

UNDERSTANDING DESISTING AND PERSISTING FORMS OF DELINQUENCY:  
THE UNIQUE CONTRIBUTIONS OF DISRUPTIVE BEHAVIOR DISORDERS  
AND INTERPERSONAL CALLOUSNESS

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The current study examined whether childhood and adolescent symptoms of conduct disorder (CD), oppositional defiant disorder (ODD), attention-deficit hyperactivity disorder (ADHD) and interpersonal callousness (IC) distinguish boys who will exhibit persisting versus desisting patterns of delinquent behavior from adolescence into early adulthood. The sample consisted of an ethnically diverse group of 503 boys who were repeatedly assessed from ages 6 to 25. In childhood, univariate analyses indicated that CD and IC symptoms were higher among boys whose delinquent behavior persisted from adolescence into adulthood relative to those boys whose delinquency desisted across time and non-delinquents. However, after controlling for the overlap between symptoms of ADHD, ODD, CD and IC in childhood, only CD symptoms differentiated persisters from non-delinquents. In adolescence, univariate analyses indicated that ODD, CD, and IC symptoms were higher in persisters relative to both desisters and non-delinquents, while elevated ADHD symptoms only distinguished persisters from non-delinquents. In multivariate analyses controlling for the co-occurrence ADHD, ODD, CD and IC symptoms in adolescence, associations between CD and IC symptoms and delinquency group membership remained significant such that CD and IC symptoms were higher in persisters relative to both desisters and non-delinquents. Moreover, these significant relations held even after controlling for ADHD, ODD, CD and IC symptoms in childhood. Taken together, this indicates that the boys with elevated levels of CD and IC symptoms are at risk for exhibiting a pattern of delinquent behavior that persists from adolescence into early adulthood.

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## 1.0 INTRODUCTION

Developmental studies have shown that the prevalence of delinquent behavior (e.g., theft, vandalism, assault, etc.) rises and peaks during adolescence and then greatly dissipates for most individuals by adulthood, a phenomena referred to as the age crime curve (Farrington, 1986). Research has traditionally focused on factors that predict the emergence and severity of delinquency during adolescence, though relatively little is known about the characteristics that distinguish adolescents whose delinquent behavior persists into early adulthood (i.e., persisters) from those who desist from delinquent behavior during the transition to adulthood (i.e., desisters). There is some suggestion that conduct disorder (CD) symptoms represent a robust developmental precursor to severe and chronic delinquency. However, it less clear as to whether symptoms of oppositional defiant disorder (ODD) or attention deficit hyperactivity disorder (ADHD) contribute to the prediction of persistent versus desistant delinquent behavior after controlling for co-occurring CD symptoms. Moreover, a significant proportion of youth with symptoms of disruptive behavior disorders (DBD; i.e., CD, ODD, ADHD) eventually desist from delinquency by adulthood (Moffitt, 1993). This imprecision in prediction emphasizes the need to identify additional individual difference characteristics beyond symptoms of disruptive behavior disorders (DBD) that distinguish persisters from desisters.

In an attempt to identify those youth most at risk for persistent delinquency, many investigators have focused on the interpersonal and affective features associated with adult

psychopathy. Hereafter referred to as interpersonal callousness (IC), these features include a lack of guilt/empathy, manipulative or deceitful behavior, superficial charm, and a failure to accept responsibility for one's own actions. While the relation between IC in youth and future delinquent behavior has been established (Frick, et al., 2003; Pardini, Obradovic, & Loeber, 2006), it is unclear whether IC can provide prognostic information about which delinquents will become persisters versus desisters. Moreover, there are only a few studies that have examined whether features of IC uniquely predict future delinquency after controlling for co-occurring DBD symptoms. Lastly, although features of IC are thought to be indicative of severe and chronic delinquency (Loeber, Farrington, Stouthamer-Loeber, & White, 2008; Loeber, Pardini, Stouthamer-Loeber, & Raine, 2007), there is some speculation that the utility of IC may fluctuate across development due to normative variations in these characteristics. Manifestations of features associated with IC in adolescence have been described as normative and temporary (Edens, Skeem, Cruise, & Cauffman, 2001), with similar claims being made about adolescent-onset forms of CD (Moffitt, 1993). However, there is reason to believe that the presence of both IC and CD in adolescence are not completely benign and may provide additional information about the persistence of delinquent behavior into adulthood (Burke, Loeber, & Lahey, 2007; Pardini, et al., 2006).

In sum, researchers have traditionally focused on what distinguishes non-delinquents from delinquents, rather than determining what factors distinguish persisters from desisters (Figure 1a). To address this issue and the limitations mentioned above, the present study examined DBD and IC symptoms as unique predictors of desisting and persisting forms of delinquency in an ethnically diverse sample of boys assessed prospectively from childhood into early adulthood (Figure 1b). The study also examined whether DBD and IC symptoms in

adolescence can help determine which youth will become persisters versus desisters after controlling for early manifestations of these characteristics in childhood. The extensive developmental span covered by this study and its prospective design makes it ideal for addressing the aforementioned limitations in the existing literature.

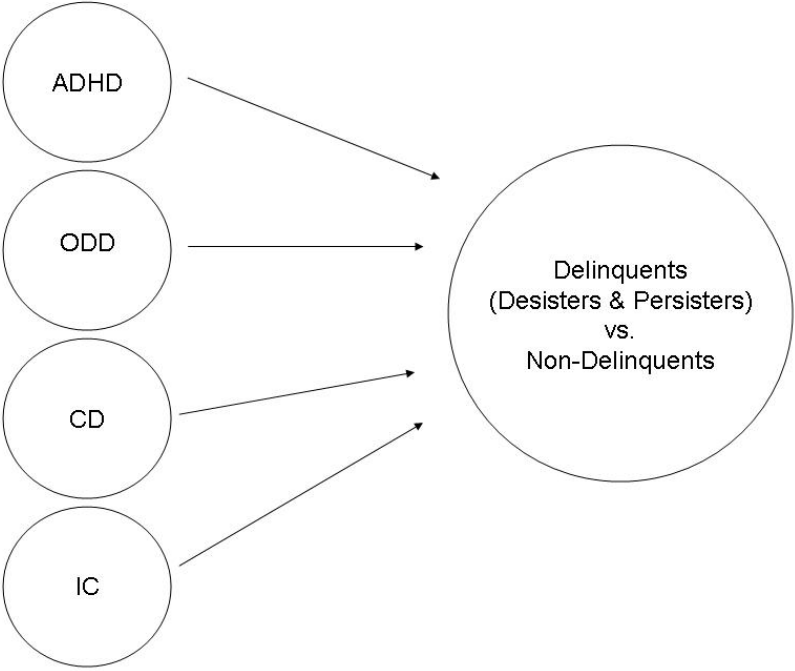


Figure 1a. Disruptive Behavior Disorders and Interpersonal Callousness Predicting Delinquency

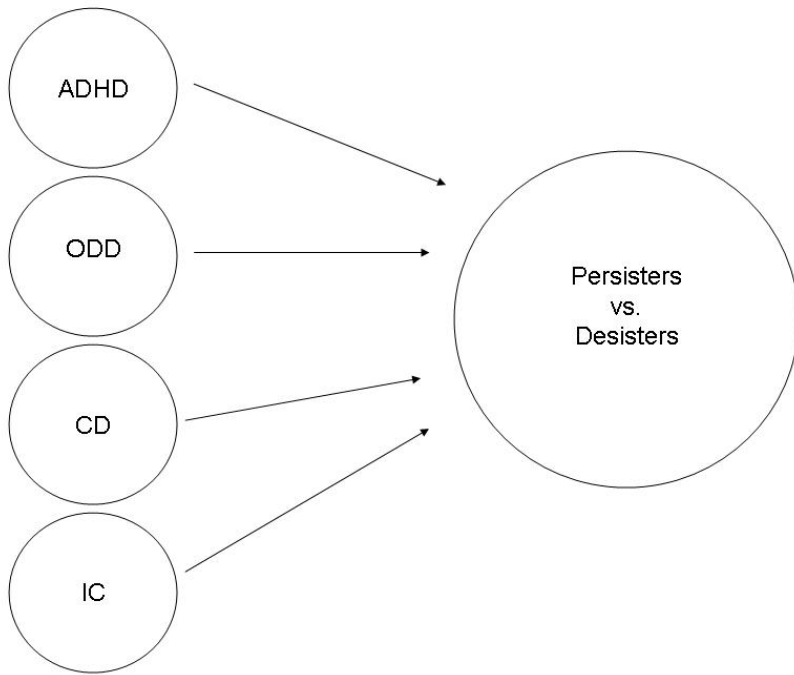


Figure 1b. Disruptive Behavior Disorders and Interpersonal Callousness Distinguishing Between Desisting and Persisting Delinquency

## **2.0 LITERATURE REVIEW**

### **2.1 DELINQUENCY EMERGENCE, DESISTANCE, AND PERSISTENCE**

Research indicates that the vast majority of youth engage in some form of delinquent behavior in childhood or adolescence (Elliott, Huizinga, & Ageton, 1985). Delinquency, defined as “the act of breaking one or more criminal laws” (Loeber, et al., 2008), tends to emerge in early adolescence, peak in mid to late adolescence, and subsequently decrease precipitously into early adulthood (Farrington, 1986; Laub & Sampson, 2003; Tremblay & Nagin, 2005). Individuals whose pattern of delinquent behavior tends to mimic this normative age-crime curve have been referred to as desisters and there is a great deal of empirical evidence to suggest that a substantial proportion of delinquent youth eventually desist from delinquency. For example, a large longitudinal study assessing individuals from late childhood into early adulthood found that approximately two-thirds of those arrested as juveniles were not re-arrested up to age 26 (Tracy & Kempf-Leonard, 1996). Nonetheless, there are still a small percentage of individuals whose delinquent behavior persists into adulthood (Moffitt, Caspi, Harrington, & Milne, 2002). In a longitudinal investigation of males, Loeber and colleagues (2008) found that approximately 20% of those youth who engaged in serious delinquent behavior during adolescence continued to offend into early adulthood. Trajectory analyses within similar longitudinal designs have provided further support for these two distinct courses of delinquency, with roughly one-fifth of delinquent youth continuing to engage in delinquent behavior into adulthood (Laub, Nagin, &

Sampson, 1998; Nagin & Land, 1993). Overall these findings have led to a focus on understanding the factors that distinguish between desisting and persisting forms of delinquency.

Although there remains little consensus regarding the mechanisms underlying these divergent developmental trajectories of delinquency, several plausible explanations have been proposed. Many attribute the differentiation between desistant and persistent delinquency to a variety of environmental factors, such as changes in informal social control or bonds (Hirschi, 1969). For example, empirical studies suggest that individuals who enter into a stable marriage or steady employment are more likely to desist from delinquency than those lacking social bonds (Farrington & West, 1995; Laub, et al., 1998; Sampson & Laub, 1993; 2003). Social learning theorists similarly posit that different developmental patterns of delinquent behavior are shaped by one's social interactions (Akers, 1990), with delinquent peer group associations being one of the most important factors distinguishing between persisting and desisting delinquency (Akers, 1998; Warr, 1993). Indeed, recent longitudinal evidence has supported this assertion (Loeber, et al., 2008). Additionally, parenting factors in childhood and adolescence such as parental supervision and physical punishment have been shown to be important in differentiating between desistant and persistent delinquent behavior (Farrington, 1990; Loeber, et al., 2008).

While the relation between environmental factors and the distinction between desisting and persisting forms of delinquency has received growing attention, relatively less emphasis has been placed on the importance of considering individual characteristics. Understanding the nature of the relation between individual characteristics and patterns of delinquency is particularly important given the active role individuals play in shaping their social environments (Plomin, DeFries, & Loehlin, 1977). For example, studies have found that youth who have beliefs favoring delinquency tend to seek out peers who also engage in delinquency (Pardini,

Loeber, & Stouthamer-Loeber, 2005). Consequently, environmental influences may not be the only important predictor of divergent patterns of delinquency. Instead, youth exhibiting certain individual characteristics may be more likely to continue engaging in delinquency over time and these individual characteristics could, for example, also prevent the development of prosocial relationships and steady employment. In order to advance our knowledge in this area it is important to determine the extent to which certain individual characteristics differentiate desisting and persisting delinquency.

## **2.2 DISRUPTIVE BEHAVIOR DISORDERS AND THE DESISTANCE/ PERSISTENCE OF DELINQUENCY**

As noted above, individual characteristics are clearly important for understanding the course of delinquent behavior (Moffitt, 1993). To this end, some researchers have examined symptoms of CD, ODD, and ADHD predictors of prolonged delinquency. However, empirical studies have traditionally focused on DBD symptoms as potential precursors to the onset and severity of delinquent behavior in adolescence, with much less focus on the degree to which these characteristics differentiate between desisters and persisters in early adulthood. Nonetheless, the extant literature has consistently shown the presence of CD symptoms to robustly predict continued delinquency over time (Pardini, 2008). This is not surprising given that the majority of CD symptoms are in fact early forms of illegal behaviors (e.g., stealing, destroying property, etc.) and youth with a greater number of these behaviors tend to exhibit subsequent escalations in delinquency (Loeber, Burke, & Lahey, 2002). While early CD symptoms can be conceptualized at least partially as an index of delinquent behavior, it still remains unclear whether the number



of early CD symptoms provides any utility in predicting future persistence of delinquent behaviors.

In contrast to research on CD, less attention has been given to ADHD and ODD symptoms as independent predictors of future delinquency. However, studies have found that there is a developmental progression of problem behavior such that children with elevated ADHD symptoms are more likely to develop ODD symptoms, and the presence of ODD symptoms in turn increases risk for developing CD symptoms over time (Loeber, Green, Keenan, & Lahey, 1995; Rowe, Maughan, Pickles, Costello, & Angold, 2002). More recent longitudinal work has moved beyond the constraints of this developmental model by assessing whether ADHD and ODD symptoms independently predict future delinquent behavior after controlling for co-occurring CD symptoms. While ADHD and ODD symptoms are often correlated with engagement in delinquency (Broidy, et al., 2003; Rutter, Kim-Cohen, & Maughan, 2006), these associations are often reduced to non-significance after controlling for CD symptoms (Fite, Wynn, & Pardini, 2009; Lahey, Loeber, Burke, & Applegate, 2005; Loeber, et al., 2002). However, one important limitation of the aforementioned research is that ODD and CD are frequently combined into a single construct in longitudinal studies (Broidy, et al., 2003). Though these findings underscore the robust association between CD symptoms and later delinquency, a more comprehensive evaluation of CD, ODD, and ADHD symptoms and their unique associations with desisting and persisting forms of delinquency is still needed.

### **2.3 INTERPERSONAL CALLOUSNESS AND THE DESISTANCE/PERSISTENCE OF DELINQUENCY**

It is clear that many youth with DBD symptoms do not go on to exhibit delinquent behaviors in adulthood (Lahey, et al., 2005). Consequently, investigators have more recently begun examining whether features traditionally associated with adult psychopathy can be applied to youth (Frick, Bodin, & Barry, 2000; Lynam, 1997). While psychopathy is a complex construct characterized by a constellation of interpersonal, affective, and behavioral characteristics, downward extensions to youth have focused primarily on the interpersonal and affective facets of the disorder (e.g., lack of guilt, manipulative and deceitful behavior, superficial charm). These features are of particular relevance because they are not adequately represented among CD, ODD, and ADHD symptoms (Dadds, Fraser, Frost, & Hawes, 2005; Frick, et al., 2000; Pardini, 2006). Moreover, these characteristics are presumed to be indicative of the most severe and habitual adult offenders (Cleckley, 1976).

Consistent with the adult literature, the presence of IC has been shown to distinguish a particularly severe sub-group of youth exhibiting delinquent behavior (Frick, et al., 2003; Loeber, et al., 2002; Pardini, 2006). Cross-sectional research has shown a significant relation between increased IC and severe and aggressive behavior within both adjudicated (Kruh, Frick, & Clements, 2005; Pardini, 2006) and non-adjudicated (Frick, Stickle, Dandreaux, Farrell, & Kimonis, 2005) samples of youth. These findings provide initial evidence for the idea that features of IC may demarcate a sub-group of youth with a heightened proclivity for delinquent behavior, prompting research on the predictive utility these characteristics.

The number of longitudinal studies supporting the utility of interpersonal and affective features of psychopathy in the prediction of delinquent behavior has grown over the past decade.

The presence of IC symptoms has been shown to predict increasing levels of delinquency over time in children, even after controlling for initial levels of conduct problems (Dadds, et al., 2005; Frick, et al., 2003; Frick, et al., 2005). Similar findings have been reported in longitudinal studies of adolescents. For example, elevated IC symptoms in adolescence have been shown to predict the persistence of delinquency over time (Pardini, 2006) and distinguish between desisting and persisting forms of delinquent behavior (Loeber, et al., 2007). These findings held after controlling for a number of child, parenting, peer, and community factors. Moreover, features of IC in adolescence have been shown to predict future recidivism (Boccaccini, et al., 2007; Brandt, Kennedy, Patrick, & Curtin, 1997) as well as future antisocial personality problems (Loeber, et al., 2007; Pardini & Loeber, 2008), and increased psychopathic features (Burke, et al., 2007; Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007) in early adulthood.

While these results are promising, several limitations in the current literature remain. First, the incremental predictive utility of IC symptoms above and beyond co-occurring DBD symptoms has not been adequately assessed. Those studies that have controlled for initial levels of characteristics associated with DBD symptoms finding IC symptoms to explain a very small proportion of the variance in later delinquency (Dadds, et al., 2005; Pardini, et al., 2006). Additionally, the majority of the aforementioned studies assessed IC symptoms as a predictor of childhood and adolescent delinquent behavior. As a result, it remains unclear how well desistant and persistent delinquency in early adulthood may be predicted by early IC symptoms after controlling for contemporaneous DBD symptoms.

## 2.4 DEVELOPMENTAL CONSIDERATIONS

Another issue of substantive importance involves potential differences in the predictive utility of DBD symptoms and IC across different developmental time periods. There has been repeated suggestion that the utility of both DBD and IC symptoms may vary throughout childhood and adolescence, with many researchers proposing that childhood-onset CD in particular puts youth at heightened risk for chronic delinquency. For example, Moffitt's (1993) dual taxonomy of life-course persistent and adolescent-limited offenders is founded on the idea that early manifestations of delinquency are linked to individual characteristics resulting in a prolonged, stable course of delinquent behavior. According to this conceptualization, adolescent-onset of delinquency is more normative and transient and related more to a "maturity gap" and contextual influences. In line with this thinking, subsequent theory and empirical studies have traditionally focused on childhood-onset as particularly maladaptive.

A number of longitudinal studies demonstrate that early manifestations of DBD symptoms and IC are indicative of continued engagement in delinquency (Loeber, et al., 2008; Pardini, et al., 2006). At the same time, not all youth with heightened DBD and IC symptoms in childhood continue to engage in delinquency (Loeber, et al., 2008). More importantly, there is research to suggest that elevated DBD and IC symptoms in adolescence are useful in predicting continued delinquent behavior (Burke, et al., 2007; Loeber, et al., 2002; Pardini, 2006). However, the value added of adolescent DBD and IC symptoms is rarely assessed after controlling for earlier manifestations of these same characteristics, leaving questions about their incremental predictive utility unanswered. Taken as a whole, the current unresolved controversy underscores the need to empirically assess developmentally based variations in these characteristics as they relate to the differentiation between desisting and persisting delinquency.

### 3.0 STATEMENT OF PURPOSE

The current study has the potential to expand our knowledge about the course of delinquent behavior by examining individual difference characteristics as they relate to the potential differentiation between desisting and persisting forms of delinquency. Further clarification of the relation between DBD symptoms and features of IC in youth and divergent paths of delinquent behavior into early adulthood may be important for the identification of youth most at risk for persistent delinquency and thus most in need of intensive intervention. At present a number of studies indicate consistent and robust associations between DBD symptoms, features of IC, and delinquent behavior overall. However, less research has been conducted to clarify their *unique* ability to distinguish between desistant and persistent delinquent behavior. Moreover, the majority of research has focused on the degree to which these characteristics predict delinquency throughout childhood and adolescence, with much less focus on continued delinquency into early adulthood. Lastly, the literature has yet to clarify possible differences in the predictive utility of DBD and IC symptoms in childhood versus adolescence.

To address these limitations, the current study used longitudinal data to examine associations between early DBD symptoms and features of IC and desisting and persisting forms of delinquency into adulthood. Methodological strengths of the study included the use of multiple methods (i.e., questionnaires, official criminal records) and informants (i.e., parents, youth, teachers), regular assessments spanning from early childhood to early adulthood, and the use of an ethnically diverse sample of youth at risk for serious delinquency.

## 4.0 HYPOTHESES

### *1. DBD and IC: Univariate Associations with Desisters/Persisters.*

*Hypothesis 1a: Childhood Predictors.* It was hypothesized that ADHD, ODD, CD, and IC symptoms in childhood and adolescence will be higher in both desisters and persisters relative to non-delinquents. However, only ODD, CD, and IC symptoms in childhood and adolescence were predicted to significantly differentiate persisters from desisters.

*Hypothesis 1b: Adolescent Predictors.* The pattern of associations between adolescent ADHD, ODD, CD, and IC symptoms and patterns of delinquency (i.e., non-delinquents, desisters, persisters) will be identical to those observed for these features in childhood.

### *2. DBD and IC: Unique Associations with Desisters/Persisters.*

*Hypothesis 2a: Childhood Predictors.* It was predicted that increased childhood CD and IC symptoms would distinguish desisters and persisters from non-delinquents as well as persisters from desisters even after controlling for their co-occurrence. However, ADHD and ODD symptoms were not expected to distinguish between delinquency groups after accounting for the co-occurrence of CD and IC.

*Hypothesis 2b: Adolescent Predictors.* It was hypothesized that increased CD symptoms and features of IC in adolescence would characterize both desisters and persisters relative to non-delinquents. However, only IC symptoms were hypothesized to differentiate persisters from desisters, with CD symptoms showing no significant relation after accounting for the overlap between other DBD symptoms and IC.

*3. DBD and IC in adolescence: Unique Associations with Desisters/Persisters Controlling for Childhood Symptoms.*

*Hypothesis 3:* It was predicted that CD and IC symptoms in adolescence would significantly distinguish desisters and persisters from non-delinquents even after controlling for childhood manifestations of these symptoms. In addition, it was predicted that IC symptoms in adolescence would differentiate persisters from desisters after controlling for childhood DBD symptoms.

## 5.0 METHOD

### 5.1 PARTICIPANTS

All participants were part of the Pittsburgh Youth Study (PYS), an ongoing longitudinal study of boys recruited from Pittsburgh public schools (Loeber, Farrington, Stouthamer-Loeber, & Kaemmen, 1998). Beginning in 1987, three cohorts of first, fourth, and fifth graders in Pittsburgh public schools were randomly selected for an initial screening. From this initial pool of students, families of 1,165 first graders (i.e., youngest cohort), 1,146 fourth graders (i.e., middle cohort), and 1,125 seventh graders (i.e., oldest cohort) participated in a screening assessment that included mother, teacher, and self-report of the boys' externalizing behavior problems. Utilizing this screening assessment, those rated in the top 30% on behavior problems ( $n \sim 250$ ) from each cohort were selected for further study. In addition, a roughly equal number of boys were randomly selected from the remaining boys in each cohort for follow-up assessments ( $N = 503$  for the youngest,  $N = 508$  for the middle,  $N = 506$  for the oldest).

The current study focuses on the youngest cohort of 1st grade boys ( $M$  age = 7.43,  $SD = .56$ , range = 5 to 9) who were selected for longitudinal follow-up. This cohort was used because they have consistent annual assessments and are currently being followed up in adulthood. Fifty-seven percent of the boys in the youngest cohort were African American and 43% were Caucasian. At the time of the first assessment, nearly all of the boys lived with their biological mother (94%), though only 39% of the boys had a biological father living in the home.



Seventeen percent of the mothers had not completed high school, with 6% of the mothers having earned a college degree. Similarly, 15% of the fathers had not completed high school, with 12% of the fathers having earned a college degree. Just over half of the families reported receiving governmental financial assistance (51%) at the first follow-up assessment. Further demographic information regarding the Pittsburgh Youth Study cohorts can be found in Loeber et al. (1998).

## 5.2 PROCEDURE

Following the initial screening assessment, the youngest cohort was assessed bi-annually for the first four years and annually for all successive years. As depicted in Table 1, predictor variables and control variables for the current study were obtained during the first (middle childhood) and seventh (early adolescence) annual follow-up assessments. These assessments took place in the spring, when the boys were approximately 7 ( $M$  age = 7.43,  $SD$  = .56, range = 5 to 9) and 15 ( $M$  age = 15.04,  $SD$  = .57, range = 12 to 16) years of age and were chosen because it was the only time a structured diagnostic interview was administered. Measures of delinquency were obtained annually from early adolescence ( $M$  age = 13.99,  $SD$  = .57, range = 12 to 16) through early adulthood ( $M$  age = 25.76,  $SD$  = .96, range = 22 to 28) and were combined to define desisting and persisting forms of delinquency. Procedures during all phases of this study were reviewed and approved by the Institution Review Board at the University of Pittsburgh. At each assessment phase, parents provided written consent and youth were given the opportunity to assent or decline participation prior to the assessment. Once participants were of legal age, they provided informed written consent prior to the assessment.

Table 1. Measurement Timeline for Study Predictors and Delinquency Outcomes

	Middle Childhood	Early Adolescence				Late Adolescence			Early Adulthood
	Wave A	Wave N	Wave P	Wave R	Wave T	Wave V	Wave Y	Wave AA	Follow-Up
Predictors									
Mean Age	7.43 (0.56)		15.04 (0.57)						
Retention Rate (Parent)	92.60%		89.70%						
Delinquency Outcome									
Mean Age		13.99 (0.57)	15.04 (0.57)	15.99 (0.58)	16.97 (0.57)	17.92 (0.57)	18.99 (0.58)	20.05 (0.62)	25.76 (0.96)
Retention Rate (Child)		92.60%	90.10%	88.70%	86.70%	86.30%	83.30%	82.30%	84.90%

## 5.3 MEASURES

### 5.3.1 Control Variables

**5.3.1.1 Demographics.** The demographic characteristics of age, race (Caucasian = 0 vs. African American = 1), and family SES measured at the first follow-up assessment in middle childhood were used as covariates in this study. At the time of the first assessment, parents completed a demographic questionnaire in which information regarding age and race was obtained. In addition, information was used to calculate the two-factor Hollingshead Index of SES for each boy's family (Hollingshead, 1975). If a boy had a male and female parent/ caretaker present, the scores were averaged, if a boy only had one parent or caretaker, that score was used.

### 5.3.2 Primary Predictor Variables

Information on childhood and adolescent predictors of the desistance and persistence of moderate/severe delinquency into early adulthood was assessed using a combination of parent, child, and teacher report. Parent report was collected from the child's primary caregiver and in the majority of cases this was the biological mother (94%). DBD symptoms in childhood and adolescence were assessed using only parent report with one exception; CD symptoms in adolescence were obtained using parent and child report. IC symptoms were examined based on parent and teacher report in both childhood and adolescence. The combination of multiple informants was done for several reasons. First, it permits the incorporation of information about the child's behavior and interactional style across multiple settings while avoiding potential under-reporting by a specific informant (Frick, et al., 2003; Frick, et al., 2005; Piacentini, Cohen, & Cohen, 1992). Second, studies assessing CD and IC symptoms have combined information

across parents and children as well as parents and teachers (Frick, et al., 2003; Pardini, 2006). As such, implementation of this approach allows for a more comprehensive comparison to prior research. Therefore, in line with findings from the literature and methods employed in previous studies, the current study examined predictor variables using the optimal number of informants, data permitting. Parent ratings were combined with child- or teacher-report using the higher score for each item from either reporter (Frick, et al., 2003; Pardini, 2006).

**5.3.2.1 CD, ODD, and ADHD symptoms.** Parent-reported CD, ODD, and ADHD symptoms were assessed using the Revised Diagnostic Interview Schedule for Children, Parent Version (DISC-P; Costello, 1987) during middle childhood and early adolescence. In adolescence, child-reported CD symptoms were evaluated using the Diagnostic Interview Schedule for Children (DISC-C; Costello, Edelbrock, Dulcan, Kalas, & Klaric, 1987). These assessments are parallel structured interviews created to assess a variety of domains within the realm of child psychopathology and is based on the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III-R; American Psychiatric Association, 1987). Attempts were made to modify the scoring of the DISC-P and the DISC-C to accommodate changes in diagnostic criteria made from DSM-III-R to DSM-IV criteria (American Psychiatric Association, 2000). Specifically, the ODD symptom of “often swears or uses obscene language” was eliminated and two additional symptoms of parent-reported CD were added using supplemental questions assessing curfew violations and threatening others. Only one item was added to child-reported CD (i.e., threatening others) because youth were not questioned about curfew violations. Because substantial revisions were made to the criteria for ADHD between DSM-III-R and DSM-IV, mainly due to the additional inattention symptoms, we were unable to approximate DSM-IV

symptoms of ADHD. As a result, only the 14 symptoms associated with a DSM-III-R diagnosis of ADHD were used.

During the interview, parents reported on the presence of 15 CD symptoms (e.g., starting physical fights, running away from home, destruction of property), 9 ODD symptoms (e.g., argues, loss of temper), and 14 ADHD symptoms (e.g., easily distracted, talks excessively, interrupts). As mentioned above, children were not questioned about curfew violations and thus reported on only 14 CD symptoms. As such, parent-report of curfew violations was used when calculating parent/child combined scores. Each symptom was coded as 1 if present within the past year and 0 if not present and the total number of CD, ODD, and ADHD symptoms were summed to create total respective symptom scores. Each of these symptom scales have been shown to evidence good test-retest reliability (Schwab-Stone, et al., 1993) and moderate agreement with clinician rated symptoms (Piacentini, et al., 1993). The reliability alphas for both childhood and adolescent assessments of CD ( $\alpha=.55$  and  $\alpha=.68$ , respectively), ODD ( $\alpha=.71$  and  $\alpha=.85$ , respectively), and ADHD ( $\alpha=.85$  and  $\alpha=.88$ , respectively) were generally acceptable.

**5.3.2.2 Interpersonal Callousness.** Interpersonal callousness was measured using eight items taken from an extended version of the Child Behavior Checklist (CBC-L; Achenbach, 1991) and the Teacher Report Form (Achenbach & Edelbrock, 1986). This scale was previously validated through the use of confirmatory factor analysis within the PYS screening sample and the follow-up sample across all three cohorts in several previous studies (Obradović, Pardini, Long, & Loeber, 2007; Pardini & Loeber, 2008; Pardini, et al., 2006). Initial selection of these items was based upon developmental appropriateness and relatedness to the previously validated measures of interpersonal and affective characteristics of psychopathy in youth (Frick, et al., 2000; Loeber, et al., 2002; Lynam, 1997). The eight items on this scale assess an interpersonal style that is

characterized by deceitfulness (i.e., “you can’t trust what he says”, “does not keep promises”, and “acts sneakily”), a lack of remorse or guilt (i.e., “doesn’t seem to feel guilty after misbehaving”), manipulation (i.e., “manipulates people”), superficial charm (i.e., “when confronted about his behavior is a fast or smooth talker”), grandiosity (i.e., “exaggerates”), and an inability to accept responsibility after misbehaving (i.e., “denies having done wrong even when you are certain that he has”). All items were rated on a 3 point scale from 0 (*not true*) to 1 (*sometimes true*) to 2 (*very true*). The reliability alpha for this construct during both childhood and adolescent assessments was good ( $\alpha=.86$  and  $\alpha=.91$ , respectively).

### **5.3.3 Outcome Measures**

The outcome measures of delinquency used in the current study were obtained from early adolescence through early adulthood. Historically, some studies have focused primarily on official records of delinquency (Sampson & Laub, 2003) while others have concentrated on self-report measures (Loeber, et al., 2002). However, it has been suggested that official records may underestimate the prevalence of overall offending while self-report measures may underestimate serious offenses such as murder and rape. In attempt to gain a more comprehensive picture of participant involvement in delinquent behavior, both official record of conviction and self-reported forms of delinquency were employed as described in Loeber et al. (2008).

Furthermore, the current study will focus specifically on moderate/severe forms of delinquency, a method used previously by Loeber and colleagues (2008). Classifications of self-reported moderate/severe delinquency are as follows: moderate forms of delinquency include moderate theft (i.e., stealing a bicycle or skateboard on the street, stealing things worth more than \$5, joyriding in a stolen vehicle, purse snatching, dealing in stolen goods, or stealing from a

car) and moderate violence (i.e., gang fighting) while severe forms of delinquent behavior include serious theft (i.e., breaking and entering or auto theft) and serious violence (i.e., forcible robbery, attacking with the intent to injure, sexual coercion, or rape). Official records of convictions were classified almost identically, though a few minor adjustments were made due to the fact that categories of crime did not match exactly. Moderate delinquent behaviors include moderate theft (i.e., larceny or dealing in stolen property) and moderate violence (i.e., simple assault) while serious delinquent behavior includes serious theft (i.e., burglary or motor vehicle theft) and serious violence (i.e., robbery, homicide, rape, aggravated assault, involuntary deviate sexual intercourse, or spousal sexual assault)

**5.3.3.1 The Self-Reported Delinquency Scale.** The Self-Reported Delinquency Scale (SRD; Elliott, et al., 1985) is a 40 item scale based on the National Youth Survey. From early adolescence to late adolescence participants were administered this assessment annually. For each of the moderate/severe delinquent acts described above, participants were asked whether or not they had committed it within the past year. The SRD was also given to all participants in early adulthood, at which time they were asked whether or not they had committed the same delinquent acts within the past 5 years. At each assessment, each item was coded 1 if yes, 0 if no.

**5.3.3.2 Court Records.** Official records of criminal convictions were available for all participants from early adolescence through early adulthood. Four court sources of conviction (having been charged for a crime) were used from early adolescence through early adulthood. These include the Allegheny County Juvenile Court Records, Pennsylvania Juvenile Court Judges' Commission, Pennsylvania Police Repository, and the Federal Bureau of Investigation. Classification of each of the aforementioned moderate/severe delinquent acts was coded 1 if the

participant was convicted during a particular assessment phase and 0 if not.

#### **5.3.4 Classification of Desistant/Persistent Delinquency.**

In order to evaluate desisting and persisting forms of moderate/severe delinquency, the time between early adolescence and early adulthood was divided into three developmental blocks: early adolescence (aggregate of 4 years, average ages 13-16), late adolescence (aggregate of 3 years, average ages 17-19), and early adulthood (aggregate of 6 years, average ages 20-25). As shown in Table 2, participants were classified into one of three groups using information on the prevalence of moderate/severe delinquency during these time blocks. Delinquency during each time block was coded as 1 if the participant reported, or was convicted of, a moderate/ severe delinquent act (1 or more) and 0 if no acts of moderate/severe delinquency were present.

Participants were placed into one of three mutually exclusive groups based on their pattern of delinquent behavior across the developmental blocks. *Non-Delinquents* were participants who did not engage in moderate/ severe delinquency in any of the three developmental time blocks. *Desisters* were participants who a) committed at least one act of moderate/severe delinquency in either early or late adolescence and b) subsequently ceased to commit moderate/severe delinquency. Thus, desistance is defined as moderate/severe delinquency during early adolescence and/or late adolescence followed by a cessation of delinquent behavior during early adulthood. *Persisters* included those participants that a) committed at least one moderate/severe delinquent act in early and/or late adolescence and b) continued to commit at least one moderate/severe delinquent act in early adulthood. Thus, persistence is defined as moderate or severe delinquency in early adolescence and/or late adolescence followed by continued moderate/severe delinquency in early adulthood.



Table 2. Delinquency Classifications

Delinquency Classification	Early Adolescence (ages 13-16)	Late Adolescence (ages 17-19)	Early Adulthood (ages 20-25)
Non-Delinquents	Non-Delinquent	Non-Delinquent	Non-Delinquent
Desisters	Delinquent Delinquent Non-Delinquent	Delinquent Non-Delinquent Delinquent	Non-Delinquent Non-Delinquent Non-Delinquent
Persisters	Delinquent Delinquent Non-Delinquent	Delinquent Non-Delinquent Delinquent	Delinquent Delinquent Delinquent

### 5.3.5 Missing Data

As shown in Table 1, participant retention was high for each of the assessments included in this study and ranged from 84.9% to 92.6%, with majority of participants completing all assessments (424 out of 503, 84.29%). Boys with complete data were compared to participants with missing data at any of the three assessments in terms of age, race, and family SES as well as all primary childhood and adolescent predictors using chi-square analyses and independent sample t-tests. Missingness was unrelated to all variables including delinquency group classification with one exception; boys with missing data were significantly more likely to be African American ( $\chi^2=5.07, p < .05$ ) than those with complete data.

A total of 49 participants were excluded from analyses because they were classified as adult onset delinquents (n=22) or identified as deceased prior to the completion of the early adulthood assessment (n=10). Additionally, participants who were classified as desisters and incarcerated for more than half of the early adulthood phase (i.e., 3 years or more) and/or were not assessed in early adulthood (n=17) were excluded from analyses because it was unclear

whether their delinquency classification reflected a lack of opportunity to offend and/or lack of information regarding self-reported delinquency. Excluded participants were compared to all other participants included in the primary analyses in terms of age, race, and family SES as well as primary childhood and adolescent predictors. Adult onset delinquents were equivalent to all other participants on all control and predictor variables. Individuals identified as deceased demonstrated higher CD ( $t = 2.38, p < .05$ ) and IC ( $t = 2.00, p < .05$ ) symptoms in childhood as well as elevated IC symptoms in adolescence ( $t = 2.21, p < .05$ ). Those individuals that were excluded due to prolonged incarceration and/or lack of self-report data did not differ from other participants on any control or primary predictor variables other than age and race; they were significantly more likely to be older ( $t = 3.41, p < .01$ ) and African American ( $\chi^2 = 4.40, p < .05$ ). All of the following analyses were conducted after the exclusion of these participants.

### **5.3.6 Data Analysis**

The primary goal of the proposed study was to examine associations between childhood and adolescent DBD symptoms and features of IC and desistant and persistent delinquent behavior into early adulthood. Prior to main analyses, the proportion of individuals that fell into each delinquency group (i.e., non-delinquent, desistant, and persistent) was examined using the developmental blocks shown in Table 1. In addition, a series of preliminary Pearson correlations were conducted between all predictor and control variables and the proportion of individuals meeting diagnostic criteria for ADHD, ODD, and CD was evaluated. Main analyses were conducted by first separately entering the total number of ADHD, ODD, CD, and IC symptoms in childhood and adolescence as independent variables into univariate multinomial logistic regressions with delinquency group (i.e., non-delinquent, desistant, persistent) as the dependent

variable. Next, two multivariate multinomial logistic regressions were used to examine the unique contribution of DBD and IC symptoms childhood and adolescence after controlling for their co-occurrence. Lastly, a final multivariate multinomial logistic regression was used to assess the incremental predictive utility of adolescent DBD and IC symptoms after accounting for childhood levels of these characteristics. For each of the multivariate regressions, control variables (i.e., age, race, family SES) were also included. All significant associations within multinomial regressions were probed using post-hoc comparisons to compare the three delinquency groups (i.e., non-delinquents, desisters, and persisters) on the predictor variables.

## 6.0 RESULTS

### 6.1 DESCRIPTIVE STATISTICS

Descriptive statistics for all control, predictor and outcome variables as well as bivariate correlations for control and predictor variables are presented in Table 3. Approximately 44% of participants were classified as non-delinquents, with 34% characterized as desisters and 22% categorized as persisters. All primary predictor variables in childhood and adolescence demonstrated positive significant correlations ranging between .19 and .70. Not surprisingly, concurrently assessed DBD and IC symptoms demonstrated moderate to high positive associations (e.g.,  $r = .39$ -.70). In contrast, cross time correlations between like variables were low to moderate, with ADHD symptoms demonstrating the strongest homotypic continuity ( $r = .45$ ), followed by ODD ( $r = .34$ ), CD ( $r = .28$ ), and IC ( $r = .27$ ).

While the current study focused on symptom counts as a measure of severity, the percentage of participants meeting DSM-IV diagnostic criteria for ADHD, ODD, and CD was also examined to provide an index of the level of psychiatric disorder(s) in the sample. Prevalence estimates represent diagnoses within the past year based on symptom count thresholds. In childhood, 25% of children had ADHD, 14.8% had ODD (11.7% had ODD without CD), and 4.9% had CD. Among children with a CD diagnosis in childhood, 63.6% also met criteria ODD, and 77.7% met criteria for ADHD. Almost two-thirds (71.6%) of those children with ODD also had ADHD. In adolescence, 14.9% of children had ADHD, 17.5% had

ODD (7.5% had ODD without CD), and 21.2% had CD. Of adolescents meeting diagnostic criteria for CD, 46.5% also qualified for a diagnosis of ODD, and 31.4% met diagnostic criteria for ADHD. Just over half (53%) of adolescents with ODD also had ADHD.

Table 3. Descriptive Statistics and Correlations for Covariates and Primary Predictor Variables

	1	2	3	4	5	6	7	8	9	10	11
(n=386)											
1. Age											
2. SES	-.11*										
3. Race (African-American)	.14**	-.24**									
<u>Childhood Predictors</u>											
4. ADHD	.03	-.13**	.05								
5. ODD	.04	-.09	-.12*	.64**							
6. CD	.07	-.16**	.04	.49**	.51**						
7. IC (Parent/Teacher)	.0872	-.09*	.10*	.40**	.39**	.43**					
<u>Adolescent Predictors</u>											
8. ADHD	.08	-.18**	.12*	.45**	.32**	.28**	.29**				
9. ODD	.05	-.17**	.04	.36**	.34**	.28**	.28**	.70**			
10. CD (Parent/Child)	.03	-.19**	.08	.25**	.19**	.28**	.26**	.48**	.58**		
11. IC (Parent/Teacher)	-.02	-.17**	.18**	.28**	.20**	.25**	.27**	.55**	.55**	.45**	
<u>All Participants (n=454)</u>											
Mean	7.41	35.37	0.56	4.24	1.54	0.52	4.26	3.39	1.58	1.34	4.70
S.D.	0.55	13.14	0.50	3.53	1.76	1.00	3.51	3.61	2.17	1.75	4.44
<u>Non-Delinquents (n=200)</u>											
Mean	7.34	38.12	0.48	3.92	1.38	0.31	3.69	2.77	1.02	0.52	3.38
S.D.	0.54	12.91	0.50	3.38	1.67	0.68	3.29	3.33	1.80	0.91	3.90
<u>Desisters (n=156)</u>											
Mean	7.48	33.88	0.55	4.46	1.56	0.53	4.28	3.53	1.71	1.53	4.91
S.D.	0.57	12.77	0.50	3.72	1.78	1.02	3.38	3.57	2.18	1.68	4.49
<u>Persisters (n=98)</u>											
Mean	7.44	32.18	0.71	4.53	1.87	0.91	5.39	4.38	2.44	2.57	6.83
S.D.	0.55	13.22	0.45	3.50	1.87	1.34	3.87	3.99	2.49	2.20	4.49

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

## 6.2 PRIMARY ANALYSES

Potential problems with multicollinearity between the primary predictor and control variables were assessed using variance inflation factor (VIF) and tolerance statistics. VIF indicates the amount that the variance of an estimated regression coefficient is increased due to multicollinearity while tolerance represents the proportion of variability in an independent variable that is unrelated to the other independent variables. Commonly accepted guidelines suggest that VIF values at or above 10 and tolerance values below .10 are indicative of potential problems with multicollinearity (Cohen, Cohen, West, & Aiken, 2003). Neither VIF nor tolerance statistics in this study indicated problematic levels of multicollinearity. Specifically, all VIFs were less than 2.5 and all tolerance values were greater than .40.

### 6.2.1 DBD and IC: Univariate Associations with Desisters/Persisters

**6.2.1.1 Hypothesis 1a: Childhood Predictors.** To test the hypothesis that DBD and IC symptoms in childhood would be significantly related to delinquency group membership, a series of univariate multinomial logistic regressions were conducted (see Table 4). Consistent with study hypotheses, increased CD ( $\chi^2=22.76, p<.001$ ) and IC ( $\chi^2=15.17, p < .001$ ) symptoms significantly discriminated between delinquency groups. As show in Table 4, post-hoc tests revealed that CD symptoms were higher in both desisters (OR=1.39, 95% CI= 1.07-1.81,  $p < .05$ ) and persisters (OR=1.83, 95% CI= 1.40-2.40,  $p < .001$ ) relative to non-delinquents. Moreover, childhood CD symptoms (OR=1.32, 95% CI= 1.06-1.64,  $p < .05$ ) were higher in persisters relative to desisters. Features of IC were significantly greater in persisters compared to non-delinquents (OR=1.15, 95% CI= 1.07-1.23,  $p < .001$ ) and desisters (OR=1.09, 95% CI= 1.01-1.17,  $p < .05$ ). Contrary to prediction, childhood ODD and ADHD symptoms were

unrelated to delinquency groups.

**6.2.1.2 Hypothesis 1b: Adolescent Predictors.** Similar univariate multinomial logistic regressions were used to examine the hypothesis that adolescent DBD and IC symptoms would distinguish between delinquency groups. In line with hypotheses, all DBD and IC symptoms significantly predicted delinquency classification (see Table 4). Post-hoc analyses demonstrated that CD symptoms in adolescence were higher in both desisters (OR=1.91, 95% CI= 1.55-2.36,  $p < .001$ ) and persisters (OR=2.54, 95% CI= 2.03-3.19,  $p < .001$ ) relative to non-delinquents. In addition, higher CD symptoms differentiated persisters from desisters (OR=1.33, 95% CI= 1.15-1.54,  $p < .001$ ). ODD demonstrated similar predictive utility, with evidence of higher symptom counts in both desisters (OR=1.20, 95% CI= 1.07-1.36,  $p < .001$ ) and persisters (OR=1.36, 95% CI= 1.20-1.55,  $p < .001$ ) compared to non-delinquents as well as increased symptoms in persisters relative to desisters (OR=1.13, 95% CI= 1.02-1.27,  $p < .05$ ). Also in line with hypotheses, increased IC symptoms differentiated both desisters (OR=1.10, 95% CI= 1.04-1.16,  $p < .001$ ) and persisters (OR=1.20, 95% CI= 1.13-1.27,  $p < .001$ ) from non-delinquents. Moreover, IC symptoms were significantly higher in persisters relative to desisters (OR=1.09, 95% CI= 1.03-1.15,  $p < .001$ ). Lastly, ADHD symptoms were higher in persisters when compared to non-delinquents (OR=1.13, 95% CI= 1.05-1.21,  $p < .001$ ).



Table 4. Univariate multinomial logistic regressions using childhood and adolescent characteristics to predict delinquency group membership in early adulthood

	Non-delinquent vs. desister			Non-delinquent vs. persister			Desister vs. persister			Model Fit	
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	$\chi^2$	<i>p</i>
<u>Childhood Predictors</u>											
ADHD	1.04	0.98-1.11	0.16	1.05	0.98-1.13	0.16	1.01	0.94-1.08	0.88	2.83	0.24
ODD	1.07	0.94-1.21	0.32	1.17	1.02-1.33	0.03	1.10	0.96-1.26	0.19	4.96	0.08
CD	1.39	1.07-1.81	<b>0.02</b>	1.83	1.40-2.40	<b>0.00</b>	1.32	1.06-1.64	<b>0.02</b>	22.76	<b>0.00</b>
IC (parent/teacher)	1.05	0.99-1.12	0.10	1.15	1.07-1.23	<b>0.00</b>	1.09	1.01-1.17	<b>0.02</b>	15.17	<b>0.00</b>
<u>Adolescent Predictors</u>											
ADHD	1.07	1.00-1.14	0.06	1.13	1.05-1.21	<b>0.00</b>	1.06	0.99-1.14	0.10	11.61	<b>0.00</b>
ODD	1.20	1.07-1.36	<b>0.00</b>	1.36	1.20-1.55	<b>0.00</b>	1.13	1.02-1.27	<b>0.03</b>	26.59	<b>0.00</b>
CD (parent/child)	1.91	1.55-2.36	<b>0.00</b>	2.54	2.03-3.19	<b>0.00</b>	1.33	1.15-1.54	<b>0.00</b>	100.82	<b>0.00</b>
IC (parent/teacher)	1.10	1.04-1.16	<b>0.00</b>	1.20	1.13-1.27	<b>0.00</b>	1.09	1.03-1.15	<b>0.00</b>	37.06	<b>0.00</b>

\*Significant findings are presented in bold, *p* < .05

## 6.2.2 DBD and IC: Unique Associations with Desisters/Persisters

**6.2.2.1 Hypothesis 2a: Childhood Predictors.** To examine the hypothesis that childhood CD and IC symptoms would differentiate between delinquency groups even after controlling for the co-occurrence of DBD and IC symptoms, a multivariate multinomial logistic regression was conducted. The overall model was significant ( $\chi^2=55.50, p<.001$ ; see Table 5). Post-hoc analyses revealed that, somewhat in line with hypotheses, increased CD symptoms distinguished between delinquency groups, such that CD symptoms were significantly higher in persisters compared to non-delinquents (OR=1.71, 95% CI= 1.21-2.41,  $p < .001$ ). However, childhood IC symptoms failed to differentiate delinquents from non-delinquents after controlling for co-occurring DBD symptoms. Also contrary to prediction, neither CD nor IC symptoms differentiated between desisters and persisters after accounting for concurrent symptoms, though CD demonstrated a trend towards significance (OR=1.33, 95% CI= 0.98-1.79,  $p =.07$ ). Finally, ADHD demonstrated a trend toward significance in the opposite direction. After controlling for co-occurring DBD and IC symptoms, ADHD symptoms were *lower* in persisters compared to both non-delinquents (OR=0.90, 95% CI= 0.81-1.00,  $p =.05$ ) and desisters (OR=0.90, 95% CI= 0.81-0.99,  $p =.05$ ).

Table 5. Multivariate multinomial logistic regression using childhood characteristics to predict delinquency group membership in early adulthood

(n=449)	Non-delinquent vs. desister			Non-delinquent vs. persister			Desister vs. persister			Model Fit	
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	$\chi^2$	<i>p</i>
Age	1.42	0.95-2.11	0.09	1.07	0.66-1.72	0.79	0.75	0.47-1.21	0.24		
Race (African-American)	1.08	0.69-1.71	0.73	2.38	1.34-4.23	<b>0.00</b>	2.20	1.22-3.95	<b>0.01</b>		
SES	0.98	0.96-1.00	<b>0.02</b>	0.98	0.96-1.00	<b>0.03</b>	1.00	0.98-1.02	0.82		
<u>Childhood Predictors</u>											
ADHD	1.01	0.92-1.09	0.91	0.90	0.81-1.00	0.05	0.90	0.81-0.99	0.05		
ODD	0.98	0.82-1.17	0.83	1.10	0.90-1.35	0.37	1.12	0.91-1.37	0.27		
CD	1.29	0.94-1.78	0.12	1.71	1.21-2.41	<b>0.00</b>	1.33	0.98-1.79	0.07		
IC (parent/teacher)	1.02	0.95-1.10	0.56	1.09	1.00-1.18	0.05	1.06	0.98-1.15	0.15	55.50	<b>0.00</b>

\*Significant findings are presented in bold,  $p < .05$

**6.2.2.2 Hypothesis 2b: Adolescent Predictors.** A similar multivariate multinomial logistic regression was conducted to test the hypothesis that CD and IC symptoms in adolescence would significantly predict the distinction between delinquency groups even after accounting for their concurrent DBD and IC symptoms. Again, the overall model was significant ( $\chi^2=129.20$ ,  $p<.001$ ; see Table 6) and, consistent with hypotheses, CD symptoms were higher in both desisters (OR=1.96, 95% CI= 1.51-2.54,  $p < .001$ ) and persisters (OR=2.62, 95% CI= 1.98-3.48,  $p < .001$ ) relative to non-delinquents. Contrary to prediction, CD symptoms were also higher in persisters compared to desisters (OR=1.34, 95% CI= 1.10-1.63,  $p < .001$ ). As predicted, features of IC showed a similar pattern of findings. Higher IC symptoms differentiated persisters from non-delinquents (OR=1.14, 95% CI= 1.05-1.24,  $p < .001$ ) and desisters (OR=1.10, 95% CI= 1.01-1.18,  $p < .05$ ). Finally, ADHD was *lower* in persisters relative to non-delinquents (OR=0.83, 95% CI= 0.73-0.95,  $p < .05$ ) after controlling for co-occurring DBD and IC symptoms.

Table 6. Multivariate multinomial logistic regression using adolescent characteristics to predict delinquency group membership in early adulthood.

(n=386)	Non-delinquent vs. desister			Non-delinquent vs. persister			Desister vs. persister			Model Fit	
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	$\chi^2$	<i>p</i>
Age	1.54	0.96-2.47	0.07	1.29	0.71-2.34	0.41	0.84	0.48-1.46	0.52		
Race (African-American)	1.12	0.67-1.88	0.66	2.55	1.23-5.03	<b>0.01</b>	2.27	1.20-4.31	<b>0.01</b>		
SES	0.99	0.97-1.01	0.27	1.00	0.97-1.02	0.75	1.01	0.98-1.03	0.56		
<u>Adolescent Predictors</u>											
ADHD	0.90	0.81-1.00	0.06	0.83	0.73-0.95	<b>0.01</b>	0.92	0.82-1.03	0.15		
ODD	1.05	0.87-1.28	0.60	1.09	0.86-1.37	0.48	1.03	0.85-1.25	0.77		
CD (parent/child)	1.96	1.51-2.54	<b>0.00</b>	2.62	1.98-3.48	<b>0.00</b>	1.34	1.10-1.63	<b>0.00</b>		
IC (parent/teacher)	1.04	0.96-1.12	0.33	1.14	1.05-1.24	<b>0.00</b>	1.10	1.01-1.18	<b>0.02</b>	129.20	<b>0.00</b>

\*Significant findings are presented in bold, *p* < .05.

### **6.2.3 DBD and IC in adolescence: Unique Associations with Desisters/Persisters**

#### **Controlling for Childhood Symptoms**

**6.2.3.1 Hypothesis 3.** To evaluate the hypothesis that CD and IC symptoms in adolescence would significantly distinguish between delinquency groups even after controlling for earlier manifestations of these same symptoms in childhood, a final multivariate multinomial logistic regression was employed. As predicted the overall model was significant ( $\chi^2=144.93$ ,  $p<.001$ ; see Table 7). Increased CD symptoms in adolescence characterized both desisters (OR=1.93, 95% CI= 1.49-2.51,  $p < .001$ ) and persisters (OR=2.59, 95% CI= 1.95-3.45,  $p < .001$ ) relative to non-delinquents. Moreover, CD symptoms were higher in persisters relative to desisters (OR=1.34, 95% CI= 1.10-1.64,  $p < .001$ ). In addition, IC symptoms were significantly higher in persisters compared to non-delinquents (OR=1.14, 95% CI= 1.04-1.24,  $p < .05$ ) and desisters (OR=1.10, 95% CI= 1.01-1.19,  $p < .05$ ) above and beyond childhood DBD and IC symptoms. Finally, *lower* ADHD symptoms were characteristic of both desisters (OR=0.89, 95% CI= 0.79-1.00,  $p < .05$ ) and persisters (OR=0.84, 95% CI= 0.73-0.97,  $p < .05$ ) relative to non-delinquents after controlling for the other covariates in the model.

Table 7. Multivariate multinomial logistic regression using childhood and adolescent characteristics to predict delinquency group membership in early adulthood

(n=386)	Non-delinquent vs. desister			Non-delinquent vs. persister			Desister vs. persister			Model Fit	
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	$\chi^2$	<i>p</i>
Age	1.53	0.95-2.47	0.08	1.24	0.67-2.30	0.49	0.81	0.46-1.43	0.47		
Race (African-American)	1.22	0.71-2.08	0.48	2.91	1.42-5.99	<b>0.00</b>	2.40	1.22-4.70	<b>0.01</b>		
SES	0.99	0.97-1.01	0.53	1.00	0.98-1.03	0.99	1.01	0.98-1.03	0.61		
<u>Childhood Predictors</u>											
ADHD	1.00	0.90-1.10	0.97	0.86	0.75-0.98	<b>0.02</b>	0.86	0.76-0.97	<b>0.01</b>		
ODD	0.98	0.80-1.19	0.80	1.07	0.83-1.39	0.59	1.10	0.87-1.40	0.43		
CD	1.56	1.04-2.35	<b>0.03</b>	1.81	1.12-2.92	0.02	1.16	0.80-1.68	0.44		
IC (parent/teacher)	0.98	0.90-1.06	0.58	1.06	0.95-1.17	0.31	1.08	0.98-1.19	0.11		
<u>Adolescent Predictors</u>											
ADHD	0.89	0.79-1.00	<b>0.04</b>	0.84	0.73-0.97	<b>0.02</b>	0.95	0.84-1.07	0.39		
ODD	1.07	0.87-1.31	0.52	1.08	0.85-1.37	0.54	1.01	0.83-1.23	0.94		
CD (parent/child)	1.93	1.49-2.51	<b>0.00</b>	2.59	1.95-3.45	<b>0.00</b>	1.34	1.10-1.64	<b>0.00</b>		
IC (parent/teacher)	1.04	0.96-1.12	0.38	1.14	1.04-1.24	<b>0.01</b>	1.10	1.01-1.19	<b>0.02</b>	144.93	<b>0.00</b>

\*Significant findings are presented in bold, *p* < .05

## 6.3 SUPPLEMENTARY ANALYSES

### 6.3.1 Parent-Report of CD and IC Symptoms

Though primary analyses sought to utilize multiple informants so as to incorporate optimal information, supplementary analyses were conducted using only parent report in order to maintain a consistent informant across measures. This was done to explore the possibility that the significant findings may be influenced by method variance due to the use of different informants for different behaviors. For example, teachers only reported on features of IC, while youth only reported on CD symptoms. Analyses were conducted identically to those described above and results are depicted in tables 8, 9, 10 and 11.

The inclusion of all parent-reported CD and IC measures did not change results dramatically. In fact, the predictive utility of parent-reported CD symptoms, within univariate and multivariate analyses, was almost identical to that of combined parent- and child-reported CD symptoms. There was one exception; parent-reported CD symptoms in childhood significantly predicted the distinction between persisters and desisters even after accounting for contemporaneous parent-reported DBD and IC symptoms. Univariate analyses found parent-reported IC symptoms in childhood to only differentiate persisters from non-delinquents while adolescent IC symptoms were significantly higher in persisters relative to both non-delinquents and desisters. In contrast, neither childhood nor adolescent IC symptoms reached significance as a predictor of delinquency groups in multivariate analyses, though trends ( $p < .10$ ) were evident in the same direction. Specifically, parent-reported IC symptoms in adolescence were higher in persisters relative to desisters after accounting for DBD symptoms. ADHD symptoms still demonstrated a positive association with delinquent groups when evaluated within a univariate framework and a negative association with delinquent groups in multivariate analyses.



Table 8. Univariate multinomial logistic regressions using only parent-reported symptoms in childhood and adolescence to predict delinquency group membership in early adulthood

	Non-delinquent vs. desister			Non-delinquent vs. persister			Desister vs. persister			Model Fit	
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	$\chi^2$	<i>p</i>
<u>Childhood Predictors</u>											
IC	1.05	0.97-1.13	0.21	1.12	1.03-1.21	<b>0.01</b>	1.06	0.98-1.16	0.15	6.74	<b>0.03</b>
<u>Adolescent Predictors</u>											
CD	1.85	1.41-2.47	<b>0.00</b>	2.44	1.84-3.24	<b>0.00</b>	1.32	1.11-1.57	<b>0.00</b>	58.22	<b>0.00</b>
IC	1.07	0.99-1.15	0.08	1.20	1.11-1.30	<b>0.00</b>	1.12	1.04-1.21	<b>0.00</b>	22.58	<b>0.00</b>

\*Significant findings are presented in bold,  $p < .05$

Table 9. Multivariate multinomial logistic regressions including only parent-reported symptoms in childhood to predict delinquency group membership in early adulthood

(n=449)	Non-delinquent vs. desister			Non-delinquent vs. persister			Desister vs. persister			Model Fit	
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	$\chi^2$	<i>p</i>
Age	1.43	0.96-2.12	0.08	1.09	0.68-1.75	0.72	0.77	0.48-1.23	0.27		
Race (African-American)	1.09	0.69-1.72	0.70	2.48	1.40-4.40	<b>0.00</b>	2.27	1.27-4.08	<b>0.01</b>		
SES	0.98	0.96-1.00	<b>0.02</b>	0.98	0.96-1.00	<b>0.03</b>	1.00	0.98-1.02	0.83		
<u>Childhood Predictors</u>											
ADHD	1.01	0.93-1.10	0.87	0.91	0.82-1.01	0.07	0.91	0.82-1.02	0.06		
ODD	0.98	0.82-1.17	0.84	1.11	0.90-1.37	0.33	1.13	0.92-1.39	0.24		
CD	1.30	0.94-1.80	0.11	1.80	1.27-2.54	<b>0.00</b>	1.38	1.02-1.88	<b>0.04</b>		
IC	1.02	.93-1.12	0.74	1.03	0.92-1.15	0.63	1.01	0.91-1.13	0.85	51.84	<b>0.00</b>

\*Significant findings are presented in bold,  $p < .05$

Table 10. Multivariate multinomial logistic regressions including only parent-reported symptoms in adolescence to predict delinquency group membership in early adulthood

(n=386)	Non-delinquent vs. desister			Non-delinquent vs. persister			Desister vs. persister			Model Fit	
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	$\chi^2$	<i>p</i>
Age	1.45	0.92-2.29	0.11	1.168	0.66-2.06	0.59	0.81	0.47-1.39	0.43		
Race (African-American)	1.29	0.78-2.12	0.32	3.429	1.18-6.59	<b>0.00</b>	2.66	1.49-5.06	<b>0.00</b>		
SES	0.99	0.97-1.01	0.27	0.993	0.97-1.02	0.57	1.00	0.98-1.03	0.72		
<u>Adolescent Predictors</u>											
ADHD	0.93	0.85-1.03	0.18	0.863	0.76-0.97	<b>0.02</b>	0.92	0.82-1.04	0.18		
ODD	1.11	0.91-1.36	0.30	1.132	0.89-1.42	0.29	1.02	0.83-1.25	0.86		
CD	1.89	1.30-2.75	<b>0.00</b>	2.584	1.79-3.86	<b>0.00</b>	1.37	1.03-1.82	<b>0.03</b>		
IC	0.98	0.88-1.09	0.74	1.076	0.96-1.21	0.23	1.10	0.99-1.22	0.09	88.97	<b>0.00</b>

\*Significant findings are presented in bold,  $p < .05$

Table 11. Multivariate multinomial logistic regressions including only parent-reported symptoms in childhood and adolescence to predict delinquency group membership in early adulthood

(n=386)	Non-delinquent vs. desister			Non-delinquent vs. persister			Desister vs. persister			Model Fit	
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	$\chi^2$	<i>p</i>
Age	1.46	0.92-2.31	0.11	1.18	0.66-2.10	0.59	0.81	0.47-1.40	0.45		
Race (African-American)	1.33	0.79-2.22	0.29	3.69	1.87-7.28	<b>0.00</b>	2.78	1.44-5.38	<b>0.00</b>		
SES	0.99	0.97-1.01	0.50	1.00	0.97-1.02	0.79	1.00	0.98-1.03	0.77		
<u>Childhood Predictors</u>											
ADHD	1.01	0.91-1.11	0.89	0.88	0.78-1.00	<b>0.04</b>	0.88	0.78-.99	<b>0.03</b>		
ODD	0.94	0.77-1.15	0.54	0.99	0.77-1.27	0.92	1.05	0.83-1.33	0.67		
CD	1.54	1.04-2.29	<b>0.03</b>	1.88	1.19-2.96	<b>0.01</b>	1.21	0.84-1.75	0.30		
IC	1.00	0.89-1.11	0.93	1.02	0.89-1.17	0.77	1.03	0.90-1.17	0.70		
<u>Adolescent Predictors</u>											
ADHD	0.92	0.83-1.02	0.12	0.88	0.77-1.00	<b>0.04</b>	0.96	0.85-1.08	0.46		
ODD	1.13	0.92-1.39	0.25	1.15	0.91-1.46	0.25	1.02	0.83-1.25	0.86		
CD	1.85	1.26-2.71	<b>0.00</b>	2.49	1.65-3.75	<b>0.00</b>	1.35	1.00-1.81	<b>0.04</b>		
IC	0.97	0.87-1.09	0.63	1.07	0.94-1.21	0.30	1.10	0.99-1.23	0.09	102.03	<b>0.00</b>

\*Significant findings are presented in bold, *p* < .05

## 7.0 DISCUSSION

The primary goal of the current study was to examine childhood and adolescent DBD and IC symptoms as predictors of desisting and persisting forms of delinquency, both independently and after controlling for their co-occurrence. Consistent with hypotheses, univariate analyses found that childhood CD and IC symptoms differentiated delinquents (i.e., desisters and/or persisters) from non-delinquents as well as persisters from desisters. Univariate analyses also demonstrated that adolescent ADHD, ODD, CD, and IC symptoms were higher in delinquents (i.e., desisters and/or persisters) relative to non-delinquents, and adolescent ODD, CD, and IC symptoms were significantly greater in persisters compared to desisters. Contrary to prediction, only childhood CD symptoms uniquely predicted the distinction between persisters and non-delinquents after accounting for co-occurring DBD and IC symptoms in childhood. As hypothesized, multivariate analyses found adolescent CD and IC symptoms were significantly higher in both delinquent groups relative to non-delinquents while somewhat discordant with prediction both CD and IC symptoms uniquely discriminated persisters from desisters. Furthermore, after controlling for DBD and IC symptoms in childhood, adolescent CD and IC symptoms remained significantly predictive of the distinctions between delinquents (i.e., desisters and/or persisters) and non-delinquents as well as persisters and desisters. Lastly, though ADHD demonstrated significant univariate relations in the hypothesized direction, associations after controlling for DBD and IC symptoms were in the opposite direction, such that *decreased* ADHD symptoms were characteristic of delinquent groups.

## **7.1 DBD AND IC IN CHILDHOOD: UNIVARIATE ASSOCIATIONS WITH DESISTERS/PERSISTERS**

As predicted, CD symptoms in childhood were significantly higher in desisters and persisters relative to non-delinquents; moreover, CD symptoms were higher in boys whose delinquency persisted into adulthood relative to boys who desisted from delinquency. Research has reliably documented strong associations between early CD symptoms and subsequent delinquent behavior (Fergusson, Horwood, & Ridder, 2005; Lahey, et al., 2005). In addition, these results are in line with the theoretical consensus that childhood manifestations of these characteristics demarcate a subgroup of youth most at risk for prolonged delinquency (Moffitt, 1993). Furthermore, these findings indicate that assessing the number of CD symptoms in childhood provides valuable prognostic information. Specifically, childhood CD symptoms not only predicted which youth would go on to engage in delinquent behavior in adolescence, it also delineated youth at heightened risk for delinquency that persisted into early adulthood.

Also concordant with hypotheses, manifestations of IC symptoms in childhood were associated with an increased risk for persistent delinquent behavior. Specifically, higher IC symptoms in childhood differentiated persisters from non-delinquents and desisters. However, desisters and non-delinquents were indistinguishable based on their childhood IC symptoms. Taken together, these results suggest that childhood IC symptoms characterize the most chronic and refractory delinquents and may be less closely related to more transient forms of delinquent behavior seen in adolescence (i.e., desistant delinquency). While the current study is the first to examine the relation between childhood manifestations of IC and divergent patterns of delinquency in early adulthood among a community sample, other studies found that features of IC may delineate youth at risk for a severe and stable pattern of delinquent behavior (Edens,

Campbell, & Weir, 2007; Frick & Dickens, 2006; Frick & White, 2008). For example, in a quantitative meta-analysis Edens and colleagues (2007) demonstrated robust relations (effect sizes between  $r=.24-.25$ ) between features of IC and both general and violent recidivism, and Frick and colleagues (2006, 2008) identified several longitudinal studies with follow-ups ranging from 6 months to 10 years linking features of IC to prolonged delinquency.

Contrary to hypotheses, univariate analyses found childhood ADHD and ODD symptoms to be unrelated to delinquency groups. Though research has demonstrated relations between early ADHD and ODD symptoms and later delinquent behavior (Broidy, et al., 2003; Gittelman, Mannuzza, Shenker, & Bonagura, 1985), the follow-up periods among these studies were much shorter than in the current investigation. Moreover, associations between childhood ADHD and ODD symptoms and later delinquency is thought to be indirect and best conceptualized as a developmental progression, primarily mediated through the presence of CD symptoms (Loeber, et al., 1995; Rowe, et al., 2002). It is also possible that the current study reflects an inadequate assessment of these symptoms due to the use of parent-report alone. For example, ADHD requires impairment across multiple settings (e.g., home, school). As such, failure to incorporate additional informants (i.e., teacher) may have resulted in a less comprehensive measure of these characteristics, in turn limiting the ability to sufficiently assess their predictive utility.

## **7.2 DBD AND IC IN ADOLESCENCE: UNIVARIATE ASSOCIATIONS WITH DESISTERS/PERSISTERS**

As predicted, adolescent ADHD, ODD, CD, and IC symptoms were significantly higher in delinquents relative to non-delinquents. Specifically, ODD, CD, and IC symptoms were higher in

both delinquent groups relative to non-delinquents and ADHD symptoms differentiated persisters from non-delinquents. This provides further evidence for the manifestation of DBD and IC symptoms in adolescence as significant risk factors for the engagement in delinquent behaviors (Broidy, et al., 2003; Pardini, et al., 2006). However, it is important to note that in the current study the assessment of adolescent predictors overlapped with the initial assessment of delinquency, making it impossible to determine whether the emergence of these features preceded delinquency engagement, thus limiting conclusions regarding their predictive utility.

Also accordant with hypotheses, CD and IC symptoms in adolescence were significantly higher in persisters relative to desisters. Though some studies have suggested that adolescent manifestations of CD (Moffitt, 1993) and IC (Cauffman & Steinberg, 2000; Edens, et al., 2001) are more normative and transient in nature, and in turn less likely to distinguish persisters from desisters, results from the current study suggest otherwise. Findings from other studies have also challenged the notion that CD and IC symptoms in adolescence tend to be relatively benign. For example, CD and IC symptoms in adolescence have shown significant associations with persistent delinquent behavior (Pardini, et al., 2006), a heightened proclivity for re-offending (Gretton, Hare, & Catchpole, 2004; Salekin, Ziegler, Larrea, Anthony, & Bennett, 2003), and increased levels of characteristics associated with antisocial personality disorder in adulthood (Loeber, et al., 2002; Pardini & Loeber, 2008). Taken together, the findings indicate that elevated levels of CD and IC symptoms in adolescence may delineate a sub-group of youth whose engagement in delinquency is not merely short-lived or reflective of contextually influenced “maturity gap”. Instead, increased levels of these characteristics in adolescence appear to demarcate a sub-group of youth at potential risk for chronic delinquent behavior.

### **7.3 DBD AND IC IN CHILDHOOD: MULTIVARIATE ASSOCIATIONS WITH DESISTERS/PERSISTERS**

Results assessing the unique associations of childhood predictors failed to fully support hypotheses. Only CD symptoms emerged as a unique predictor of delinquency group membership in multivariate analyses, with higher CD symptoms only differentiating persisters and non-delinquents. While there was a trend toward significance, IC in childhood failed to uniquely predict the distinction between delinquency groups. This suggests that the association between IC and future delinquent groups may be primarily accounted for by co-occurring DBD symptoms. Though there is some evidence for the incremental predictive utility of childhood features of IC (Dadds, et al., 2005), these effects are small and often overshadowed by the robust predictive utility of CD symptoms (Pardini, et al., 2006). At the same time, empirical studies have found that children demonstrating the highest rates of self-reported delinquency and police contacts have high levels of both CD and IC symptoms (Frick, et al., 2005; Rowe, et al., 2010). This suggests that the *co-occurrence* of these characteristics may put children at heightened risk for severe and recalcitrant delinquency.

### **7.4 DBD AND IC IN ADOLESCENCE: MULTIVARIATE ASSOCIATIONS WITH DESISTERS/PERSISTERS**

As predicted, adolescent CD symptoms continued to uniquely predict the distinction between delinquent groups and non-delinquents. Moreover, contrary to hypotheses, CD symptoms were higher in persisters relative to desisters after controlling for co-occurring ODD, ADHD, and IC symptoms. This suggests that the number of CD symptoms exhibited by delinquent adolescents



helps to delineate who will continue engaging in delinquent behavior into early adulthood. This is consistent with studies indicating that dimensional approaches to assessing problem behavior (e.g., CD symptoms) have distinct advantages over categorical approaches when it comes to predicting pertinent developmental outcomes (Pardini, Frick, & Moffitt, in press). It is also in line with studies indicating that while CD symptoms overlap with delinquent behaviors these behaviors tend to provide unique prognostic information above and beyond measures of delinquency (Burke, Loeber, Mutchka, & Lahey, 2002).

In line with prediction, elevated IC symptoms in adolescence demonstrated incremental predictive utility after controlling for DBD symptoms. Specifically, adolescent features of IC were higher in persisters relative to desisters and non-delinquents. This bolsters emerging evidence indicating that IC is associated with an increased risk for recidivism in adolescent offenders (Forth, Kosson, & Hare, 2003; Frick & Dickens, 2006; Frick, et al., 2005) and may differentiate between persisting and desisting forms of delinquency (Loeber, et al., 2008; 2007). Thus, these results add to the existing literature by indicating that IC symptoms in adolescence provide unique prognostic information about variations in patterns of delinquent behavior into adulthood even after controlling for co-occurring DBD symptoms. This is particularly relevant to the debate surrounding the addition of a specific subtype of CD encompassing features of IC, namely callous-unemotional (CU) traits (Frick, O'Brien, Wootton, & McBurnett, 1994). Though the current study did not examine CU traits specifically, nor did it assess these features as a subtype of CD as proposed in the DSM-V (Frick & Moffitt, 2010) it does point to the importance of IC as a unique predictor of chronic and severe delinquency, particularly in adolescence.

Also as hypothesized, associations between ODD and delinquency group were reduced to non-significance after accounting for concurrent ADHD, CD, and IC symptoms in adolescence.

Indeed, studies have shown relations between ODD and delinquency to be attributed to overlap with CD symptoms (Broidy, et al., 2003), which has been conceptualized as a developmental progression from ODD to CD to delinquency (Loeber, Burke, Lahey, Winters, & Zera, 2000). Further, investigations assessing the unique contribution of ODD symptoms demonstrate links with internalizing disorders, such as depression or anxiety, as opposed to later delinquency (Burke, 2009; Burke, Loeber, Lahey, & Rathouz, 2005; Stringaris & Goodman, 2009).

As predicted, positive associations between ADHD symptoms and delinquency group were reduced after controlling for co-occurring DBD and IC symptoms (Broidy, et al., 2003; Fergusson & Horwood, 1995). However, contrary to hypotheses, ADHD symptoms were significantly *higher* in non-delinquents relative to persisters after accounting for covarying ODD, CD, and IC symptoms, mirroring trends seen in the analysis assessing childhood predictors. While it is possible that this result reflects a statistical artifact resulting from the high degree of covariance between DBD and IC symptoms, potential issues with multicollinearity were explored and no problems were indicated. This implies the features of ADHD that were unrelated to covariates were significantly less likely to characterize persisters. However, caution must be used due to interpretive difficulty inherent to the decomposition of the original construct (Cohen, et al., 2003; Lynam, Hoyle, & Newman, 2006). While the negative association between ADHD symptoms and persisters needs to be interpreted conservatively, one potential explanation is offered. Specifically, longitudinal studies show that boys with ADHD symptoms are at risk for social rejection and internalizing problems, even after controlling for co-occurring ODD/CD symptoms (Mash & Wolfe, 2002; Pardini & Fite, in press). This suggests that boys with ADHD symptoms without co-occurring ODD/CD symptoms may be socially isolated and timid and in turn less likely to affiliate with deviant peers and engage in risky behaviors such as delinquency.

However, these findings must be replicated and further explored before conclusions are made.

### **7.5 DBD AND IC IN ADOLESCENCE: UNIQUE ASSOCIATIONS WITH DESISTER/PERSISTER CONTROLLING FOR CHILDHOOD SYMPTOMS**

In accordance with hypotheses, boys with higher CD and IC symptoms in adolescence were significantly more likely to engage in delinquency even after accounting for these same symptoms in childhood; furthermore, adolescent CD and IC symptoms emerged as a unique predictors of the distinction between persisters and desisters. Together, the current results highlight the importance of adolescent CD and IC symptoms as independent predictors, above and beyond childhood symptoms, further opposing ideas that adolescent manifestations of these characteristics are normative and temporary. As mentioned above, several investigations have challenged the idea that CD and IC symptoms in adolescence are transient (Broidy, et al., 2003; Loeber, et al., 2007; Pardini, et al., 2006); however definitive conclusions about the utility of adolescent CD and IC symptoms are often limited by failure to account for earlier manifestations of these same characteristics. Thus, the current study builds upon previous work by providing evidence for the unique predictive utility of adolescent CD and IC symptoms exceeding childhood symptoms. One potential caveat to these findings is that childhood CD symptoms were assessed at approximately age 7 despite the traditional conceptualization of childhood onset as prior to age 10 (American Psychiatric Association, 2000). Thus, it is possible that the incremental predictive utility of adolescent CD symptoms simply reflects childhood onset that occurred between the ages of 8 and 10. As such, findings should be interpreted with caution.

## **7.6 POTENTIAL INFORMANT EFFECTS**

Supplementary analyses examined the predictive utility of parent-reported DBD and IC symptoms. While all CD findings remained significant, parent-reported IC symptoms were unrelated to the distinction between delinquency groups after controlling for DBD symptoms. One possible explanation for this may be the importance of establishing the presence of IC across multiple domains (i.e., home and school), with some researchers viewing discrepancies between parent and teacher report as indicative of important situational components of these characteristics (Frick & Hare, 2001). Along these lines, certain situations may be more likely to elicit features of IC (e.g., interaction with peers). In addition, there may be substantial motivation for parents to under-report features of IC due to their lack of social desirability. Taken together, this suggests the importance of combining ratings across multiple informants when assessing IC. In contrast, parent-reported CD symptoms were found to be a sufficient indicator of delinquency group, perhaps due to the more overt nature of the symptoms and salient social consequences.

## **7.7 LIMITATIONS**

It is important to consider the current findings in light of several limitations. First, the present study focused on predicting desisting and persisting patterns of delinquency in a community sample of at-risk boys, limiting the degree to which these results can be generalized to girls and clinical populations. As such, future research is needed to examine the extent to which DBD and IC symptoms predict differences in patterns of delinquent behavior across various samples. Second, this study focused on moderate and severe theft and violence (Laub & Sampson, 2003; Loeber, et al., 2008), rather than minor forms of delinquency (e.g., vandalism, truancy) and drug-

related crimes (e.g., drug dealing). In addition, the current study measured delinquency through age 25 which precludes the notion that desistance may occur later in life. Thus, future research may target early DBD and IC symptoms as predictors of delinquency patterns, defined by a broader range of delinquent behaviors, beyond early adulthood.

In addition, the classification of participants as desisters or persisters was predicated on their engagement in at least one delinquent act during middle and late adolescence. This resulted in a somewhat heterogeneous group of both desisters and persisters. For example, within the persister group, the majority of individuals committed at least one delinquent act in both middle and late adolescence while others engaged in delinquency in only middle adolescence or only late adolescence. While all persisters, by definition, continued to engage in moderate/severe delinquency in early adulthood, their pattern of delinquency engagement in adolescence differed. Conceptually, persisters are presumed to consistently engage in delinquency. Thus, those individuals found to be delinquent across both adolescent phases may be different than those who only engage in delinquency periodically throughout adolescence. Along these lines, desisters who engaged in delinquency in middle adolescence and refrained from delinquency thereafter have been referred to as early desisters (Loeber, et al., 2008) and may be different than those engaging in delinquency into late adolescence (e.g., late desisters). As such, it may be important to examine DBD and IC symptoms as predictors of specific sub-groups of persisters and desisters in future work.

Also noteworthy, the measurement of IC in the current study is not directly comparable to more prominent measures of this construct, such as the CU traits scale from the Antisocial Processes Screening Device (Frick, et al., 1994). Because items indexing IC were obtained post-hoc from archival data, none of the items adequately assessed characteristics such as a lack of

empathy and shallow affect. As such, a direct comparison to the broader literature is limited. However, the selection of items comprising the measure used in the current study was based upon their relatedness to previously validated measures of interpersonal and affective features of psychopathy in youth (Frick, et al., 2000; Lynam, 1997). Moreover, the IC construct has been validated using all three cohorts of the PYS (Pardini & Loeber, 2008; Pardini, et al., 2006), showing structural and metric (e.g., loadings, thresholds) invariance across childhood and adolescence (Obradović, et al., 2007). Importantly, IC predicts persistent delinquency in adolescence (Pardini, et al., 2006) as well as increased psychopathic traits (Burke, et al., 2007) and antisocial personality problems (Pardini & Loeber, 2008) in adulthood.

In addition, while the current study utilized multiple informants for measures of CD and IC, symptoms of ADHD and ODD were only assessed via parent-report. Research with ADHD in particular has shown the importance of incorporating teacher report (Mannuzza, Klein, & Moulton, 2002) and given the unexpected ADHD findings, future work may aim to more comprehensively assess these characteristics through the use of multiple informants.

Lastly, though the current study controlled for age, race, and family SES, there are a number of other factors that were not accounted for. Some such factors, including IQ (Moffitt & Caspi, 2001), onset of delinquency, and age of first arrest (Loeber, et al., 2008) may be important to examine as these characteristics have shown robust relations with chronic and severe patterns of delinquency. Furthermore, unique associations between race and family SES and delinquency groups seen in the current study warrant further attention in future research.

## 7.8 CLINICAL IMPLICATIONS AND FUTURE DIRECTIONS

The current study broadens our understanding of early DBD and IC symptoms and their associations with delinquency by extending this link to the differentiation between desisters and persisters in early adulthood. Specifically, univariate results point to increased CD and IC symptoms as consistent predictors of the distinction between delinquents and non-delinquents as well as persisters and desisters. Furthermore, current results bridge a gap in the extant literature by examining the *unique* predictive utility of these characteristics as well as elucidating developmentally based differences in childhood versus adolescent manifestations. Interestingly, only adolescent CD and IC symptoms offered unique prognostic information in the distinction between persisters and desisters and these significant associations remained after accounting for DBD and IC symptoms in childhood. Also noteworthy, CD symptoms were the most robust predictor, replicating recent empirical work showing CD related behaviors (e.g., antisocial behavior) to be more strongly associated with later delinquency than features of IC (Keenaely, Skeem, Walters, Camp, 2010). In sum, these findings have significant implications for intervention programs designed to target youth at risk for protracted engagement in moderate to severe delinquent behaviors. Namely, intervention efforts should be directed towards identifying youth demonstrating increased CD and IC symptoms in childhood and adolescence. Further, results suggest interventions may be best served by obtaining multiple informants of these characteristics, especially with regard to features of IC for which teacher-report was essential.

While future research is needed to solidify the relation between childhood and adolescent manifestations of DBD and IC symptoms and divergent patterns of delinquency, there is strong need to understand the development of CD and IC as pre-cursors to persistent delinquency. Along these lines, it may be important to look at the predictive utility of these characteristics

from a person-centered approach. Though the current study demonstrated the unique predictive utility of CD and IC, at least in adolescence, examining various sub-groups of individuals demonstrating high levels of both CD and IC symptoms could be useful in identifying unique etiological factors underlying the development and persistence of delinquency (Frick & Morris, 2004; Frick & White, 2008). Moreover, exploring the potential moderating effects of various environmental factors (e.g., parenting) may be particularly informative. In sum, furthering our knowledge about these diverse developmental pathways will lead to a more comprehensive understanding of the mechanisms underlying the associations seen in the current study and in turn will function to better inform prevention and intervention strategies for these at risk youth.



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