Introduction

Conduct disorder (CD) is defined as a repetitive and persistent pattern of behavior that violates the rights of others (e.g., aggression, vandalism, theft) or that violates major age-appropriate societal norms or rules (e.g., deceitfulness, truancy, running away from home) [1]. Depending on the exact definition of CD, between 3% and 5% of pre-adolescent boys and between 6% and 8% of adolescent boys meet criteria for the disorder, with boys outnumbering girls approximately 4:1 before adolescence to approximately 2:1 in adolescence [2]. CD is a critical mental health concern for several reasons. First, children with CD can cause significant disruption in families trying to manage the behavior of an antisocial and aggressive child [3], and in schools trying to serve children with CD while ensuring the safety of other students and teachers [4]. Second, children and adolescents with CD can victimize peers with their aggressive acts that can have serious physical and emotional consequences to their victims [5]. Third, CD is the psychiatric disorder most strongly associated with illegal and delinquent behavior through adolescence and into adulthood [6].

In addition to its harmful effects on others, CD also is related to numerous psychosocial impairments. Children and adolescents with CD show high levels of anxiety and depression [7]. They are often rejected by their peers [8] and are more likely to drop out of school early [9]. Children and adolescents with CD are more likely to use and abuse substances [10]. In addition to being more likely to be arrested as adults, children with CD also are more likely to have financial problems, poor work histories, unstable marital relationships, and various mental health problems in adulthood [9,11,12].

Given these many serious and costly effects, it is not surprising that CD is one of the most extensively studied of all forms of childhood psychopathology. This literature is more extensive if it is broadened to include not only children diagnosed with psychiatric definitions of CD, but also antisocial youths defined by the severity of their illegal, aggressive, and violent behavior. There have been several comprehensive reviews of this extensive body of research that include many risk factors for CD, aggression, and delinquency [13–16]. These risk factors include biological (e.g., neurochemical and autonomic irregularities), cognitive (e.g., deficits in executive functioning), emotional (e.g., poor emotional regulation), personality (e.g., impulsivity), familial (e.g., ineffective discipline), peer (e.g., association with deviant peers), and neighborhood (e.g., high levels of exposure to violence) risk factors.

This research has made it clear that causal models cannot focus on single risk factors (e.g., neighborhood violence) or single domains of risk factors (e.g., biological abnormalities) if they are to adequately explain the development of CD. In addition, causal models must specify the processes through which these various risk factors make a child more likely to act in an aggressive and antisocial manner. Stated in developmental terms, causal models need to consider how these risk factors disrupt the normal development of the child to place him or her on a deviant trajectory that involves the symptoms of CD. Such models require an integration of research on the normal development of processes that inhibit such behaviors in most children, with research on antisocial and aggressive youths in whom such processes have gone awry. Lastly, causal models must recognize that the same causal
processes may not be operating for all children with CD. That is, there are likely to be subgroups of youth with CD who have distinct causal mechanisms underlying their antisocial and aggressive behavior. One theoretical model that has attempted to incorporate all of these considerations involves the distinction between childhood-onset and adolescent-onset forms of CD.

Childhood-onset and Adolescent-onset Conduct Disorder

Research has consistently documented that some children with CD begin showing mild conduct problems as early as preschool or early elementary school, and that their behavioral problems tend to increase in rate and severity throughout childhood and into adolescence [17]. There is a second group of youths with CD who do not show significant behavioral problems in childhood, but begin showing significant antisocial and delinquent behavior that coincides with the onset of adolescence [18,19•]. In addition to the different patterns of onset, the childhood-onset group is more likely to show aggressive behaviors in childhood and adolescence and is more likely to continue to show antisocial and criminal behavior into adulthood [20]. More relevant to causal theory, most of the dispositional (eg, impulsivity) and contextual (eg, family dysfunction) correlates to CD are more strongly associated with the childhood-onset subtype of CD [18,19•]. In contrast, if the adolescent-onset group differs from children without CD, it seems primarily in showing more affiliation with delinquent peers and higher levels of rebelliousness and conflict with authority [21].

The different outcomes and risk factors for the two subtypes of CD have led to theoretical models that propose very different causal mechanisms operating across the two groups. For example, Moffitt [18,19•] has proposed that children in the childhood-onset group develop their problem behavior through a transactional process in which a difficult and vulnerable child (eg, impulsive, with verbal deficits) experiences an inadequate rearing environment (eg, poor parental supervision, poor quality schools). This dysfunctional transactional process disrupts the child's socialization, leading to enduring vulnerabilities that can negatively affect the child's psychosocial adjustment across multiple developmental stages. In contrast, children in the adolescent-onset group seem to show an exaggeration of the normative process of adolescent rebellion. That is, some level of rebelliousness to parents and other authority figures is normal in adolescence and is part of a process by which the adolescent begins to develop his or her autonomous sense of self and his or her unique identity. According to Moffitt [18,19•], the child in the adolescent-onset group engages in antisocial and delinquent behaviors as a misguided attempt to obtain a subjective sense of maturity and adult status in a way that is maladaptive (eg, breaking societal norms) but encouraged by an antisocial peer group.

The distinction between childhood-onset and adolescent-onset CD has been adopted by many diagnostic systems for CD [1]. However, research has begun extending this conceptualization by exploring whether additional distinctions can be made within childhood-onset CD. As noted above, the childhood-onset group seems to show the most severe, chronic, and aggressive pattern of behavior. However, there is evidence that a small percentage of youth account for a large proportion of the severity and stability within this group [20]. As also noted above, the childhood-onset group seems to show an enduring vulnerability that leads to problems in adjustment across multiple developmental stages. However, there is evidence that a further distinction can be made within this group that defines several different types of vulnerabilities. This distinction is based on the presence or absence of a callous and unemotional interpersonal style.

Callous-unemotional Traits and Subtypes of Childhood-onset Conduct Disorder

Measuring callous-unemotional traits in youth

Focusing on the person's affective and interpersonal style to designate subgroups of antisocial individuals is the hallmark of the construct of psychopathy. Decades of research with incarcerated adults has shown that there is a subgroup of prisoners who show a distinct constellation of affective, interpersonal, and behavioral traits that has been labeled as "psychopathic" [22•]. A summary of these traits is provided in Table 1. These psychopathic traits seem to designate a group of adult inmates who show a more severe and violent pattern of antisocial behavior, both within the institution and after release [23]. These individuals with psychopathic traits also show several distinct cognitive [24], emotional [25], and neurologic [26] deficits that seem to implicate different causal processes in the development of antisocial behavior for those with and without psychopathic traits.

There is growing evidence that similar affective and interpersonal traits designate important subgroups of antisocial youth. In samples of clinic-referred and nonreferred children [27] and in samples of incarcerated adolescents [28], factor analyses have identified three dimensions similar to those identified in adult samples. These dimensions have been labeled as callous-unemotional (CU), narcissistic, and impulsive traits (Table 1). Although all three dimensions emerge in youths, there is evidence to suggest that the CU dimension that is most important for distinguishing within subgroups of antisocial youth. Specifically, a cluster analysis of these psychopathic traits and conduct problems in a clinic-referred sample of children ages 6 to 13 years revealed two distinct conduct problem clusters [29]. These clusters did not differ on their level of impulsivity and narcissism, but they differed on their level of CU traits, with the group high in CU traits
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Affective</td>
<td>1. Callous-unemotional</td>
</tr>
<tr>
<td>Lacks guilt and remorse</td>
<td>Does not feel bad or guilty</td>
</tr>
<tr>
<td>Shallow affect</td>
<td>Does not show emotions</td>
</tr>
<tr>
<td>Callous use of others</td>
<td>Is unconcerned about the feelings of others</td>
</tr>
<tr>
<td>Fails to accept responsibility</td>
<td>Is unconcerned about schoolwork</td>
</tr>
<tr>
<td>2. Interpersonal</td>
<td>Does not keep promises</td>
</tr>
<tr>
<td>Pathological lying</td>
<td>Does not keep the same friends</td>
</tr>
<tr>
<td>Manipulative</td>
<td>2. Narcissism</td>
</tr>
<tr>
<td>Good at impression management</td>
<td>Can be charming in ways that seem insincere</td>
</tr>
<tr>
<td>Grandiose</td>
<td>Brags excessively</td>
</tr>
<tr>
<td>3. Lifestyle</td>
<td>Uses and cons others</td>
</tr>
<tr>
<td>Impulsive</td>
<td>Teases others</td>
</tr>
<tr>
<td>Irresponsible</td>
<td>Thinks he/she is more important than others</td>
</tr>
<tr>
<td>Stimulus seeking</td>
<td>Becomes angry when corrected</td>
</tr>
<tr>
<td>Parasitic lifestyle</td>
<td>Emotions seem shallow</td>
</tr>
<tr>
<td>Lacks goals</td>
<td>3. Impulsivity</td>
</tr>
<tr>
<td></td>
<td>Does not plan ahead</td>
</tr>
<tr>
<td></td>
<td>Blames others for mistakes</td>
</tr>
<tr>
<td></td>
<td>Engages in risky activities</td>
</tr>
<tr>
<td></td>
<td>Gets bored easily</td>
</tr>
</tbody>
</table>

*Items on the Antisocial Behavior Factor of the Pathology Checklist-Revised, 2nd Edition are not included because there is no analogous dimension on the Antisocial Process Screening Device.

showing more severe conduct problems and earlier police contact. Similarly, in a sample of adjudicated adolescents, narcissistic and impulsive traits did not differentiate among nonviolent offenders, violent offenders, and violent sex offenders, but violent sex offenders showed higher levels of CU traits [30].

Callous-unemotional traits have been reliably assessed in samples as young as 3 and 4 years [31]. However, the method used most often to assess them varies depending on the age and type of sample being studied. Specifically, in adjudicated samples of adolescents, the Psychopathy Checklist Revised – Youth Version [32] is one of the most commonly used instruments. It involves combining information from a semistructured interview with the adolescent and information from the adolescent’s institutional record to score a checklist of these traits. Given the time-intensive nature of this assessment and the need for institutional records, several self-report inventories also have been used in adjudicated samples of adolescents when a more time-efficient screening is appropriate [33] and in nonadjudicated samples of adolescents [34] in which institutional records are not available. For preadolescent samples, the most common assessment instrument has been the Antisocial Process Screening Device [35], which relies on parent and teacher ratings of these traits.

One concern that has been raised about extending the construct of psychopathy to youth has been whether these traits are stable enough before adulthood to warrant the label of a “trait” [36]. In one of the few published tests of the stability of these traits over an extended follow-up period, Frick et al. [37] examined the stability of parent ratings of CU traits over a 4-year study period in a sample of 98 children who were in grades 3, 4, 6, and 7 at the time of initial assessment. The intraclass correlation coefficients across 2 (0.76), 3 (0.86), and 4 (0.71) years were high, substantially higher than stability coefficients that have been reported for parent ratings of other forms of childhood psychopathology [38]. When patterns of stability were examined, there were few children who developed high rates of CU traits over the course of the study. However, there were several children who initially had high rates of these traits but who became less callous and unemotional during the course of the study. This decrease seemed to
be related to contextual factors, such as being in families of higher socioeconomic status and experiencing higher quality parenting. These findings suggest that, although relatively stable, these traits may be modifiable through environmental influences.

**Callous-unemotional traits and the severity and stability of antisocial behavior**

As noted previously, one of the most clinically important findings in adult samples has been the ability of measures of psychopathy to predict a more severe and more violent pattern of antisocial behavior. There is now growing evidence that the same is true for these traits in samples of youth. Of 22 independent samples in which psychopathic traits in general, or CU traits specifically, were associated with more severe conduct problems, delinquency, or aggression, 10 studies were cross-sectional (Table 2), showing contemporaneous associations between CU traits and antisocial behavior, and 12 were longitudinal studies showing predictive relations between these two constructs (Table 3). Generally, these studies have consistently found that CU traits

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**Table 2. Summary of studies showing the association of psychopathic traits with severity of antisocial and aggressive behavior [29,32-35,39,40,44,117-119,128,129]**

<table>
<thead>
<tr>
<th>Study</th>
<th>n</th>
<th>Age range, y</th>
<th>Male gender, %</th>
<th>Sample type</th>
<th>Measure</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andershed et al. [34]</td>
<td>1077</td>
<td>Man, 14-42</td>
<td>NR</td>
<td>Community</td>
<td>YPI</td>
<td>Self-reported psychopathic traits were associated with more frequent and violent antisocial behavior</td>
</tr>
<tr>
<td>Campbell et al. [117]</td>
<td>226</td>
<td>12 to 19</td>
<td>83</td>
<td>Adjudicated</td>
<td>PCL-YV</td>
<td>Psychopathic traits were associated with self-reported delinquency and aggressive behavior</td>
</tr>
<tr>
<td>Caputo et al. [30]</td>
<td>69</td>
<td>13 to 18</td>
<td>100</td>
<td>Adjudicated</td>
<td>APSD (Y)</td>
<td>CU traits were associated with violent sexual offending</td>
</tr>
<tr>
<td>Christian et al. [29]</td>
<td>120</td>
<td>6 to 13</td>
<td>80</td>
<td>Clinical</td>
<td>APSD (T and P)</td>
<td>Children with conduct problems and CU traits showed more severe and more varied conduct problems, earlier police contact, and stronger family history of antisocial behavior</td>
</tr>
<tr>
<td>Kruh et al. [33]</td>
<td>100</td>
<td>16 to 21</td>
<td>100</td>
<td>Adjudicated</td>
<td>APSD (Y)</td>
<td>Psychopathic traits were associated with more frequent and varied violent acts including more repeated, instrumental, and sadistic violence and more severe harm to the victim</td>
</tr>
<tr>
<td>Lexcen et al. [118]</td>
<td>481</td>
<td>12 to 17</td>
<td>100</td>
<td>Adjudicated</td>
<td>MACI</td>
<td>Psychopathic traits were associated with aggression, delinquency, and substance use</td>
</tr>
<tr>
<td>Marsen et al. [44]</td>
<td>200</td>
<td>10 to 17</td>
<td>43</td>
<td>Community</td>
<td>APSD (T and P)</td>
<td>Psychopathic traits were associated with overt aggression, relational aggression, and delinquency</td>
</tr>
<tr>
<td>Murne et al. [115]</td>
<td>113</td>
<td>13 to 18</td>
<td>100</td>
<td>Detained</td>
<td>PCL-YV, APSD (Y), MACI (PCS)</td>
<td>Psychopathic traits were significantly associated with a history of violent offending, especially instrumental violence, and with violence in the institution</td>
</tr>
<tr>
<td>Salekin et al. [39]</td>
<td>130</td>
<td>9 to 18</td>
<td>71</td>
<td>Detained</td>
<td>PCL-YV, SRP-II, APSD (Y)</td>
<td>Psychopathic traits were associated with number of prior violent and nonviolent offenses, and early age of first antisocial behavior</td>
</tr>
<tr>
<td>Silverthorn et al. [40]</td>
<td>72</td>
<td>13 to 18</td>
<td>44</td>
<td>Adjudicated</td>
<td>APSD (Y)</td>
<td>CU traits were associated with early onset of offending in boys</td>
</tr>
</tbody>
</table>

**Notes:**
- APSD—Antisocial Process Screening Device Parent (P) or Teacher (T) Version or Youth Self-report (Y); CU—callous-unemotional; MACI—Millon Adolescent Clinical Inventory; NR—not reported; PCL-YV—Psychopathy Checklist-Youth Version; SRP-II—Self Report of Psychopathy-II; YPI—Youth Psychopathy Inventory.
are associated with more severe patterns of antisocial behavior across forensic, clinic-referred, and community samples. Several of these studies have shown that these traits are specifically associated with early onset of antisocial behaviors [39-42], supporting the contention that they designate a particularly severe group of youth within the childhood-onset category.

As noted in Tables 2 and 3, the studies on the association between CU traits and antisocial behavior are heavily weighted toward adolescent samples, although one study focused exclusively on preschool children and reported that CU traits predicted teacher-rated aggression 6 months later in this age group [43]. In addition, most of the studies used samples that were exclusively or predominantly male, although the few studies that included girls and studied them separate from boys reported that the association between CU traits and antisocial behavior was as strong, and in some cases stronger, for girls than for boys [40,44]. Another notable characteristic of this body of literature is that most of the prospective studies involved follow-up periods of 1 to 2 years, with a few showing more extended follow-up periods of 4 to 7 years. In one of the most extended prospective studies to date, CU traits predicted violent re-offending and shorter time to violent reoffending over a 10-year follow-up period in a sample of adjudicated adolescents [47].

The studies mentioned previously strongly support the association, concurrent and predictive, between CU traits and the severity of aggression. However, a few studies have separated different patterns of aggression to see if these traits are associated with a specific type of aggression, as has been reported in adult samples [48,49]. For example, in a sample of juvenile offenders incarcerated in adult prison, offenders who showed more severe, repeated, instrumental (i.e., for gain), and sadistic violence against their victims scored higher on a self-report measure of CU traits [33]. Similarly, nonreferred children with conduct problems and CU traits showed more severe aggression and behavior involving reactive (e.g., impulsive; attributable to perceived provocation) and proactive (e.g., premeditated, for gain) aggression, whereas children with conduct problems without CU traits only differed from children without conduct problems by showing significantly more reactive aggression [50].

One additional line of research supporting the clinical importance of CU traits is studies linking these traits to poor treatment progress. Four published studies (Table 4) have shown that CU traits predicted poor treatment progress and higher rates of recidivism after release from treatment programs for adjudicated adolescents [51-54]. In one of the only published studies testing the moderating role of CU traits on treatment success in a mental health setting, Hawes and Dadds [55] reported that, within a group of children (age 4 to 9 years) with conduct problems who were referred to a mental health clinic for a parenting intervention, those children with CU traits showed a less overall positive response to treatment than other children with conduct problems. However, this differential effectiveness was not consistently found across all phases of the treatment. That is, children with and without CU traits seemed to respond equally well to the first part of the intervention that focused on teaching parents methods of using positive reinforcement to encourage prosocial behavior. In contrast, only the group without CU traits showed added improvement with the second part of the intervention that focused on teaching parents more effective discipline strategies.

Distinct Correlates to Conduct Problems in Children with Callous-unemotional Traits

In addition to research linking CU traits to more severe and stable antisocial behavior, there also is growing evidence that the causes of antisocial behavior in youth with CU traits may be different from the causal processes operating for other youth with childhood-onset CD. One of the strongest pieces of evidence for potential differences in causal processes across the two groups comes from a study of 3687 7-year-old twin pairs [56]. In this study, children rated by teachers as showing significant conduct problems were divided into those with (n = 234) and without (n = 210) significant levels of CU traits. Estimates of the genetic and environmental effects on variations in conduct problems were very different for the two groups. Specifically, the heritability estimate for the group high on conduct problems and CU traits (0.81) was more than twice that for the group low on CU traits (0.30).

Although this twin study provides strong evidence that different causal processes may be operating for conduct problem children with and without CU traits, it does not help to identify these processes. However, numerous studies have identified several distinct risk factors that could provide clues to the causal mechanisms operating for the two groups of antisocial youth. First, children with conduct problems and CU traits show a preference for novel, exciting, and dangerous activities [57,58], and they score lower on measures of anxiety [57,58] and neuroticism [59] than other children with equivalent levels of conduct problems. Second, children with conduct disorder and CU traits show deficits in passive avoidance learning (i.e., ability to inhibit behavior that would otherwise result in punishment) [60], and these deficits are especially evident on tasks in which a reward-oriented response set is primed [61,62]. That is, on computer tasks in which responding initially leads to a high rate of rewards but later leads to a high rate of punishment (e.g., loss of points), children with conduct problems and CU traits respond longer despite the increasing rate of punishment. This reward-oriented response set not only appears in computerized laboratory tests but also in social situations. In a sample of adjudicated adolescents, CU traits were related to a
<table>
<thead>
<tr>
<th>Study</th>
<th>n</th>
<th>Age range, y</th>
<th>Male gender, %</th>
<th>Sample type</th>
<th>Measure</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brandt et al. [41]</td>
<td>130</td>
<td>14 to 18</td>
<td>100</td>
<td>Adjudicated</td>
<td>PCL-R</td>
<td>Psychopathic traits were associated with earlier age of onset, number of prior commitments, and crime severity; they predicted shorter time to violent recidivism over 18 to 24 months.</td>
</tr>
<tr>
<td>Catchpole and Gretton [120]</td>
<td>120</td>
<td>15 to 19</td>
<td>85</td>
<td>Adjudicated</td>
<td>PCL-YV</td>
<td>Psychopathic traits predicted general and violent recidivism and shorter time to violent reoffending over a 12 month follow-up period.</td>
</tr>
<tr>
<td>Corrado et al. [42]</td>
<td>182</td>
<td>12 to 19</td>
<td>100</td>
<td>Adjudicated</td>
<td>PCL-YV</td>
<td>Psychopathic traits were associated with early age of first conviction and number of prior convictions, especially violent convictions. Psychopathic traits predicted general and violent recidivism and shorter time to re-offending over 27 months.</td>
</tr>
<tr>
<td>Vincent et al. [121]</td>
<td>259</td>
<td>13 to 19</td>
<td>100</td>
<td>Detained</td>
<td>PCL-YV</td>
<td>Psychopathic traits were associated with number of CD symptoms, prior violent offenses, and institutional violence, and they predicted violent recidivism over a 27-month follow-up period.</td>
</tr>
<tr>
<td>Dadds et al. [31]</td>
<td>139</td>
<td>4 to 9</td>
<td>52</td>
<td>Community</td>
<td>APSD (T, P, and Y)</td>
<td>Children with conduct problems and CU traits showed higher levels of aggression, especially proactive aggression at 1-year follow-up, and showed the highest rates of self-reported delinquency and police contacts across a 4-year follow-up period.</td>
</tr>
<tr>
<td>Forth et al. [122]</td>
<td>70</td>
<td>13 to 20</td>
<td>100</td>
<td>Detained</td>
<td>APSD (T and P)</td>
<td>Psychopathic traits predicted shorter time to violent reoffending over a 10-year follow-up period.</td>
</tr>
<tr>
<td>Frick et al. [45,50]</td>
<td>98</td>
<td>10 to 17</td>
<td>33</td>
<td>Community</td>
<td>APSD (T and P)</td>
<td>Psychopathic traits predicted more serious and stable antisocial behavior over a three year follow-up.</td>
</tr>
<tr>
<td>Grettan et al. [47]</td>
<td>157</td>
<td>12 to 18</td>
<td>100</td>
<td>Adjudicated</td>
<td>PCL-YV</td>
<td>Psychopathic traits predicted severity of delinquency at 5- to 7-year follow-up period.</td>
</tr>
<tr>
<td>Kimonis et al. [43]</td>
<td>49</td>
<td>2 to 5</td>
<td>43</td>
<td>Community</td>
<td>APSD (T and P)</td>
<td>Psychopathic scores predicted general and violent recidivism over a 2-year follow-up period.</td>
</tr>
<tr>
<td>Lynam [123]</td>
<td>430</td>
<td>12 to 13</td>
<td>100</td>
<td>Community</td>
<td>APSD (T and P)</td>
<td>Psychopathic traits predicted reactive and instrumental aggression during a hospital stay of 14 to 45 days.</td>
</tr>
<tr>
<td>Piątigorski and Hinshaw [46]</td>
<td>122</td>
<td>6 to 12</td>
<td>100</td>
<td>Clinical (n = 66) and community (n = 56)</td>
<td>CCQ</td>
<td>Psychopathic traits predicted severity of delinquency at 5- to 7-year follow-up period.</td>
</tr>
<tr>
<td>Salekin et al. [124]</td>
<td>55</td>
<td>13 to 17</td>
<td>64</td>
<td>Detained</td>
<td>MACI</td>
<td>Psychopathic traits predicted reactive and instrumental aggression during a hospital stay of 14 to 45 days.</td>
</tr>
<tr>
<td>Stafford and Cornell [125]</td>
<td>72</td>
<td>12 to 17</td>
<td>51</td>
<td>Clinical</td>
<td>PCL-R</td>
<td>Psychopathic traits predicted reactive and instrumental aggression during a hospital stay of 14 to 45 days.</td>
</tr>
</tbody>
</table>

APSD — Antisocial Process Screening Device Parent (P) or Teacher (T); CBCL — Childhood Behavior Checklist; CCQ — California Child Q-set; CPS — Childhood Psychopathy Scale; CU — callous-unemotional; MACI — Miltion Adolescent Clinical Inventory; PCL-R — Psychopathy Checklist—Revised; PCL-YV — Psychopathy Checklist—Youth Version.
<table>
<thead>
<tr>
<th>Study</th>
<th>n</th>
<th>Age range, y</th>
<th>Male gender, %</th>
<th>Sample type</th>
<th>Measure</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falkenbach et al. [51]</td>
<td>69</td>
<td>9 to 17</td>
<td>60</td>
<td>Adjudicated</td>
<td>APSD, CPS</td>
<td>Psychopathic traits were associated with noncompliance to diversion program and predicted rearrest after 1-year follow-up</td>
</tr>
<tr>
<td>Gretton et al. [52]</td>
<td>220</td>
<td>12 to 18</td>
<td>100</td>
<td>Adjudicated</td>
<td>PCL-YV</td>
<td>Psychopathic traits predicted more breaches of probation, violent offenses, sexual offenses, and shorter time to reoffending after release from a sexual offender treatment program</td>
</tr>
<tr>
<td>Hawes and Dadds [53]</td>
<td>55</td>
<td>4 to 8</td>
<td>100</td>
<td>Clinical</td>
<td>APSD (P)</td>
<td>Children with conduct problems and CU traits showed poorer response to parenting intervention</td>
</tr>
<tr>
<td>O' Neill et al. [53]</td>
<td>64</td>
<td>15 to 18</td>
<td>100</td>
<td>Adjudicated</td>
<td>PCL-YV</td>
<td>Psychopathic traits were associated with fewer days of attendance, lower rated quality of participation, less clinical improvement, and higher rates of reoffends 12 months following treatment program for adjudicated youth with substance abuse problems</td>
</tr>
<tr>
<td>Spain et al. [54]</td>
<td>85</td>
<td>11 to 18</td>
<td>100</td>
<td>Adjudicated</td>
<td>PCL-YV, APSD, CPS</td>
<td>Psychopathic traits were associated with number of disciplinary infractions and longer time to progress through a residential treatment program for adjudicated youth</td>
</tr>
</tbody>
</table>

APSD—Antisocial Process Screening Device; Parent (P); CPS—Childhood Psychopathy Scale; CU—callous-unemotional; PCL-YV—Psychopathy Checklist-Youth Version.

tendency to emphasize the positive aspects (e.g., obtaining rewards, gaining dominance) of solving peer conflicts with aggression and to minimize the negative aspects (e.g., getting punished, hurting others) [63].

One of the most consistent findings in research on youth with CU traits is the finding of several emotional deficits that are unique to this group of antisocial youth. Specifically, children with CU traits and conduct problems seem less reactive to threatening and emotionally distressing stimuli than other antisocial youth using a number of different methodologies. For example, in a sample of adolescent boys referred to a diversion program for delinquent behavior, youth with high levels of CU traits showed reduced emotional reactivity on a lexical decision task that assessed facilitation in the speed of a child's recognition of words with negative emotional content compared to recognition of emotionally neutral words [64]. Additionally, this difference in responding to words with negative emotional content did not seem to be attributable to a lack of knowledge of the emotional content of the words because there was no difference between groups on their ratings of the emotional valence.
of the words. Similarly, in a sample of nonreferred children between 6 and 13 years of age, those with conduct problems and CU traits showed reduced reactivity to pictures involving distressing content (eg, a child in pain or a hurt animal) using a dot-probe paradigm, whereas children rated high on a measure of conduct problems, but low on CU traits, showed a heightened level of reactivity to these stimuli [65]. These findings of emotional deficits in youth with CU traits have been found using visual [66] and auditory [67] emotional stimuli and when using direct psychophysiologic measures of emotional reactivity [68].

Callous-unemotional Traits and Developmental Models of Conduct Problems

These personality, cognitive, and affective differences between children with conduct problems who show or do not show CU traits have led to numerous theories to explain the development of conduct problems in these two groups [69, 70]. The preference for novel and dangerous activities, the avoidance learning deficits, and the lack of emotional responsiveness to negative emotional material found in the group with CU traits all are consistent with a temperamentally style that has been variously labeled as low fearfulness [71], low behavioral inhibition [72], low harm avoidance [73], or high daring [74]. Several studies of normally developing children have linked this temperamentally style to lower scores on measures of conscience development in concurrent [75, 76] and prospective studies [77]. This link would be consistent with developmental theories suggesting that moral socialization and the internalization of parental and societal norms are partly dependent on the negative arousal evoked by potential punishment for misbehavior [78]. Guilt and anxiety associated with actual or anticipated wrongdoing can be impaired, if the child has a temperament in which the negative arousal to cues of punishment is attenuated, resulting in a diminished experience of anxiety. Also, such negative arousal may be critical in the development of empathetic concern in response to the distress in others, whereby negative emotional reactivity to the distress of others becomes conditioned to behaviors on the part of the child that resulted in the distress of others [79]. Because this process involves avoidance learning, a temperament characterized by a deficit in this type of learning could make the development of empathy more difficult.

This theoretical link between CU traits and conscience development are consistent with many characteristics of antisocial youth with CU traits. Specifically, children with conduct problems and CU traits seem to be less responsive to typical parental socialization practices than other children with conduct problems [80, 81], they are less distressed by the negative effects of their behavior on others [63], they are more impaired in their moral reasoning and empathic concern toward others [62, 63, 68], and they are less able to recognize expressions of sadness in the faces and vocalizations of other children [67]. Also, integrating research on normal conscience development with research on children with conduct problems, allows for investigation into what protective factors may deflect children off this deviant pathway. Specifically, it is likely that many children with a temperament characterized by low fearful inhibitions would, despite this temperamentally risk factor, develop sufficient levels of empathy and guilt to inhibit serious antisocial and aggressive behaviors. There is research investigating if certain parenting practices promote conscience development in relatively fearful children. For example, there is evidence to suggest that the use of parenting practices that do not rely solely on punishment-related arousal for internalization of parental norms, but instead focuses on the positive qualities of the parent-child relationship are more effective in promoting conscience development in relatively fearless children [82]. Additionally, in a sample of preschool children (mean age, 4.39 years; SD = 0.51), fearless and behaviorally uninhibited children who had consistent, strong, rule-oriented (ie, authoritarian) parenting showed enhanced conscience development (Cornell and Frick, unpublished data). These examples show the importance of testing potential protective factors that can enhance the development of children who may show some of the temperamentally risk factors for severe conduct problems.

Defining this unique subgroup of youth with CU traits it has also helped to identify important characteristics of other youth with childhood-onset CD. Specifically, a high level of CU traits seems to be present in approximately 28% of clinic-referred children with childhood-onset conduct problems [29]. Although the two childhood-onset groups do not consistently differ on levels of impulsivity or diagnoses of attention-deficit/hyperactivity disorder (ADHD) [29, 58], children without CU traits are less aggressive. When they act aggressively, it is likely to be confined to reactive forms of aggression [50]. Additionally, the conduct problems of children without CU traits are more strongly related to intellectual deficits, especially deficits in verbal intelligence [83], and ineffective parenting practices [80, 81]. Lastly, antisocial youth without CU traits seem to show problems regulating their emotions. They show high levels of self-reported anxiety [57, 58], they are more reactive to the distress of others in social situations [63], and they are highly reactive to various types of negative emotional stimuli [64, 65].

These characteristics of youth without CU traits suggest that their conduct problems are largely reactive and impulsive in nature and may be caused by several different processes leading to their disinhibited behavior. For example, their deficits in verbal intelligence could be related to problems in executive functioning that make it difficult for the child to delay gratification and lead to deficits in the child's ability to anticipate the conse-
sequences of his or her behavior [84]. Additionally, given the strong association with ineffective parenting practices, it is also possible that some children in this group are not socialized adequately and as a result do not learn to regulate their behavior appropriately in response to environmental contingencies [85]. However, difficulty regulating emotions seems to be the risk factor that most clearly distinguishes this group from children with CU traits who, as noted previously, show too little emotional arousal in many situations. For the group without CU traits, an inability to regulate emotions may directly (e.g., acting aggressively because of intense anger) or indirectly (e.g., by making the child more difficult to discipline) lead to the development of conduct problems [69].

Extending the Developmental Model to Girls

There is now substantial research supporting the presence of several distinct causal pathways leading to severe antisocial and aggressive behavior in youth. Additionally, this research has led to causal theories proposing different developmental mechanisms leading to the problem behavior across these pathways. Most research in this area has been done on samples that were entirely or largely male. Therefore, the applicability of these developmental models for explaining antisocial and aggressive behavior in girls is less clear.

Research generally suggests that, although girls are less likely to show severe conduct problems than boys after early childhood [2], boys and girls with conduct problems show similar risk factors [86, 87]. However, less research has focused on whether the different developmental pathways that have been used to explain these risk factors in boys are applicable for antisocial and aggressive girls. One consistent finding is that a childhood onset of severe antisocial and aggressive behavior is relatively rare in girls than in boys [88–90]. For example, in an entire birth cohort of New Zealand children, only a very small group of girls with childhood-onset antisocial behavior (n = 6) could be identified compared to larger groups of adolescent-onset girls (n = 78), childhood-onset boys (n = 47), and adolescent-onset boys (n = 122) [89]. Similarly, in an adjudicated sample of adolescent boys and girls, an almost equal number of boys had a childhood onset (46%) or adolescent onset (54%) of severe antisocial behavior, whereas 94% of the girls had an adolescent onset of their antisocial behavior [40].

However, despite the predominance of adolescent onset in antisocial girls, there is evidence that girls with severe conduct problems show poor outcomes in adulthood and show a large number of the dispositional and contextual risk factors that are more characteristic of childhood-onset CD in boys. For example, girls with severe conduct problems show high rates of criminality, violence, antisocial personality, and other psychiatric disorders in adulthood [91, 92]. In addition, girls with severe conduct problems show autonomic irregularities [93], problems with emotional regulation [94], and deficits in empathy [95] similar to childhood-onset boys.

To reconcile these findings, Silverthorn and Frick [96] proposed a delayed-onset pathway to antisocial behavior for girls. These authors proposed that antisocial and aggressive behavior in girls show the same causal mechanisms as those outlined previously for childhood-onset boys. However, their severe antisocial behavior often is delayed until adolescence, coinciding with biological (e.g., hormonal changes associated with puberty) and psychosocial (e.g., less parental monitoring and supervision; greater contact with deviant peers) changes that encourage antisocial behavior in girls with predisposing vulnerabilities (e.g., CU traits; problems in emotional regulation). In an initial test of this theory, adjudicated adolescent girls who largely showed an adolescent onset to their antisocial behavior also showed high levels of CU traits, problems with impulse control, and numerous other social and temperamental vulnerabilities that were more similar to childhood-onset boys than to adolescent-onset boys [40].

One central prediction of this model is that childhood-onset antisocial behavior would be rarer in girls than in boys, and as noted above, this has been consistently supported by research. Unfortunately, there have been few tests of the more important prediction of this delayed-onset model that adolescent-onset girls would be more similar to childhood-onset boys than to adolescent boys on key risk factors. The studies that have tested this prediction have lead to mixed results. For example, in the birth cohort of New Zealand youngsters described previously, girls with adolescent-onset conduct problems showed less parenting dysfunctional, fewer temperamental vulnerabilities, and fewer neurocognitive deficits than childhood-onset boys, contrary to the predictions made by the delayed-onset model [89]. In another community sample, adolescent-onset girls showed less parental antisocial behavior and were less likely to be diagnosed with ADHD than childhood-onset boys and girls, but they did not differ from the childhood-onset groups on poor parental monitoring and maltreatment history [97].

As a result of these conflicting findings, the predictions made from the delayed-onset theory require additional testing. It also is possible that, although many girls may not show the overt antisocial and aggressive behavior that would lead to a diagnosis of CD before adolescence, they may show other forms of antisocial behavior such as relational aggression. Relational aggression can be defined as behaviors that seek to harm another child's social relationships (e.g., lying about them, excluding them from social events) rather than physically harming the child [98]. There is evidence that girls are more likely to show relational rather than physical aggression [99], and that relational aggression shares some of the same risk factors as overt aggression, including impulsivity [100] and
Implications for Classification

This research on antisocial and aggressive behavior in youth has several important implications for diagnostic classifications systems. Most broadly, it supports the need to define more homogeneous subgroups within the broad category of CD. That is, there is now clear evidence that children within this broad category can vary greatly in the type and severity of antisocial behavior, in their risk for problems later in development, and in the causal processes underlying their behavior. Further, the distinction between childhood-onset and adolescent-onset patterns of CD that has been made in many recent classifications systems [1] is supported by research. However, there is evidence that it may be too broad of a distinction. That is, within the childhood-onset group, there may be a further distinction that is important based on the presence or absence of CU traits. As noted above, much more work is needed to determine how well these different causal pathways generalize to girls. Additionally, little research has investigated these distinctions across different socioeconomic, ethnic, and cultural groups [65].

However, this distinction could help to refine and integrate numerous past subtyping approaches to antisocial youth. First, one distinction that has been made in past diagnostic classifications systems is between undersocialized and socialized youth with CD. The undersocialized group was characterized by a failure to establish a normal degree of affection, empathy, or bonding with others and whose peer relationships were absent or superficial [101]. These descriptions are very similar to the items used to assess CU traits in youth (see Table 1). Second, there is a growing body of research distinguishing among aggressive youth based on the type of aggressive behavior that is shown. Specifically, research has shown that youth who show reactive and proactive forms of aggression show distinct cognitive and emotional correlates and worse outcomes than youth who only show reactive forms of aggression [102]. As noted above, the members of the former group showing both types of aggression are more likely to show CU traits [33,50], and the presence or absence of the CU traits may account for the different correlates and outcomes across groups. Third, some studies have used the presence or absence of anxiety to distinguish subgroups of youth with CD [103]. Again, these differences could be accounted for by the fact that children who show CU traits are less distressed by the effects of their behavior on others and, as a result, score lower on measures of anxiety than other children with comparable levels of conduct problems [57].

A distinction that has been the focus of a significant amount of research has been between children with CD with and without a comorbid diagnosis of ADHD. This large body of research has clearly shown that children with both diagnoses show a more severe and aggressive pattern of antisocial behavior [104], have poorer adult outcomes [29], and numerous distinct neuropsychologic deficits (eg, executive functioning deficit, deficits in verbal and auditory memory; problems delaying gratification) [105]. However, the combination of symptoms of CD and ADHD seems to designate a broad pattern of disinhibited behavior that is characteristic of most children who meet criteria for childhood-onset CD [18,19•]. Further, it does not seem to distinguish well within children who may have different causes to their disinhibited behavior. As noted above, in clinic-referred [29], and community [58] samples, children with and without CU traits show similar levels of ADHD symptoms and diagnoses. However, it is the presence of CU traits that seems to designate a group with more severe and aggressive behavior problems [50] and with different correlates suggesting distinct causal processes [61].

Implications for Intervention

This theoretical model proposing numerous distinct developmental pathways to CD also has several implications for intervention. First, this model highlights the importance of prevention. Children at risk for the most severe and aggressive patterns of behavior in adolescence and adulthood (ie, the childhood-onset group) typically have a history of behavior problems beginning early in development. Additionally, there are numerous interventions that have proven to be effective in reducing conduct problems in preschool and early school-age children, such as structured contingency management programs, programs to teach parents behavior-management skills, impulse and anger control training programs, and stimulant medication for children with conduct problems and a diagnosis of ADHD [13,106]. Therefore, intervening early in the developmental trajectory of childhood-onset CD, when interventions are more effective, is essential.

Second, given the many different risk factors that can be involved in the development of CD, interventions need to be comprehensive and should target multiple risk factors. For example, the Families and Schools Together (FAST Track) Program is a multicomponent intervention designed to intervene early in children with severe conduct problems, and its effectiveness has been documented in a large multisite trial [107]. The FAST Track intervention involved several treatment components including 1) a parenting intervention that focused on teaching parents more appropriate behavior management skills, 2) a cognitive-behavior intervention that focused on helping children to develop anger control and social problem-solving skills, and 3) a classroom intervention that
helped teachers to implement more effective behavior management skills, 4) academic tutoring, and 5) a case management component involving home visits to support family functioning.

Third, a key assumption of the developmental model outlined in this paper is that there are several different causal pathways leading to CD. As a result, interventions not only need to be comprehensive, but they also need to be individualized. For example, Multisystemic Therapy is one of the few interventions documented to be successful in treating older and more severely antisocial youth [108]. This treatment program provides individualized interventions using an array of services provided in the community. Similarly, a recent study group commissioned by the Office of Juvenile Justice and Delinquency Prevention of the United States Department of Justice evaluated several model juvenile justice programs. The critical characteristics of these programs were that 1) they provided individualized and comprehensive services that included mental health, medical, child welfare, and educational components, and 2) they included a strong case-management system for ensuring that services were provided in an integrated and coherent manner [109].

Research on the different developmental processes that may be operating across the various subgroups of youth with CD could help in determining the most effective combination of services for an individual child [110•]. For example, interventions that focus on enhancing identity development in adolescents and increase their contact with prosocial peers, such as mentoring programs [111] or programs that provide structured after-school activities [112], may be particularly effective for children within the adolescent-onset pathway. However, interventions that focus on anger control [113] or parental supervision and discipline [114] may be more effective for children within the childhood-onset pathway who do not show CU traits. Further, interventions that intervene early in the parent-child relationship to teach parents ways to foster empathic concern in their young child may be more effective for children with CU traits [115]. Later in development, intervening in ways that emphasize the reward-oriented response style of this group and attempt to motivate children through appealing to their self-interest rather than through interventions that solely focus on punishment-oriented strategies may be more effective for this group of youth with CD [110•].

Conclusions

Much more research is needed to test the effectiveness of such comprehensive and individualized treatment approaches. Additionally, innovative methods for implementing such systems of care in mental health clinics, schools, and juvenile justice settings in the most cost-efficient manner are needed. Although establishing such systems of care can seem like a daunting task, the costly and impairing nature of CD make them a high priority for mental health practitioners working in several different settings. The developmental model outlined in this article provides a framework to guide future research on the causes of CD. It highlights the need to use designs and methods that recognize the heterogeneity within antisocial and aggressive youth, and it shows the promise of using developmental theory to inform causal models of CD.

References and Recommended Reading

Papers of particular interest, published recently, have been highlighted as:
• Of importance
  • Of major importance


70. Reivich E, the developmental mechanisms involved in the various pathways to conduct disorder.


Summarizes the treatment implications of a developmental approach to understanding conduct disorder.


