < 2, 3
Depression diagnosis (%)	$\chi^2 = 11.1, p < .01$	7% (.26)	29% (.46)	14% (.36)	1 < 2
Substance-abuse diagnosis (%)	$\chi^2 = 8.52, p < .05$	25% (.44)	52% (.51)	43% (.51)	1 < 2, 3
Substance-dependence diagnosis (%)	$\chi^2 = 17.8, p < .001$	15% (.36)	52% (.51)	29% (.47)	1 < 2, 3
CU traits (age 20)	$F = 6.92, p = .001$	2.4 (1.7)	2.9 (1.9)	4.2 (1.7)	1 < 3
Arrest record (adult)	$\chi^2 = 18.3, p < .001$	26% (.44)	71% (.46)	29% (.47)	1, 3 < 2

Note. $N = 250$ for all analyses, and the data from the first imputed dataset are presented, though note that results were equivalent across five imputed datasets. Statistical comparisons of the means were conducted on the log-transformed data (for aggressive, rule breaking, and self-reported delinquency), as they better approximate normality. However, the corresponding raw symptom counts are presented here and discussed in the text to promote ease of understanding. Post hoc group differences were tested using a Tukey test (for analyses of variance [ANOVAs] with continuous outcomes) and individual chi-square tests (for binary outcomes) and are marked if $p < .05$. Results with binary outcomes are presented with chi-square tests but were similar in terms of significance when using Fisher exact tests or ANOVAs. APD = antisocial personality disorder, CU = callous–unemotional.

pairwise comparisons, early starters were particularly high on aggressive symptoms—higher than late starters and the low AB group. Desisters, late-starting, and early-starting youth were all elevated on rule breaking compared with the low AB youth, with early starters being significantly higher than late starters. Thus, consistent with past research (Moffitt, 2003), aggressive symptoms appear to represent a distinguishing feature of early starters (and perhaps the desisting group as well). Rule breaking, by contrast, was high among all three AB groups, although early starters were significantly higher than late starters on this dimension.

Are those high on CU traits higher on aggressive versus rule-breaking symptoms? As shown in Table 1, when examined dimensionally, CU traits were modestly correlated with CD diagnosis ($r = .20$) and CD symptoms ($r = .21$), with similar correlations between CU traits and the aggressive ($r = .20$) and rule-breaking symptom dimensions ($r = .16$; all $ps < .05$ unless otherwise specified). When aggressive and rule-breaking symptoms were entered into a regression predicting age 17 CU traits, neither variables predicted unique variance in CU traits (aggressive symptoms: $B = 0.43$, $SE = 0.27$, $\beta = .13$, $p = .13$; rule-breaking symptoms: $B = 0.28$, $SE = 0.16$, $\beta = .15$, $p = .09$). When examined using a person-centered approach of ANOVAs and pairwise comparisons (see Table 3), both aggressive and rule-breaking symptoms were higher in CD+CU− and CD+CU+ groups than the CD−CU− group, but these groups (CD+CU+, CD+CU−) did not differ statistically from each other. These results suggest that CU traits are correlated similarly with aggressive and rule-breaking symptoms but that this relationship may not hold when accounting for CD diagnosis. To explore this issue further, we conducted two regression analyses in which CU traits predicted aggressive and then rule-breaking behaviors (results not shown). In these regressions, when CD diagnosis was partialled out, the association between CU traits and these outcomes became nonsignificant (both $ps > .19$), indicating that much of the relationship between these dimensions and CU traits may have to do with the overlap between CU traits and CD diagnosis/severity.

Which Outcomes Does Each Subtyping Scheme Predict at Age 20?

Does the early starting group have the highest later delinquency, rate of antisocial personality, and depression diagnoses? Does late starting preferentially predict substance use? When analyzed using ANOVAs with pairwise comparisons, trajectory group membership significantly discriminated each adult outcome. The low-AB group was protected from all negative outcomes at age 20 (see Table 2). Early and late starters demonstrated the highest level of self-reported delinquency and percentage of depression diagnoses but, important to note, did not differ statistically from one another. Desisting and early starting groups demonstrated the highest levels of APD symptoms and diagnoses but did not differ from each other for either outcome. For substance abuse and dependence, early starters were higher than the later starting and low-AB groups. In sum, the low-AB group demonstrated the lowest levels of all maladaptive outcomes, and early starters generally demonstrated the highest levels of symptoms and diagnoses, except for CU traits. However, for some outcomes (APD symptoms, substance abuse, and dependence) early starters (and desisters) were higher than late starters, whereas

for others (self-reported delinquency, depression, CU traits) early and late starters did not differ statistically.

Do CU traits predict age 20 outcomes? In zero-order correlations, dimensions of CU traits at age 17 predicted adult self-reports of CU traits ($r = .41$), the probability of being diagnosed with substance dependence ($r = .14$) and abuse (marginally: $r = .12$, $p = .11$), and predicted the chances of arrest during adolescence ($r = .17$) but not adulthood ($r = .09$, $p = .18$; see Table 1). However, in contrast to our hypotheses, CU traits did not predict APD symptoms or diagnosis, nor were CU traits significantly associated with later depression diagnosis ($r = -.05$, $p = .47$). The person-centered results presented in Table 3 analyzed using ANOVAs and pairwise comparisons further indicate that though CD diagnosis significantly predicted all outcomes, in contrast with our hypotheses, the CD+CU− versus CD+CU+ groups did not differ significantly across any outcome variable. For APD symptoms and diagnosis, as well as substance abuse and dependence diagnosis, both CD groups were significantly higher than the group not diagnosed with CD, but they did not differ from each other. For depression diagnosis at age 20 the CD+CU+ group was intermediate to the CD+CU− group and the non-CD group. The only exception to the overall pattern was in examining CU traits at age 20, in which not surprisingly, the CD+CU+ group was the highest on CU traits, albeit this group did not differ statistically from the CD+CU− group (see Table 3).

Do aggression and rule breaking differentially predict Age 20 outcomes? As shown in Table 1, aggression and rule-breaking symptoms predicted all concurrent (e.g., adolescent arrest) and prospective outcomes based on zero-order correlations, including APD symptoms, APD diagnosis, substance abuse and dependence diagnosis, and CU traits at age 20. The exception was depression diagnosis, which was uniquely predicted by aggressive symptoms. In contrast to the hypothesis that aggression would be a stronger predictor of some outcomes, aggressive and rule-breaking symptoms had similar-magnitude associations with outcomes, with none of the correlations differing statistically from each other. The exception was that for APD diagnosis, aggressive behaviors demonstrated a statistically larger correlation with APD diagnosis than rule breaking when comparing the magnitude of correlations between APD and each predictor ($Z = 2.53$, $p < .01$) using the Steiger (1980) test for comparison of correlations sharing one variable in common (Lee & Preacher, 2013).

Which Subtyping Scheme Uniquely Predicts Outcomes Over and Above Other Subtyping Schemes?

Does the early starting category predict later outcomes over and above other subtyping approaches? Table 4 presents results from linear and logistic regressions using subgrouping schemes to predict adolescent arrest records and prospectively predict age 20 outcomes. In this series of regressions, all subtyping schemes were examined dimensionally as predictors, whereas trajectory group was examined using the contrast codes described above. Those in any partially or persistently high AB trajectory (i.e., early–high, late, or desisting groups vs. those in the low–never starting group) were at greatest risk for all outcomes, even when controlling for other subgrouping dimensions (except for the

Table 4
Predicting Emerging Adult Outcomes From Adolescent Subtypes of Youth Antisocial Behavior (AB)

Outcome	Step 1		Step 2				
	Contrast Code 1: Presence of AB	Contrast code 2: Age of onset of AB	Contrast Code 1: Presence of AB	Contrast Code 2: Age of onset of AB	Aggressive symptoms	Rule-breaking symptoms	CU traits (age 17)
Any arrest–petition? (adolescence)	.33 (.07)**	.62 (.26)*	.14 (.09)	.21 (.29)	.75 (.30)*	.47 (.16)**	.09 (.06)
Self-reported delinquency	.24 (.04)**	.11 (.13)	.22 (.04)**	.07 (.13)	.04 (.10)	.03 (.07)	.001 (.03)
APD symptoms	.17 (.02)**	.31 (.06)**	.14 (.02)**	.22 (.07)**	.13 (.05)**	.04 (.03)†	–.005 (.01)
APD diagnosis	.35 (.11)**	.56 (.26)*	.26 (.11)*	.25 (.31)	.63 (.31)†	.03 (.17)	–.03 (.10)
Depression diagnosis	.34 (.16)*	.16 (.30)	.24 (.18)†	–.23 (.37)	.65 (.27)*	.03 (.21)	–.15 (.11)
Substance-abuse	.33 (.08)**	.49 (.29)†	.26 (.09)**	.29 (.29)	.33 (.22)	.07 (.14)	.07 (.08)
Substance-dependence	.37 (.10)**	.56 (.28)†	.27 (.12)*	.28 (.30)	.46 (.25)†	.11 (.15)	.09 (.09)
CU traits (age 20)	.24 (.06)**	.17 (.22)	.19 (.07)*	.01 (.21)	.03 (.16)	.08 (.11)	.28 (.05)**
Any arrest–petition? (adult)	.36 (.07)**	.74 (.25)**	.33 (.08)**	.67 (.27)*	.05 (.20)	.08 (.14)	.07 (.06)

Note. $N = 266$. All tests were two-tailed. Each box represents unstandardized regression coefficients with standard error. Patterns for alcohol abuse and dependence were identical to substance abuse and dependence finding. Self-reported delinquency and antisocial personality disorder (APD) symptoms were log transformed to account for their skew. Logistic regression was used for all binary outcomes and linear regression for all continuous outcomes. Similar regressions were explored using dummy-coded trajectory groups and interactions with CU traits at age 17 to predict adult outcomes. None of these interactions were statistically significant and are thus not reported but are available on request. CU = callous–unemotional.

† $p < .10$, two-tailed. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.

outcome of adolescent arrests). Thus, the most robust predictor of adult outcomes was simply being in a trajectory group that involved AB during adolescence. Beyond this contrast, early starters demonstrated higher risk than late starters for adolescent and adult arrests, APD symptoms and diagnosis, as well as substance abuse and dependence. It is important to note, however, the strength of these coefficients was reduced in the second step of the regression analyses when controlling for aggressive symptoms, rule-breaking symptoms, and CU traits. In particular, only the early starting contrast code (i.e., early starters vs. later starters) continued to account for unique variance in predicting APD symptoms and adult arrest records.

Do CU traits add unique variance to the prediction of later outcomes? CU traits at age 17 predicted CU traits at age 20 but did not significantly predict other age 20 outcomes in regressions when accounting for aggressive symptoms, rule-breaking symptoms, and trajectory group.

Does the aggression–rule-breaking approach add unique variance to the prediction of later outcomes? The number of aggressive symptoms was a robust predictor of adolescent (but not adult) arrest, APD symptoms and diagnosis, and depression and substance use diagnosis after accounting for other subtyping dimensions in multiple regressions (though relationships with APD and substance dependence diagnosis were trend level). The number of rule-breaking symptoms, by contrast, predicted adolescent arrest and marginally predicted APD symptoms ($p = .05$).

Overall, the presence or absence of AB across adolescence was the most robust predictor of deleterious outcomes in early adulthood. A dimension of aggressive behaviors added explanatory power to predicting APD diagnosis and symptoms, depression diagnosis, as well as the presence or absence of an adolescent arrest record, whereas early starting AB added explanatory power only when predicting APD symptoms and adult arrest record. CU traits only added explanatory variance when predicting concurrent court arrest records and later CU traits.

Discussion

Overall, this study tested important and novel questions regarding the overlap and predictive utility of the three most common subtyping approaches for understanding heterogeneity in youth AB in a sample of low-income males followed prospectively. The results indicated high overlap between aggression and early starting AB but much less overlap between these schemes and CU traits. Being in an AB trajectory group (i.e., desisting, late, early) across adolescence robustly predicted adult outcomes, with early starters being at particular risk for APD symptoms and adult arrest. Aggressive symptoms appeared to capture the most unique variance in most of the adult outcomes when controlling for the overlap of all schemes. CU traits showed stability from adolescence to adulthood, but these traits were not a robust predictor of adult outcomes over and above other subtypes approaches. Given the complexity of the results, we organize the discussion by subtyping scheme.

Age of Onset

Consistent with the literature, early starting AB was associated with a more malignant course, despite having similarly high levels of AB with late starters in late adolescence. Our results indicated that all AB groups were relatively high on rule breaking, but early starters were particularly high on rule breaking and were the only group high on aggression. This result emphasizes that though early and late starters may both have higher AB in late adolescence, early starters' trajectories appear to be higher in terms of severity of rule-breaking symptoms and be marked by an additional set of aggression symptoms not seen in other groups, even during adolescence when both early and late starters demonstrate a peak in AB.

Early starters were highest on likelihood of adolescent and adult arrest, APD symptoms and diagnosis, and substance abuse diagnosis, but not self-reported delinquency or CU traits. This result

was consistent with seminal work demonstrating that early starters to appear to be highest on many, but not all, maladaptive outcomes in early adulthood (Moffitt et al., 2002). Also consistent with Moffitt's work, although late starters were not higher than early starters on any outcome, late starters were nonetheless impaired compared with the non-AB group on adult AB, APD symptoms, depression diagnosis, and CU traits. Thus, although this later onset trajectory may not end in as severe outcomes as early starters, this group is still associated with multiple negative outcomes in early adulthood. However, it should be noted that our follow-up was in emerging adulthood and thus differences between these groups may narrow or widen later in adulthood.

It is interesting that being in an AB trajectory group (i.e., early, late, or desisting) added unique explanatory power above other subtyping groups to the prediction of adult outcomes; however, being an early starter only uniquely predicted APD symptoms and adult arrest record in a multiple regression framework. In fact, as discussed below, in a multivariate framework the addition of aggressive and rule-breaking symptoms attenuated the magnitude of associations for the early starting group in predicting later outcomes. This is consistent with the small amount of literature in this area (Burt, Donnellan, Iacono, et al., 2011; Burt & Hopwood, 2010) and demonstrates that examining aggressive and rule-breaking symptoms may be more helpful in predicting later outcomes than age of onset alone. Overall, early starting was not as powerful of a predictor in multivariate models as we had expected or one might expect given the major focus on this subgroup in the literature. On the other hand, early starting was the best unique predictor of adult arrest record, which is a very important outcome.

In interpreting results examining age of onset, two important points should be considered. First, age of onset was assessed through trajectory analyses of self-reported delinquency from age 10–17. This method differs substantially from the way that clinicians using the DSM-5 are able to make this diagnosis (i.e., by asking for self-report retrospective recall of when symptoms began). Whereas our approach uses more data and therefore may contain greater accuracy, it is also less clinically meaningful and thus may not be comparable to many previous studies in this area. Second, our trajectory method identified a fourth group of “desisting” youth, which could mark youth who are improving in their AB during adolescence. However, as we have discussed in a recent related article examining these trajectory groups in this sample (Shaw et al., 2012), this “desisting” group may actually represent a group of youth who begin underreporting their AB as they get older and thus may be misclassified (i.e., they should be in the early–high group based on their 60% record of arrest as juveniles). This issue may explain why ANOVAs using trajectory group to predict later outcomes show less predictive power of the early starting group than contrast codes that only compare early to late starters (rather than early starters to all other groups).

CU Traits

Counter to our hypotheses, CU traits were not more common in early starters and neither were those high on CU traits more likely to be early starters. CU traits were similarly correlated with both rule-breaking and aggressive symptoms, and neither set of symptoms appeared to be unique to CU traits. Whereas it is surprising that CU traits were not more highly overlapping with age of onset

and aggression, there have only been a few prior prospective studies to examine this question, and some of the existing studies have found relatively even distributions of those with CU traits between early and late starters (e.g., Dandreaux & Frick, 2009; Silverthorn et al., 2001). A caveat is that CU traits in this study were measured in late adolescence, and it is possible that this construct or measure taps a different process than CU traits measured earlier in adolescence–childhood. Our measure of CU traits was also fairly short, and thus a more extensive measurement of this construct (i.e., with the Inventory of Callous-Unemotional traits, the Clinical Assessment of Prosocial Emotions) may yield different results.

Consistent with previous research (Frick & Dickens, 2006), CU traits did predict important outcomes such as adolescent arrests, later CU traits, and substance dependence. It is interesting that the dimensional measure of CU traits was a much better predictor of outcomes than the group-based approach that is now used in DSM-5. As many studies involving CU traits have examined this construct dimensionally, it will be important for research to examine this construct as it is defined in the DSM-5 to assess whether a dichotomous measure (that also requires CD diagnosis) will capture the same predictive power as studies using dimensional measures.

In contrast to previous longitudinal work (e.g., Loeber et al., 2002), CU traits did not predict adult APD diagnosis or symptoms. Additionally, CU traits did not contribute unique variance to the prediction of later outcomes other than later CU traits over and above aggression/rule-breaking dimensions and trajectory class membership. Although this outcome was surprising, it is important to consider how these findings differ from other studies showing the power of CU traits in predicting worse AB outcomes. First, many of these studies used clinical or forensic samples with individuals already high on CD symptoms, and thus CU traits may be most predictive in the most extreme samples. Second, it is important to consider the base rates of CU traits in this sample. Although this sample is high risk and has a substantial number of youth with significant AB, only 35 boys in the sample met criteria for CD and only 14 of those boys met for the CU specifier. Therefore, even in a high-risk community sample with fairly high rates of adolescent arrests (35% had court records), highly elevated CU traits were relatively rare. Overall, these findings emphasize the need to specify what outcomes researchers expect CU traits to be especially predictive of, and whether this prediction is unique to CU traits above and beyond the severity of CD symptoms. Finally, it is important to note that much recent research has focused on how those with and without CU traits may have similar ABs but a different underlying etiology to those behaviors (Frick et al., 2014; Frick & White, 2008). As this study only examines overlap of subgroups and prediction of outcomes, it cannot address the extent to which these groups share or differ in earlier risk or underlying etiology.

Aggression Versus Rule Breaking

Aggressive and rule-breaking symptoms were robust correlates of all outcomes. Surprisingly, both dimensions appeared to correlate at similar levels with most outcomes in univariate models. When controlling for their overlap and other subtyping schemes, aggressive behaviors alone predicted unique variance in probabil-

ity of adolescent arrest, APD symptoms and diagnosis, and depression diagnosis, but not substance use, or dependence. Beyond simply knowing whether a youth was classified as having any AB or not, aggressive symptoms appeared to explain the most unique variance in a majority of outcomes, which is consistent with a small set of recent studies (Burt et al., 2011; Burt & Hopwood, 2010).

Comparison of Subtyping Approaches

Consistent with our hypotheses, aggression and early starting appeared to have a high overlap and account for similar variance. However, aggressive symptoms were a better predictor of most outcomes than age of onset. Albeit intriguing, this result could be considered in terms of measurement issues. As age of onset is a categorical measure, it may provide less explanatory power than dimensional approaches, though it may be more clinically useful. As aggression and rule breaking appeared to have similar relationships with many variables (which is not surprising given their moderate correlation in this sample), it may be that examining aggression and rule breaking, especially within the same regression, ends up tapping the severity of AB, as these dimensions are essentially symptom counts of CD. Thus, our results could simply reflect the continuity of severe AB across the life span. To address this potential confounding of aggression and rule breaking as simply measures of severity, we conducted additional analyses (see online supplemental Table 1) in which we estimated a similar set of regressions predicting outcomes shown in Table 4 in which we dichotomized aggression and rule breaking (0 = *no aggression symptoms or no rule-breaking symptoms*, 1 = *any aggression symptoms or any rule-breaking symptoms*). In these regressions, the dichotomized measures performed similarly in prediction of later outcomes, and in some cases, they were better predictors than the dimensional versions. Moreover, the dichotomized variables showed more specificity in that having any aggressive symptoms predicted APD diagnosis more strongly than previously, and having any rule-breaking symptoms emerged as a unique predictor of substance use and dependence as we had hypothesized. Thus, it appears that there is something unique about the presence of these particular symptoms in terms of predicting outcomes over and above their implications for severity of CD symptoms. Thus, clinically, it may be most useful beyond age of onset for clinicians to consider the severity of symptoms by symptom count, and the presence of an aggressive symptom, which according to our results, may uniquely predict the most maladaptive outcomes in early adulthood. In short, we suspect the type of AB youth engage is an important consideration when thinking about the longer term ramifications of early AB.

Beyond these two subtypes, CU traits appeared to have the least unique predictive validity above and beyond the other variables. A wealth of studies have shown that CU traits predict worse AB outcomes (Frick et al., 2014), yet studies in this area have not been consistent in controlling for the severity of AB or other aspects of AB such as age of onset, therefore it is important for studies to begin assessing the unique predictive nature of CU traits over and above the severity of AB and age of onset. It is also worth noting that CU traits were self-reported, which has been an issue of controversy in the field of adult psychopathy (Hare, 1985). Moreover, as all adult outcomes relied to some extent on self-report,

those higher on CU traits may have underreported their adult outcomes, lessening the predictive power of CU traits.

Limitations and Future Directions

This study contained several strengths including the use of longitudinal data on a relatively large, diverse sample of urban males, the use of multiple reporters and validated clinical assessments, and the comparison of multiple subtyping approaches. However, there are several limitations worth noting in interpreting the results. First, this is a sample of urban, predominantly low-income males recruited from the community and thus cannot be directly compared with broader epidemiological or higher severity clinical samples (or samples of girls) that have been the basis of many of the studies cited throughout the introduction. Also, these results cannot necessarily be generalized to studies of middle-class populations from suburban or rural communities. Second, we did not have a measure of psychopathy in adulthood, and thus we could only examine whether CU traits predicted a later measure of CU traits and not adult psychopathy. Very few studies have demonstrated this link between adolescent CU traits and adult psychopathy (e.g., Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007), and it would have been helpful to examine whether CU traits have specificity in predicting psychopathy versus APD. Third, although we attempted to measure each construct in a way consistent with past research and clinical practice, there are some limitations in our measures. For example, measures of aggression (vs. rule breaking) may confound the type of act (i.e., aggression) with the severity and frequency of the act (i.e., aggressive behaviors are often less frequent but more severe than rule breaking). Our analyses would benefit from the creation of a scale that matches aggressive and rule-breaking items based on their frequency. Unfortunately, such a measure needs to be developed and validated for diverse samples and did not exist in this study (for a further discussion of this issue see Burt, 2012).

Two other limitations bear discussion in the context of the need for future research. First, we did not focus on the potential interaction between subgrouping approaches. For example, CU traits may be most predictive only when they are in the context of early onset AB (i.e., an interaction between age of onset and CU traits). However, based on sample size we were unable to test this question with sufficient power. As noted in Table 4, we did explore these interactions but did not find any significant results. We were likely underpowered given the small amount of overlap between those qualifying as early starters and also high on CU traits. Second, our results may have been dependent on the way in which we created each measure. For example, our measure of self-reported delinquency indexes both severity and variety, likely with a greater weight on variety (i.e., the total number of different antisocial acts), which may lead to an overemphasis on frequent but less severe acts (see Bendixen, Endresen, & Olweus, 2003). The trajectory groups that were based on the self-report of delinquency and used to assess age of onset also contained information both about age and severity, which may confound the effect of age of onset and overall severity. Finally, and most important, our measures of aggression and rule breaking came from the K-SADS, which contains both parent and child reports (as well as clinician judgment). Thus, aggression and rule breaking may have been

strongest in prediction of later outcomes based on the better measurement of this construct.

To address these limitations, we present three alternate ways of creating the subtyping constructs and present the methods and a discussion of the results in the online supplemental materials (with statistical results presented in supplemental Tables 2-5). These analyses indicate that the way in which we constructed each measure has a bearing on its predictive power and overlap. Clearly, more work is needed to identify the "ideal" way of identifying those who are early starting or high on aggression or high on CU traits, as measurement (and measurement error) may play a large role in later predictive power. Future studies are needed that explicitly examine the role of measurement in each of these constructs, particularly as they relate to their relative predictive power.

Summary

In conclusion, we found moderate overlap between aggressive symptoms and early starting AB, but low overlap between these constructs and CU traits. Consistent with past research, we found that any AB in adolescence portends poorer outcomes in early adulthood, but that early starting AB and those with more aggressive symptoms had the worst outcomes. This work underscores the importance of understanding the overlap of these subtyping approaches and their potential clinical utility, including more evidence that dimensional measures such as examining severity of AB may be helpful in predicting outcomes. Overall, aggressive symptoms and age of onset were highly overlapping and good predictors of poor outcomes in emerging adulthood. CU traits appear to identify a different group of youth than age of onset or aggressive symptoms. However, CU traits at diagnosable levels were relatively rare in this sample and did not appear to be as good a predictor of adult outcomes as expected. Ultimately, this research underscores the complexity of comparing these approaches and emphasizes that, though each subtyping approach identifies a more severe group, the youth identified by each are not necessarily entirely overlapping.

References

- Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for ASEBA school-age forms & profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.
- Aguilar, B., Sroufe, L. A., Egeland, B., & Carlson, E. (2000). Distinguishing the early-onset/persistent and adolescence-onset antisocial behavior types: From birth to 16 years. *Development and Psychopathology, 12*, 109–132. <http://dx.doi.org/10.1017/S0954579400002017>
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Bendixen, M., Endresen, I. M., & Olweus, D. (2003). Variety and frequency scales of antisocial involvement: Which one is better? *Legal and Criminological Psychology, 8*, 135–150. <http://dx.doi.org/10.1348/13553250322362924>
- Burke, J. D., Loeber, R., & Lahey, B. B. (2007). Adolescent conduct disorder and interpersonal callousness as predictors of psychopathy in young adults. *Journal of Clinical Child and Adolescent Psychology, 36*, 334–346. <http://dx.doi.org/10.1080/15374410701444223>
- Burt, S. A. (2012). How do we optimally conceptualize the heterogeneity within antisocial behavior? An argument for aggressive versus non-aggressive behavioral dimensions. *Clinical Psychology Review, 32*, 263–279. <http://dx.doi.org/10.1016/j.cpr.2012.02.006>
- Burt, S. A., Donnellan, M. B., Iacono, W. G., & McGue, M. (2011). Age-of-onset or behavioral sub-types? A prospective comparison of two approaches to characterizing the heterogeneity within antisocial behavior. *Journal of Abnormal Child Psychology, 39*, 633–644. <http://dx.doi.org/10.1007/s10802-011-9491-9>
- Burt, S. A., & Hopwood, C. J. (2010). A comparison of two different approaches to characterizing the heterogeneity within antisocial behavior: Age-of-onset versus behavioral sub-types. *Journal of Personality Disorders, 24*, 272–283. <http://dx.doi.org/10.1521/pe.2010.24.2.272>
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Erlbaum.
- Cornell, D. G., Warren, J., Hawk, G., Stafford, E., Oram, G., & Pine, D. (1996). Psychopathy in instrumental and reactive violent offenders. *Journal of Consulting and Clinical Psychology, 64*, 783–790. <http://dx.doi.org/10.1037/0022-006X.64.4.783>
- Dandreaux, D. M., & Frick, P. J. (2009). Developmental pathways to conduct problems: A further test of the childhood and adolescent-onset distinction. *Journal of Abnormal Child Psychology, 37*, 375–385. <http://dx.doi.org/10.1007/s10802-008-9261-5>
- Dillard, C. L., Salekin, R. T., Barker, E. D., & Grimes, R. D. (2013). Psychopathy in adolescent offenders: An item response theory study of the antisocial process screening device-self report and the Psychopathy Checklist: Youth Version. *Personality Disorders: Theory, Research, and Treatment, 4*, 101–120. <http://dx.doi.org/10.1037/a0028439>
- Dishion, T. J., Patterson, G. R., Stoolmiller, M., & Skinner, M. L. (1991). Family, school, and behavioral antecedents to early adolescent involvement with antisocial peers. *Developmental Psychology, 27*, 172–180. <http://dx.doi.org/10.1037/0012-1649.27.1.172>
- Edens, J. F., Marcus, D. K., Lilienfeld, S. O., & Poythress, N. G., Jr. (2006). Psychopathic, not psychopath: Taxometric evidence for the dimensional structure of psychopathy. *Journal of Abnormal Psychology, 115*, 131–144. <http://dx.doi.org/10.1037/0021-843X.115.1.131>
- Edens, J. F., Marcus, D. K., & Vaughn, M. G. (2011). Exploring the taxometric status of psychopathy among youthful offenders: Is there a juvenile psychopath taxon? *Law and Human Behavior, 35*, 13–24. <http://dx.doi.org/10.1007/s10979-010-9230-8>
- Elliott, D., Huizinga, D., & Ageton, S. (1985). *Explaining delinquency and drug use*. Beverly Hills, CA: Sage.
- Farrington, D. P., & Loeber, R. (2000). Epidemiology of juvenile violence. *Child and Adolescent Psychiatric Clinics of North America, 9*, 733–748.
- First, M. B., Gibbon, M., Spitzer, R. L., Williams, J. B. W., & Benjamin, L. S. (1997). *Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II), user's guide*. Washington, DC: American Psychiatric Press.
- First, M., Spitzer, R., Gibbon, M., & Williams, J. (1996). *Structured Clinical Interview for DSM-IV Axis I Disorders Research Version (SCID-I)*. New York, NY: Biometrics Research, New York State Psychiatric Institute.
- Foster, E. M., & Jones, D. E. (2005). The high costs of aggression: Public expenditures resulting from conduct disorder. *American Journal of Public Health, 95*, 1767–1772. <http://dx.doi.org/10.2105/AJPH.2004.061424>
- Frick, P. J., Bodin, S. D., & Barry, C. T. (2000). Psychopathic traits and conduct problems in community and clinic-referred samples of children: Further development of the psychopathy screening device. *Psychological Assessment, 12*, 382–393. <http://dx.doi.org/10.1037/1040-3590.12.4.382>
- Frick, P. J., Cornell, A. H., Barry, C. T., Bodin, S. D., & Dane, H. E. (2003). Callous-unemotional traits and conduct problems in the prediction of conduct problem severity, aggression, and self-report of delin-

- quency. *Journal of Abnormal Child Psychology*, 31, 457–470. <http://dx.doi.org/10.1023/A:1023899703866>
- Frick, P. J., Cornell, A. H., Bodin, S. D., Dane, H. E., Barry, C. T., & Loney, B. R. (2003). Callous-unemotional traits and developmental pathways to severe conduct problems. *Developmental Psychology*, 39, 246–260. <http://dx.doi.org/10.1037/0012-1649.39.2.246>
- Frick, P. J., & Dickens, C. (2006). Current perspectives on conduct disorder. *Current Psychiatry Reports*, 8, 59–72. <http://dx.doi.org/10.1007/s11920-006-0082-3>
- Frick, P. J., & Ellis, M. (1999). Callous-unemotional traits and subtypes of conduct disorder. *Clinical Child and Family Psychology Review*, 2, 149–168. <http://dx.doi.org/10.1023/A:1021803005547>
- Frick, P. J., Lahey, B. B., Loeber, R., Tannenbaum, L., Van Horn, Y., Christ, M. A. G., . . . Hanson, K. (1993). Oppositional defiant disorder and conduct disorder: A meta-analytic review of factor analyses and cross-validation in a clinic sample. *Clinical Psychology Review*, 13, 319–340. [http://dx.doi.org/10.1016/0272-7358\(93\)90016-F](http://dx.doi.org/10.1016/0272-7358(93)90016-F)
- Frick, P. J., & Moffitt, T. E. (2010). *A proposal to the DSM-V Childhood Disorders and the ADHD and Disruptive Behaviors Disorders Work Groups to include a specifier to the diagnosis of conduct disorder based on the presence of callous unemotional traits*. Washington, DC: American Psychiatric Association.
- Frick, P. J., & Nigg, J. T. (2012). Current issues in the diagnosis of attention deficit hyperactivity disorder, oppositional defiant disorder, and conduct disorder. *Annual Review of Clinical Psychology*, 8, 77–107. <http://dx.doi.org/10.1146/annurev-clinpsy-032511-143150>
- Frick, P. J., Ray, J. V., Thornton, L. C., & Kahn, R. E. (2014). Can callous-unemotional traits enhance the understanding, diagnosis, and treatment of serious conduct problems in children and adolescents? A comprehensive review. *Psychological Bulletin*, 140, 1–57. <http://dx.doi.org/10.1037/a0033076>
- Frick, P. J., & Viding, E. (2009). Antisocial behavior from a developmental psychopathology perspective. *Development and Psychopathology*, 21, 1111–1131. <http://dx.doi.org/10.1017/S0954579409990071>
- Frick, P. J., & White, S. F. (2008). Research review: The importance of callous-unemotional traits for developmental models of aggressive and antisocial behavior. *Journal of Child Psychology and Psychiatry*, 49, 359–375. <http://dx.doi.org/10.1111/j.1469-7610.2007.01862.x>
- Hare, R. D. (1985). Comparison of procedures for the assessment of psychopathy. *Journal of Consulting and Clinical Psychology*, 53, 7–16. <http://dx.doi.org/10.1037/0022-006X.53.1.7>
- Hinshaw, S. P., Simmel, C., & Heller, T. L. (1995). Multimethod assessment of covert antisocial behavior in children: Laboratory observations, adult ratings, and child self-report. *Psychological Assessment*, 7, 209–219. <http://dx.doi.org/10.1037/1040-3590.7.2.209>
- Hollingshead, A. B. (1975). *Four factor index of social status*. Unpublished manuscript, Yale University, New Haven.
- Hyde, L. W., Shaw, D. S., Gardner, F., Cheong, J., Dishion, T. J., & Wilson, M. (2013). Dimensions of callousness in early childhood: Links to problem behavior and family intervention effectiveness. *Development and Psychopathology*, 25, 347–363. <http://dx.doi.org/10.1017/S0954579412001101>
- Kahn, R. E., Frick, P. J., Youngstrom, E., Findling, R. L., & Youngstrom, J. K. (2012). The effects of including a callous-unemotional specifier for the diagnosis of conduct disorder. *Journal of Child Psychology and Psychiatry*, 53, 271–282. <http://dx.doi.org/10.1111/j.1469-7610.2011.02463.x>
- Kaufman, J., Birmaher, B., Brent, D., Rao, U., Flynn, C., Moreci, P., . . . Ryan, N. (1997). Schedule for Affective Disorders and Schizophrenia for School-age children—Present and Lifetime version (K-SADS-PL): Initial reliability and validity data. *Journal of the American Academy of Child & Adolescent Psychiatry*, 36, 980–988. <http://dx.doi.org/10.1097/00004583-199707000-00021>
- Kimonis, E. R., Frick, P. J., Skeem, J. L., Marsee, M. A., Cruise, K., Munoz, L. C., . . . Morris, A. S. (2008). Assessing callous-unemotional traits in adolescent offenders: Validation of the Inventory of Callous-Unemotional Traits. *International Journal of Law and Psychiatry*, 31, 241–252. <http://dx.doi.org/10.1016/j.ijlp.2008.04.002>
- Krueger, R. F., & Markon, K. E. (2011). A dimensional-spectrum model of psychopathology: Progress and opportunities. *Archives of General Psychiatry*, 68, 10–11. <http://dx.doi.org/10.1001/archgenpsychiatry.2010.188>
- Lahey, B. B., Loeber, R., Quay, H. C., Applegate, B., Shaffer, D., Waldman, I., . . . Bird, H. R. (1998). Validity of DSM-IV subtypes of conduct disorder based on age of onset. *Journal of the American Academy of Child & Adolescent Psychiatry*, 37, 435–442. <http://dx.doi.org/10.1097/00004583-199804000-00022>
- Larsson, H., Tuvblad, C., Rijdsdijk, F. V., Andershed, H., Grann, M., & Lichtenstein, P. (2007). A common genetic factor explains the association between psychopathic personality and antisocial behavior. *Psychological Medicine*, 37, 15–26. <http://dx.doi.org/10.1017/S003329170600907X>
- Lee, I. A., & Preacher, K. J. (2013). *Calculation for the test of the difference between two dependent correlations with one variable in common*. Available from <http://quantpsy.org>
- Loeber, R., Burke, J. D., & Lahey, B. B. (2002). What are adolescent antecedents to antisocial personality disorder? *Criminal Behaviour and Mental Health*, 12, 24–36. <http://dx.doi.org/10.1002/cbm.484>
- Loeber, R., & Hay, D. (1997). Key issues in the development of aggression and violence from childhood to early adulthood. *Annual Review of Psychology*, 48, 371–410. <http://dx.doi.org/10.1146/annurev.psych.48.1.371>
- Loeber, R., & Schmalzing, K. (1985). Empirical evidence for overt and covert patterns of antisocial conduct problems: A metaanalysis. *Journal of Abnormal Child Psychology*, 13, 337–352. <http://dx.doi.org/10.1007/BF00910652>
- Loeber, R., & Stouthamer-Loeber, M. (1998). Development of juvenile aggression and violence. Some common misconceptions and controversies. *American Psychologist*, 53, 242–259. <http://dx.doi.org/10.1037/0003-066X.53.2.242>
- Lynam, D. R., Caspi, A., Moffitt, T. E., Loeber, R., & Stouthamer-Loeber, M. (2007). Longitudinal evidence that psychopathy scores in early adolescence predict adult psychopathy. *Journal of Abnormal Psychology*, 116, 155–165. <http://dx.doi.org/10.1037/0021-843X.116.1.155>
- McMahon, R. J., Witkiewitz, K., & Kotler, J. S., & the Conduct Problems Prevention Research Group. (2010). Predictive validity of callous-unemotional traits measured in early adolescence with respect to multiple antisocial outcomes. *Journal of Abnormal Psychology*, 119, 752–763. <http://dx.doi.org/10.1037/a0020796>
- Moffitt, T. E. (2003). Life-course persistent and adolescent-limited antisocial behavior: A research review and a research agenda. In B. B. Lahey, T. E. Moffitt, & A. Caspi (Eds.), *Causes of conduct disorder and juvenile delinquency* (pp. 49–75). New York, NY: Guilford Press.
- Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review*, 100, 674–701. <http://dx.doi.org/10.1037/0033-295X.100.4.674>
- Moffitt, T. E., Arseneault, L., Jaffee, S. R., Kim-Cohen, J., Koenen, K. C., Odgers, C. L., . . . Viding, E. (2008). Research review: DSM-V conduct disorder: Research needs for an evidence base. *Journal of Child Psychology and Psychiatry*, 49, 3–33. <http://dx.doi.org/10.1111/j.1469-7610.2007.01823.x>
- Moffitt, T. E., Caspi, A., Dickson, N., Silva, P., & Stanton, W. (1996). Childhood-onset versus adolescent-onset antisocial conduct problems in males: Natural history from ages 3 to 18 years. *Development and Psychopathology*, 8, 399–424. <http://dx.doi.org/10.1017/S0954579400007161>

- Moffitt, T. E., Caspi, A., Harrington, H., & Milne, B. J. (2002). Males on the life-course-persistent and adolescence-limited antisocial pathways: Follow-up at age 26 years. *Development and Psychopathology, 14*, 179–207. <http://dx.doi.org/10.1017/S0954579402001104>
- Murray, J., Irving, B., Farrington, D. P., Colman, I., & Bloxson, C. A. (2010). Very early predictors of conduct problems and crime: Results from a national cohort study. *Journal of Child Psychology and Psychiatry, 51*, 1198–1207. <http://dx.doi.org/10.1111/j.1469-7610.2010.02287.x>
- Nagin, D. S. (2005). *Group-based modeling of development*. Cambridge, MA: Harvard University Press.
- Nagin, D., Farrington, D., & Moffitt, T. (1995). Life-course trajectories of different types of offenders. *Criminology, 33*, 111–139. <http://dx.doi.org/10.1111/j.1745-9125.1995.tb01173.x>
- Nock, M. K., Kazdin, A. E., Hiripi, E., & Kessler, R. C. (2006). Prevalence, subtypes, and correlates of *DSM-IV* conduct disorder in the National Comorbidity Survey Replication. *Psychological Medicine, 36*, 699–710. <http://dx.doi.org/10.1017/S0033291706007082>
- Patrick, C. J. (2007). Antisocial personality disorder and psychopathy. In W. O'Donohue, K. A. Fowler, & S. O. Lilienfeld (Eds.), *Personality disorders: Toward the DSM-V* (pp. 109–167). Thousand Oaks, CA: Sage. <http://dx.doi.org/10.4135/9781483328980.n6>
- Patterson, G. R., Reid, J. B., & Dishion, T. J. (1992). *Antisocial boys*. Eugene, OR: Castalia.
- Poythress, N. G., Dembo, R., Wareham, J., & Greenbaum, P. E. (2006). Construct validity of the Youth Psychopathic Traits Inventory (YPI) and the Antisocial Process Screening Device (APSD) with justice-involved adolescents. *Criminal Justice and Behavior, 33*, 26–55. <http://dx.doi.org/10.1177/0093854805282518>
- Quay, H. C. (1986). Conduct disorders. In H. C. Quay & J. S. Werry (Eds.), *Psychopathological disorders of childhood* (3rd ed., pp. 35–72). New York, NY: Wiley.
- Roisman, G. I., Monahan, K. C., Campbell, S. B., Steinberg, L., Cauffman, E., & the National Institute of Child Health and Human Development Early Child Care Research Network. (2010). Is adolescence-onset antisocial behavior developmentally normative? *Development and Psychopathology, 22*, 295–311. <http://dx.doi.org/10.1017/S0954579410000076>
- Rubin, D. B. (1996). Multiple imputation after 18+ years. *Journal of the American Statistical Association, 91*, 473–489. <http://dx.doi.org/10.1080/01621459.1996.10476908>
- Shaw, D. S., Gilliom, M., Ingoldsby, E. M., & Nagin, D. S. (2003). Trajectories leading to school-age conduct problems. *Developmental Psychology, 39*, 189–200. <http://dx.doi.org/10.1037/0012-1649.39.2.189>
- Shaw, D. S., & Gross, H. (2008). Early childhood and the development of delinquency: What we have learned from recent longitudinal research. In A. Lieberman (Ed.), *The long view of crime: A synthesis of longitudinal research* (pp. 79–127). New York, NY: Springer. http://dx.doi.org/10.1007/978-0-387-71165-2_3
- Shaw, D. S., Hyde, L. W., & Brennan, L. M. (2012). Predictors of boys' antisocial trajectories. *Development and Psychopathology, 24*, 871–888. <http://dx.doi.org/10.1017/S0954579412000429>
- Silverthorn, P., Frick, P. J., & Reynolds, R. (2001). Timing of onset and correlates of severe conduct problems in adjudicated girls and boys. *Journal of Psychopathology and Behavioral Assessment, 23*, 171–181. <http://dx.doi.org/10.1023/A:1010917304587>
- Steiger, J. H. (1980). Tests for comparing elements of a correlation matrix. *Psychological Bulletin, 87*, 245–251. <http://dx.doi.org/10.1037/0033-2909.87.2.245>
- Tackett, J. L., Krueger, R. F., Iacono, W. G., & McGue, M. (2005). Symptom-based subfactors of DSM-defined conduct disorder: Evidence for etiologic distinctions. *Journal of Abnormal Psychology, 114*, 483–487. <http://dx.doi.org/10.1037/0021-843X.114.3.483>
- Taylor, J., Loney, B. R., Bobadilla, L., Iacono, W. G., & McGue, M. (2003). Genetic and environmental influences on psychopathy trait dimensions in a community sample of male twins. *Journal of Abnormal Child Psychology, 31*, 633–645. <http://dx.doi.org/10.1023/A:1026262207449>

Received March 11, 2014

Revision received November 5, 2014

Accepted November 10, 2014 ■