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Revisiting Data Related to the Age of Onset and Developmental Course of Female Conduct Problems

Abstract

Children who exhibit persistently elevated levels of conduct problems (CP) from early childhood, so called "early-starters," are known to be at increased risk for continued CP throughout middle childhood, adolescence, and adulthood. Theoretical and empirical work has focused on this subgroup of children characterized by similar risk factors, an early age of onset, and a persistent developmental course of CP. However, females were historically neglected from this literature. Although research on female CP has increased, conclusions drawn from limited prior work continue to predominate. The primary aim of this review was to evaluate the updated literature to determine the percentage of females who show the early-starter CP pattern relative to two other trajectories often theorized to be more characteristic of females: early-starting desisting and adolescent onset CP. The findings suggest that a subgroup of females exhibits an early-starting *and* persistent CP pattern, while a separate group of females demonstrates an onset of CP in adolescence. In addition, although it has been argued that females with childhood CP are not likely to show CP into adolescence and adulthood, evidence for early-starting desisting CP was inconsistent. The results are discussed with respect to implications for developmental taxonomy theory and future basic research in the area of CP development, as well as intervention efforts.

Keywords

Disruptive behavior; trajectories; sex differences; developmental psychopathology

Introduction

Children who exhibit elevated and persistent levels of conduct problems (CP) from early childhood have received increased attention from researchers in recent decades. The increasing focus on young children with CP is warranted because research has found early-starting problem behaviors to be relatively stable from early and middle childhood throughout adolescence and adulthood (Campbell, Shaw, & Gilliom, 2000; Odgers et al., 2008). In later childhood and adolescence, CP in its more serious form, antisocial behavior, is problematic to both society, in the form of direct behavioral consequences and costs (U.S. Department of Justice Federal Bureau of Investigation, 2011), and to the individual, in the form of poor academic, occupational, and psychosocial functioning (Bongers, Koot, van der Ende, & Verhulst, 2004).

Researchers have long posited that age of onset of CP is a valuable way to identify subgroups of children who share similar causal mechanisms and show a common course to the development of their CP (Moffitt, 1993a; Patterson, DeBaryshe, & Ramsey, 1989; Shaw, Bell, & Gilliom, 2000). In the last two decades, great strides have been made in validating the predictive utility of age of onset of CP, with children who exhibit a childhood onset (i.e., before age 10), classified as "early-starters," showing a greater level of risk and a more persistent and severe course to their antisocial behavior, as well as more maladaptive outcomes than those with an adolescent onset (i.e., "late-starters") to their CP (Aguilar, Sroufe, Egeland, & Carlson, 2000; Odgers et al., 2008; Tolan & Thomas, 1995). Moreover, this work has elucidated a number of biological, cognitive, and social (e.g., socialization

influences within and outside the family) characteristics associated with a childhood onset to CP, including difficult child temperament (Shaw et al., 2000), neurocognitive impairments (Moffitt, 1993b), coercive family processes (Patterson et al., 1989), and low socioeconomic status (Campbell et al., 2000).

Although a great deal of work has been conducted on the age of onset and developmental course of CP, much of the existing research to date has focused on all-male samples (e.g., Shaw, Gilliom, Ingoldsby, & Nagin, 2003) or failed to probe mixed-sex samples for potential sex differences in the development of CP throughout childhood (e.g., Aguilar et al., 2000). Although it is has been shown that boys demonstrate reliably higher rates of CP by age 4 or 5 (Keenan & Shaw, 1997) and that this sex difference persists throughout the remainder of childhood, adolescence, and adulthood (Moffitt, Caspi, Rutter, & Silva, 2001), it is less clear if there are also sex differences in the age of onset and developmental course of CP or whether developmental taxonomies found in males are similar for females.

Prior to the 1990s, longitudinal research on female CP was very limited; however, research examining longitudinal CP trajectories in females has increased in the past two decades (e.g., Broidy et al., 2003; Keenan et al., 2010). Findings from this literature have been mixed and there has been much debate over whether *either* the childhood age of onset or persistent course associated with the early-starter pathway is applicable to females (Denno, 1994; Elliott, 1994; Silverthorn & Frick, 1999). Specifically, one prominent theory from Silverthorn and Frick (1999) claimed that even girls with the highest levels of risk do not show CP until adolescence, while others claimed that the predictive utility associated with an early age of onset was low in females due to high rates of desistence (Elliott, 1994; Moffitt, 1994). However, because much of this work was based on research in small adjudicated samples, it is unclear whether these patterns of sex differences would generalize to other samples.

In fact, more recent empirical work utilizing prospective longitudinal designs in community samples has demonstrated that a small group of females can be identified based on the existence of elevated *and* persistent CP from early and middle childhood into late adolescence (Bongers et al., 2004; Lahey et al., 2006; Odgers et al., 2008). These studies also suggest that early-starting females demonstrate maladaptive outcomes similar in severity to, and in some cases worse than, their male counterparts (Odgers et al., 2008). For example, in a longitudinal study following a birth cohort to age 32, both men and women classified in the early-starter trajectory from ages 7 to 15 reported significantly more violence toward others, including partners and children, than those in the low CP trajectory group. Moreover, 41.7% of early-starting women vs. 10.2% of early-starting men endorsed hitting or hurting a child out of anger. Thus, recent findings indicate that both the early age of onset and the persistent course associated with the early-starter CP pathway *is* applicable to females.

Despite recent advances in our understanding of the development of CP in females, researchers often rely on conclusions drawn from limited work plagued with methodological limitations (e.g., focus on adjudicated populations, reliance on retrospective report), which perpetuates the notion that early-starting CP is negligible or nonexistent in females. However, given the robustness of the association between child sex and CP, an increased understanding of CP development in both males and females is likely to contribute important etiological information to the field (Rutter, Caspi, & Moffitt, 2003). Therefore, this paper aims to rectify the gap in the current literature with respect to an updated review of findings on the percentage of females that exhibit a childhood CP onset and whether their typical developmental course is one of persistence or desistence. This review will first provide an overview of findings related to sex differences and CP before delving into a

summary of predominant developmental taxonomies of CP. Next, this paper will review longitudinal studies conducted on a variety of populations (e.g., community, high-risk) and utilizing multiple assessment methods (e.g., parent and teacher report, youth report, official records) to revisit past conclusions that a negligible amount of girls demonstrate an early onset *and* a persistent course of CP.

Defining Terms

Conduct problems—Broadly defined, the term conduct problems refers to behaviors under the conduct-oppositional spectrum, including those that are disruptive and/or potentially harmful to others (APA, 2000; Campbell et al., 2000) such as physical aggression and rule-breaking. For the purposes of this review, other terms including disruptive behavior, antisocial behavior, and physical aggression may also be used to describe conduct problems during childhood and adolescence. In addition, terms often used in the criminality field, such as delinquency and offending, are also used in this paper to describe behavior problems. Although these CP behaviors do fall under the "externalizing," umbrella (Hinshaw, 1987), the terms are not synonymous because measures of externalizing behavior are broad and include behaviors ranging from aggression to inattention, the latter of which is less a focus of this review.

Trajectory labels—The ensuing review will include many studies utilizing person-centered analyses, such as latent class analysis and semi-parametric group based modeling (Muthén & Muthén, 2000; Nagin & Tremblay, 2005). These techniques are advantageous in their ability to identify clusters of individuals who show similar patterns of development over time, whereas analytic techniques that examine mean level group differences could cloud potential subgroup heterogeneity (Nagin & Tremblay, 2005). However, it is important to note that this analytic strategy allows the researcher to estimate the number and type of groups that best fit the data. The way in which the groups are labeled is relatively subjective and arbitrary. For example, some may choose to label the children who show persistently elevated CP compared to the other groups "early-onset persistent," while others may call the same group "life-course persistent."

In addition, there is no standard suggesting a minimum level of CP that should be characterized as "high." Therefore, it is important to inspect the results to determine if the label reflects the true pattern of the data. Unfortunately, it is often not possible to compare levels of CP between studies because of measurement differences. Keeping these caveats in mind, this review retains terms originally used by authors to reflect trajectories of CP and treats them synonymously, although attempts were made to note differences across studies.

Sex-specific vs. grouped trajectories—An important variation in semi-parametric group based modeling approaches is whether models should be estimated for males and females separately. One important advantage to estimating trajectories separately is that females demonstrating clinically meaningful levels of CP that are not *as* high as male levels may be placed in a "lower" trajectory in mixed sex models; however, in female-specific models this group would be more clearly identified as distinct from those with lower levels of CP. Despite this advantage of estimating males and female trajectories separately, there is also the possibility of the identification of groups that are *not* clinically meaningful (e.g., a female "high" group that engages in relatively low levels of CP). Thus, as with trajectory labels, it is important to consider the results in context and be mindful of the effect this variation may have on findings.

Sex Differences in Conduct Problems

In an effort to provide some context for why female CP may have been neglected by researchers for so long, the following section will offer an overview of some of the literature demonstrating sex differences in risk for CP. As noted above, boys show reliably higher rates of CP and antisocial behavior during middle childhood (Lahey et al., 2000), adolescence, and adulthood (Broidy et al., 2003). However, this male predominance is not observed in the earliest measures of child behavior, with the majority of research finding a lack of sex differences in difficult temperament, behavioral inhibition, noncompliance, and even physical aggression prior to age 4 (Keenan & Shaw, 1997; Maccoby, 1998; Zahn-Waxler, 1993). It is not until age 4-5, or preschool-age, that the well-documented sex differences in CP reliably emerge (Keenan & Shaw, 1997). Males are subsequently more likely than females to exhibit elevated levels of conduct problems (Fergusson & Horwood, 2002) and antisocial behavior (Moffitt et al., 2001), whether the construct is defined as disruptive behavior disorder symptoms (Thomas, Byrne, Offord, & Boyle, 1991), physical aggression (Côté, Vaillancourt, LeBlanc, Nagin, & Tremblay, 2006), or symptoms of conduct disorder (Odgers et al., 2008), and regardless of informant.

Similarly, clinical diagnoses of Conduct Disorder (CD) and Oppositional Defiant Disorder (ODD) during childhood are approximately 3-4 times higher in males than in females (Lahey et al., 1999; Maughan, Rowe, Messer, Goodman, & Meltzer, 2004). Although the prevalence of antisocial behavior is known to increase for both sexes during adolescence (Fergusson & Horwood, 2002), some findings suggest that this increase is disproportionately higher in girls, resulting in the narrowest sex ratio at any point in the lifespan occurring during adolescence (Moffitt et al., 2001; Silverthorn & Frick, 1999). These consistent sex differences, in combination with developmental shifts, first during preschool-age and later during adolescence, have led to speculation as to whether female CP may be better captured by different developmental patterns than male CP.

In addition to base rate differences in CP, findings related to sex differences in biological and social influences on CP have also contributed to theories that early-starting and persistent CP development may be a rare occurrence in females. Although a thorough examination of this work is beyond the scope of this review, key points are summarized below.

Biological risk—First, a large literature has investigated the biological underpinnings of the link between male sex and CP, particularly for physical aggression, where some of the most robust sex differences are found throughout the lifespan (Loeber & Hay, 1997; Lorber, 2004). Some work has pointed to evolutionary influences on male propensity toward aggression (Zahn-Waxler, 1993), while other researchers have focused on the influence of one fundamental aspect of being male, possessing a Y chromosome. Findings from this work have linked males' risk for CP to the secretion of high levels of testosterone in the developing male fetus (Eme, 2007).

Work with animal models and in humans with a congenital disorder associated with excessive fetal testosterone exposure, congenital adrenal hyperplasia (CAH), supports the link between prenatal testosterone and risk for aggression. For example, animals injected with testosterone during critical periods of pregnancy produced females who engaged in more "rough- and-tumble" play, a male sex-typed form of play (Maccoby, 1998), than comparison females (Eme, 2007). Similarly, human females with CAH were also shown to more physically active and more aggressive than control females (Berenbaum & Resnick, 1997; Pasterski et al., 2007).

Males also have been shown to be more susceptible to developing neuropsychological problems previously shown to be associated with CP (Eme, 2007; Moffitt, 1993b). For example, males are known to be diagnosed with Attention-Deficit Hyperactivity Disorder (ADHD) at three times the rate of females (APA, 2000), and to show more language delays and verbal skills deficits (Moffitt, 1993b; Moffitt, Lynam, & Silva, 1994), all of which have been linked to the development of CP. In summary, an accumulation of evidence on biological risk factors suggests that males are likely born with an increased propensity toward disruptive behavior. This may partly be what led many researchers to historically view CP as a primarily male phenomenon.

Socialization influences on CP—Socialization differences have also been shown to play an important role in sex differences in the development of CP. In their 1997 review, Keenan & Shaw detailed the numerous ways in which socializing agents (i.e., parents, teachers, and peers) exert pressure on males and females to conform their behavior to social expectations. They cite research indicating that boys and girls tend to exhibit similar levels of CP prior to the preschool-age; however, girls show a sharper decline in their CP throughout early childhood than boys, who show little decline or even demonstrate increases in CP (Keenan & Shaw, 1997). Moreover, parents and teachers were found to respond differently to CP in males and females, being more discouraging toward girls than boys for similar types of disruptive behaviors (Fagot, 1984).

Another potentially powerful socializing influence on the sex difference in base rates of CP comes from peers. Beginning around preschool-age, boys and girls segregate into same-sex peer groups (Maccoby, 1998). Children also begin to identify with and imitate their same-sex peers around this age, leading to increased engagement in sex-typed activities and behaviors (Rose & Rudolph, 2006). For example, it is a well-replicated finding that, beginning around preschool-age, boys engage in rough-and-tumble play more frequently than girls, whose peer groups are characterized more by nurturance and intimacy (Maccoby, 1998). In addition, there is evidence that gender-segregated peer groups develop their own acceptable forms of interaction and communication (Maccoby, 2002). It seems plausible that, in combination with same-sex imitation and social referencing, selective reinforcement from one's peer group would exert pressure on boys and girls to conform to same-sex norms (Rose & Rudolph, 2006).

In summary, there is evidence that teachers, parents, and peers all respond differently to boys' and girls' CP. Moreover, the combined influence of boys' possible biological predisposition to CP along with differential socialization from early childhood likely plays an important role in the emergence and maintenance of the well-documented sex differences in CP. Unfortunately, it is also these sex differences that have contributed to the notion that female CP is negligible and perpetuated the neglect of the study of female CP. Despite evidence that females possess less risk for CP than males, longitudinal work demonstrating individual and social consequences of their behavior suggests female CP should not be ignored.

Consequences of Female Conduct Problems

Despite the prevailing belief that female antisocial behavior is a relatively rare occurrence, data from national crime statistics show a different story. For example, in 2010, just under 20% of all *violent* crimes in the United States were committed by females, and females committed 38% of property crimes (U.S. Department of Justice Federal Bureau of Investigation, 2011). Moreover, according to a recent review of cost/benefit analysis studies, serious crimes committed by females cost the United States $17.5 billion in 2010, with $513.9 million in costs attributed to females under the age of 15 alone (Heaton, 2010).

In addition to the monetary costs of antisocial behavior committed by females and the intangible effects on victims, research has shown that females with early-starting CP continue to fare poorly into adulthood. For example, a number of problematic outcomes have been linked with early CP in females, including teenage pregnancy (Woodward & Fergusson, 1999), adult depression and anxiety (Bor, McGee, Hayatbakhsh, Dean, & Najman, 2010), and higher rates of substance use and homelessness in adulthood (Odgers et al., 2008). Moreover, because of assortative mating (Krueger, Moffitt, Caspi, Bleske, & Silva, 1998; Rhule-Louie & McMahon, 2007) and the intergenerational transmission of antisocial behavior (Farrington, Jolliffe, Loeber, Stouthamer-Loeber, & Kalb, 2001; Tzoumakis, Lussier, & Corrado, 2012), both established phenomena, the next generation is at even greater risk for the development of CP. Therefore, although females may demonstrate lower levels of risk for CP than males, the serious consequences associated with female CP suggests it is worthy of attention from researchers.

Developmental Taxonomy Theory

A central component of this review is the seminal theoretical framework put forth by researchers (e.g., Moffitt, 1993a; Patterson et al., 1989) which has greatly improved the field's understanding of mechanisms underlying both the etiology and course of early-starting CP. Specifically, Patterson and colleagues (1989) described the crucial contribution of parent-child interaction, beginning in early childhood, to the development of CP and later antisocial behavior. Their work explained that noncontingent parental responses to both prosocial and antisocial child behavior from an early age leads to the inadvertent reinforcement of child behavior problems. Moreover, parents' and family members' engagement in "coercive cycles," in which children learn the functional value of their aversive behaviors for escape and avoidance from unwanted interactions, ultimately leads to the use of heightened aversive behaviors (e.g., physical aggression) from both the child and other family members to obtain social goals. As a result, these children are also more likely to struggle in academic and social domains, which carry a different set of behavioral demands. Patterson's theory states that it is this combination of child behavioral training and social rejection that leads to deviant peer affiliation and delinquency in adolescence. Thus, according to this theory, it is a complex interplay of child and proximal factors that ensnare a child in the early-starter pathway.

Furthermore, Moffitt (1993a) detailed the existence of two subgroups of youth who engage in antisocial behavior: early-starters, who she called life-course-persistent, and adolescent-limited, a group comprised of individuals who do not show elevated levels of childhood CP, primarily engage in antisocial behavior during adolescence, and desist in adulthood. Moffitt also accounted for child characteristics, specifically neuropsychological deficits (e.g., verbal and executive functions), which increase the likelihood of life-course persistent antisocial behavior. This theory posited that infants born with neuropsychological deficits are "difficult" to manage and, consequently, evoke negative reactions from their caregivers. In addition, many children with such deficits are often born into environments that are not well-equipped to care for them. In this way, the stage is set for negative parent-child transactions and behavioral training similar to that described in Patterson's model.

Empirical Support for Developmental Taxonomy Theory

Taxonomy theory has spurred a plethora of research that has identified common predictors, correlates, and outcomes associated with the age of onset and developmental course of CP. The results have supported the existence of a subgroup of children (approximately 5-9% of males in community samples) who show an early onset to their CP, persist throughout childhood, and exhibit more serious forms of antisocial behavior into adolescence and adulthood (Broidy et al., 2003). This work has provided insight into the proximal factors in

early childhood that confer risk for early starting persistent CP. These include inconsistent and rejecting parenting (Campbell et al., 2010; Shaw et al., 2000), family conflict (Harachi et al., 2006), and low socioeconomic status (Côté et al., 2006). In addition, numerous child characteristics such as infant difficult temperament (Lahey et al., 2008), toddler-age lack of control (Caspi, Henry, McGee, Moffitt, & Silva, 1995), and early disruptive behavior (Campbell et al., 2000), as well as preschool-age verbal ability (Moffitt, 1993b) have been linked with risk for early-starting and persistent CP. In sum, empirical work has supported developmental taxonomy theory suggesting that there is a subgroup of children who are characterized by a common set of risk factors from early childhood and are at increased risk of exhibiting early-starting and persistent CP.

Building upon the original taxonomy theory, theoretical reformulations have been posited, including those suggesting that adolescent antisocial behavior is less "limited" than originally believed (Byrd, Loeber, & Pardini, 2012), those pointing a group of children whose CP desists throughout childhood (Barker & Maughan, 2009), and those suggesting that the theory may not be applicable to girls (Silverthorn & Frick, 1999). However, the notion that there is a small percentage of children who can be identified from an early age as having increased risk of engaging in life-long patterns of CP continues to be a vital contribution to our understanding of CP development and the advancement of research in this area.

Applying Taxonomies to Females

Although there has been extensive growth in our knowledge about the age of onset and developmental course of CP, both developmental taxonomy theory and empirical work in support of it has largely been based on research with males. The historical lack of prospective, longitudinal work beginning in early childhood with females has resulted in limited evidence related to the age of onset and developmental course of their CP. Therefore, it is less clear if females exhibit early-starting CP or whether elevated CP during childhood in females would have similar predictive utility for later antisocial behavior as it does in males.

As noted above, some researchers have questioned the relevance of the childhood onset/adolescent onset distinction for females. Specifically, Silverthorn and Frick (1999) suggested that existing developmental taxonomies are not applicable to females, whose CP may be better captured by one pathway. The authors cite mostly retrospective work in offending populations (e.g., Robins, 1966; Warren & Rosenbaum, 1986) showing that females who report similar levels of risk from early childhood, relative to early-starting males, do not demonstrate CP until adolescence. This pattern was referred to as the "delayed-onset" pathway and was posited to be more representative of female CP development than traditional taxonomies.

Additional work, also primarily from the offending literature, has suggested that while females *do* demonstrate early onset CP, their behavior is not as strongly predictive of adolescent and adult antisocial behavior as it is for males (Denno, 1994; Gorman-Smith, 2003; Moffitt, 1994; Silverthorn & Frick, 1999). Accordingly, early-starting females were believed to be typically characterized by a desisting developmental course. This would be in line with findings reviewed above that females are subjected to less biological risk (Eme, 2007) and a greater social "push" away from problem behaviors (Keenan & Shaw, 1997) than males. Based on this literature, one might expect that a negligible number of females show an early onset *and* persistent course to their CP and instead, expect a childhood onset desisting pathway or late-starting pathway to be characteristic of CP development in girls. Consistent with this perspective, some research has failed to find a female early-starting

trajectory (Moffitt, 1994; Moffitt et al., 2001) and others have found only an early-starting desisting group (Fontaine et al., 2008).

In contrast, "gender paradox" theory (Loeber & Keenan, 1994; Robins, 1986) would predict that the behavior with low base rates in one gender relative to the other (e.g., CP in girls, depression in boys) would be associated with worse outcomes in the gender that exhibits the behavior less frequently. That is, because females with CP exhibit these behaviors *in spite of* lowered biological risk and socialization pressures away from them (Keenan & Shaw, 1997), girls with CP could be at increased risk for persistence relative to boys. Correspondingly, some recent work has suggested that a subset of females show a childhood onset to their CP with increased rates of more serious forms of antisocial behavior during adolescence and adulthood compared to those without an early CP onset (Bongers et al., 2004; Odgers et al., 2008).

In summary, past theory and evidence suggests that females do not show early-starting CP, that female CP during childhood lacks persistence, and that the onset of female CP occurs overwhelmingly during adolescence. In contrast, more recent theoretical and empirical work indicates that a small percentage of females do exhibit an early-starting and persistent developmental course of CP. Multiple factors could explain the discrepant findings, ranging from true differences in the development of CP between samples to methodological variations such as the assessment technique (e.g., self-report vs. parent-report), the behavior being assessed, the definition of age of onset, and the modeling technique. However, a thorough review of recent research would be necessary to gain a better understanding of factors contributing to differences in findings related to the age of onset and developmental course of CP in females.

Determining whether girls do show early-starting CP and whether these girls are more often characterized by a persisting or desisting developmental course could have important implications for both theory and practice. However, the historical lack of longitudinal work examining both the age of onset and the developmental progression of CP in females has made it difficult to draw evidence-based conclusions regarding this matter.

Summary

In conclusion, it is unclear what percentage of females demonstrates an early onset to their CP and whether females who do show an early onset would be at increased risk of continued antisocial behavior into adolescence or whether they follow a desisting trajectory marked by low CP in adolescence and adulthood. While some data suggest that female CP does not emerge until adolescence (Silverthorn & Frick, 1999), and other data indicate that early-starting CP in females is unlikely to persist into later childhood and adolescence (Denno, 1994; Gorman-Smith, 2003), there is an inherent bias in those studies' reliance on retrospective report and samples of offenders, who differ from females in community and even clinical samples (Butler et al., 2006; Lyons, Baerger, Quigley, Erlich, & Griffin, 2001). Moreover, theory and more recent evidence (Broidy et al., 2003; Odgers et al., 2008) provide reason to believe a subset of females do show an early starting and persistent course to their CP.

Although there has been a burgeoning of research on female CP in the last decade, the lack of a review of the updated literature has led to the perpetuation of conclusions drawn from limited evidence related to the age of onset and course of CP in females. In contrast with prior reviews, which were restricted by the limited availability of prospective longitudinal studies that included females (e.g., Keenan, Loeber, & Green, 1999), this review can take advantage of the plethora of studies published in the last ten years and focus only on those that are optimally designed to address questions about the age of onset and developmental

course of female CP. To this end, this review seeks to address the following two notions: 1) A negligible proportion of females show a childhood onset to their CP, particularly in relation to an adolescent onset, and 2) these females are unlikely to demonstrate persistence in their antisocial behavior throughout development. Thus, this review aims to examine whether, as with males, a small percentage of females follow an early-starting *and* persistent course of CP.

Inclusion and Exclusion Criteria

Peer-reviewed studies were located using a keyword search in major publication databases (e.g., PsychInfo, Google Scholar). Key words included were: trajectories, delinquency, conduct problems, aggression, antisocial behavior, conduct disorder, females, gender, and sex. The initial results of the literature search were then filtered according to the following criteria:

Construct—Only studies that focused on conduct problems or related constructs were included in this review. Studies focusing on ADHD symptoms such as inattention and hyperactivity/impulsivity were not included, nor were broad-band externalizing behavior measures, because of the review's focus on CP and antisocial behaviors specifically (for a thorough review of the difference between aggressive-oppositional and hyperactive-inattentive behaviors, see Hinshaw, 1987). Additionally, studies that focused solely on official legal offenses were excluded because of the likelihood that the combined influences of a low percentage of delinquent acts being identified (Farrington et al., 2003) and sex differences in rates of arrest (Spohn, Gruhl, & Welch, 1987) would bias the results. Finally, although some researchers have posited that there are female-specific manifestations of conduct problems (i.e., relational aggression) analogous to male forms of aggression (Crick & Grotpeter, 1995), studies focusing on relational or indirect aggression were excluded because of a lack of empirical work in support of these claims (Keenan, Coyne, & Lahey, 2008).

Study design—A longitudinal, prospective design was required for studies to be included in this review. Although cross-sectional studies are useful in providing information about point prevalence of behavior problems and disorders, these studies were excluded because they could not adequately address questions pertaining to females' developmental *trajectories* of CP. Furthermore, retrospective designs were excluded due to well-known problems with reporter bias and recall in retrospective studies (Henry, Moffitt, Caspi, Langley, & Silva, 1994).

Sample population—Based on the review's focus on filling gaps in the literature with respect to the development of CP among females, only studies that included females were included. Thus, studies that did not provide information about the percentage of females following each trajectory (e.g., only provided overall group rates) or did not include females were excluded. Moreover, studies were required to cover an age range that included childhood (i.e., age 11 or earlier) because of the review's interest in early-starting CP. To establish the age criterion, we relied on the DSM-IV-TR cutoff of age 10 for the "Childhood Onset" specifier to the CD diagnosis. However, to maximize the number of studies that could address the review's aims, we included studies that were initiated at age 11 because including these children accounts for the retrospective nature of many assessment techniques utilized in measuring CP and antisocial behaviors (e.g., the Self Report of Delinquency asks youth to report on behavior over the past 12 months; the Child Behavior Checklist assesses the past six months).

Literature Review

Early Childhood to Middle Childhood Samples

Table 1 contains the seven studies examining longitudinal trajectories of CP during early and middle childhood. Of these, one study examined only early childhood and three studies only middle childhood. There were three studies that assessed CP from early to middle childhood. The results are grouped accordingly and presented below.

One study in a Quebec community sample assessed trajectories of parent-rated physical aggression from infancy to toddlerhood (i.e., 5 months to 42 months) and demonstrated that 11.1% of the girls showed a consistently high pattern of physical aggression across early childhood (Tremblay et al., 2005). Similarly, 16.9% of males in their sample showed persistently elevated aggression throughout the same age range. However, given the normativity of CP during this developmental period (Shaw & Gross, 2008), it is possible that the majority of both males and females showing this pattern will not exhibit CP during later childhood.

Three studies (McFadyen-Ketchum, Bates, Dodge, & Pettit, 1996; Schaeffer et al., 2006; van Lier & Crijnen, 2005) assessed CP in the middle childhood range (i.e., ages 5 to 11) and revealed that between 5% and 9% of females from community samples had persistently elevated CP (versus 5% to 15% for males). In contrast, only one study in this age range identified a group of girls (12%) or boys (11%) following an initially high, decreasing CP course.

Although the three studies were consistent in that they all identified an early-starting group of females, the percentage of girls characterized by this pattern differed across studies, in part due to differences in sample characteristics and the measurement of CP. For example, the two studies focusing on teacher- or peer-rated *aggression* in predominantly Caucasian community samples from the United States and the Netherlands identified lower numbers of persistently high females, 6.4% (McFadyen-Ketchum et al., 1996) and 5% (van Lier & Crijnen, 2005), respectively. In contrast, the study examining teacher-rated *aggressive-disruptive behavior* in a predominantly African American, low-income Baltimore community sample, identified approximately 9% of the females on a chronically high course of CP from ages 6 to 11 (Schaeffer et al., 2006). The latter study by Schaeffer and colleagues (2006), in addition to including a higher-risk sample than the other two projects, utilized a broader operational definition of CP (e.g., physical aggression and more mild disruptive behaviors such as yelling).

The studies were less consistent with respect to the existence of a desisting CP pathway during middle childhood. Only the study by McFadyen-Ketchum and colleagues (1996) identified a subset of females (12%) showing an initially elevated level of aggression that desisted from age 5 to age 8. However, this was also the only study to identify an analogous group of males (11%); the method used to classify children into trajectories in this study relied on a relatively lenient criterion, a Teacher Report Form (TRF) Aggressive Behavior T-score greater than 50 (the T-score mean),which likely initially over-classified some children as “high” at age 5. Conversely, the other two studies utilized person-centered analyses (i.e., growth mixture modeling) to group children who showed similar developmental patterns and did not identify an early-starting desisting trajectory. Thus, even in studies of a relatively restricted age range of middle childhood, variations in measurement (broad CP vs. physical aggression), sample characteristics (high vs. low risk), and classification strategy contributed to discrepant findings in the proportion of females showing early-starting persisting versus early-starting desisting CP.

Three studies (Côté, Vaillancourt, Barker, Nagin, & Tremblay, 2007; Côté et al., 2006; NICHD Early Child Care Research Network & Arsenio, 2004) examined the development of CP from early to middle childhood and found that between 1.4% and 13.5% of females showed a persistently high course of CP, while between 4.3% and 20% of males showed this pattern. No study identified a group of girls or boys who showed an initially *high*, desisting pathway; although all three identified a group of females, between 9.6% and 51.8%, exhibiting an initially *moderate*, but desisting CP pattern. Rates of moderate desisting CP were similar for males.

Despite similarities between sample characteristics, construct, and analytic strategy, the NICHD (2004) study and the two studies by Côté and colleagues (2006; 2007) produced widely varying estimates of the percentage of females following an early onset and persistent course of physical aggression throughout childhood. Once again, differences in the measurement of CP could be a possible source of variation. For example, in the NICHD study (2004), trajectories of physical aggression from ages 2 to 8 were identified in a predominantly Caucasian, middle class sample relying on six parent-rated CBCL items (e.g., destroys others' things, gets in many fights). Only 1.4% of the females in this sample were on the high trajectory. In contrast, Côté et al. (2006) and (2007) relied on 3 parent-reported physical aggression items (i.e., kicks, bites, hits other children; gets into many fights; reacts with anger and fighting) to create trajectories in a representative Canadian sample from ages 2 to 11 and ages 2 to 8, respectively. Although all three studies utilized person-centered semi-parametric modeling, the studies of Canadian children placed 13.2% and 13.5% of their respective females on the high trajectory from early to middle childhood. The differences are likely due in the number of items used to measure disruptive behavior, with the NICHD study's 6-item scale allowing for a greater amount of variability and, thus, differentiation, than Côté and colleagues' 3-item scale.

In addition, although the studies identified a moderate desisting group, no study from early to middle childhood identified a group of initially high then desisting females. For example, in Cote et al., (2006), at age 2, the high group mean was 2.5 on a scale from 0-6 in contrast with the desisting group's age 2 mean of 1.5. Moreover, the findings paralleled those of the early-starting persistent group, with both studies by Côté and colleagues (2006; 2007) finding many more girls following the moderate desisting trajectory (51.8% and 41.8%, respectively) than the NICHD study (2004), which found only 9.6% of the females in their sample followed this trajectory. In sum, it seems that girls with the highest levels of CP during early childhood tended to maintain a high level of CP into middle childhood, while girls with *moderate* levels of CP were more likely to desist across childhood.

In conclusion, of the studies in early and middle childhood, the findings varied between 11% of girls showing a persistently high course to their CP during toddlerhood to between 5% and 9% showing chronically high CP across middle childhood and between 1.4% and 13.5% showing early-onset persistent CP from early to middle childhood. In addition, only one study found a desisting group that demonstrated initially similar levels of CP to their high group. Thus, most studies in the early to middle childhood age range do not show a large proportion of females with an initially high and desisting pattern of CP. Moreover, a small proportion of females were classified as showing an early onset and persistent course to their CP in all studies reviewed, a rate that was typically lower than, albeit sometimes comparable to, that found for boys. Differences in the measurement of CP might account for some of the differences in the percentages of females on each trajectory between studies; however, variations in sample characteristics and classification strategy, among other possible contextual differences (e.g., cohort effects, cultural norms), also likely contributed to the discrepant findings.

Early and Middle Childhood to Early Adolescent Samples

Seven studies (ten samples) were identified for assessing female CP from early or middle childhood to early adolescence. As displayed in Table 2, all but one study (Barker & Maughan, 2009) utilized teacher report of child CP and all but two studies (Barker & Maughan, 2009; Côté, Zoccolillo, Tremblay, Nagin, & Vitaro, 2001) assessed a construct they described as aggressive behavior. In eight of the ten samples, a group of females, between 1% and 10.4%, were classified as exhibiting an early-starting and persistent pattern of CP; while females in three of the ten samples showed an early-starting and desisting CP trajectory, between 8.9% and 14%. In addition, one study identified a group of females with adolescent onset CP. Consistent with findings from studies in early and middle childhood, rates of persisting and desisting CP in females paralleled those found in males (6.6-11.9% persisting and 15.4-31% desisting), although females generally had lower base rates.

With respect to the percentage of females following an early-starting persistent trajectory, the results did not appear to systematically differ by sample characteristics, CP measurement, or modeling technique. For example, there were six samples in which physical aggression was assessed and all six relied on semi-parametric group modeling to identify patterns of physical aggression from middle childhood to early adolescence. In spite of the common age range, construct, and analytic technique used in these studies, the percentage of females on the early-starter path ranged between 1% in a Quebec community sample (Joussemet et al., 2008) to 10% in a United States community sample (Child Development Project) and a Christchurch, New Zealand birth cohort (Broidy et al., 2003). The remaining two studies, a mixed community and high-risk Quebec sample (Fontaine et al., 2008) and a Dunedin, New Zealand birth cohort (Broidy et al., 2003) did not identify a stable high physical aggression group. Illustrating the importance of CP measurement, even within New Zealand birth cohorts following children from ages 7 to 13 (Broidy et al., 2003), the addition of one item to the physical aggression measure might have influenced the pattern of results (see Table 2, p. 60). For example, CP was assessed with three items in the Christchurch cohort (e.g., frequently fights children, bullies other children, and temper outbursts) and two items in the Dunedin cohort (e.g., frequently fights children, bullies other children). Although the Christchurch cohort had approximately 10% of females showing high and stable CP, no high stable group was identified in the Dunedin cohort. Notably, this measurement difference did not appear to affect results for males (11% high stable males in Christchurch vs. 9% in Dunedin sample), suggesting that female CP rates may be more sensitive to measurement differences than male CP rates. However, although Christchurch and Dunedin are both New Zealand cities made up of predominantly European descendants (i.e., greater than 75%) with similar rates of post-school qualifications (41%), Christchurch is much larger than Dunedin (population 348,400 vs. 118,683) and also has a higher median income ($23,400 in Christchurch vs. $19,400 in Dunedin; Statistics New Zealand, 2006). Thus, it is also possible that true differences between samples contributed to the discrepant results. Therefore, it would be important for future work to compare how developmental trajectories of CP are affected by broadening CP measurement within the same sample.

Furthermore, four studies examined more broadly-defined CP from early or middle childhood to early adolescence. Once again, there was variability in the proportion of females classified as showing childhood onset and persistent CP. For example, in a mostly white high-risk and community sample from Quebec, Côté and colleagues (2001) classified 1.4% of females as showing high teacher-rated disruptive behavior from ages 6-12. Alternatively, in a mostly white U.S. community sample, Harachi and colleagues (2006) found that 10.4% of their sample exhibited high levels of teacher-rated aggressive behavior from ages 7-13. Similarly, Barker and Maughan (2009), the only study in this age group to use parent-report, demonstrated that in a mostly white English community sample, 8.3% of females showed early-starting and persistent CP from age 4 to age 12. Lastly, Campbell et

al. (2010) found that in the NICHD sample, 4.5% of the females exhibited high, but varying levels of teacher-rated aggressive behavior. Thus, in studies examining CP from middle childhood to early adolescence, using measures of both physically and verbally aggressive, as well as oppositional, behaviors, the proportion of females identified as early-starting and persistent ranged between 1% and 10.4%.

In addition, only three studies (Barker & Maughan, 2009; Broidy et al., 2003; Fontaine et al., 2008) found an early-starting group that desisted from ages 6 to 12, with percentages between 8.9% and 14.1%. Again, no consistent methodological aspect could be identified as the source of differences between studies. For example, two of the three studies identifying an early-starting desisting pathway assessed physical aggression, while four studies that assessed physical aggression did not identify a childhood limited pathway. However, one of the three studies (Fontaine et al., 2008) recruited a portion of their sample based on elevated CP at age 5, which may have contributed to their identification of a desisting group; however the remaining two studies finding this trajectory were in community samples.

In addition, one study that found a childhood limited trajectory (Barker & Maughan, 2009) was the only study in this age range to identify a group of females, 11.8%, (or males, 11.9%) showing an adolescent onset CP pattern. However, this study differed from comparison studies in several important ways that may partially explain some of their findings: First, the study began at age 4 while many of the other studies began at ages 6 and 7. Incorporating preschool-age children in their longitudinal sample may have allowed this study to capture children showing problematic levels of CP in preschool- and early school-age, while studies beginning at a later age would have missed this developmental change and simply classified these children as low. Second, this study estimated developmental trajectories for males and females together, while all but one other study in this age range estimated them separately; this modeling difference could have contributed to the identification of different types of developmental trajectories. Third, this study relied on parent informant, rather than teacher, which all of the other middle childhood studies used. Although teachers may be able to make unbiased ratings of children, parents may be uniquely able to capture within-child change.

The majority of evidence suggests that there are a small proportion of females (between 1% and 10%) who demonstrate both early-starting and persisting levels of CP from early or middle childhood to early adolescence. However, studies have been inconsistent in their identification of an early-starting desisting subgroup. Moreover, only one study identified a subgroup of females in this age range with adolescent onset CP (11.8%); however, only early adolescence was covered. Consistent with conclusions drawn from studies in younger children, methodological variables such as sample characteristics and CP measurement, which in one case was only one item, appeared to play a major role in the discrepant literature findings with respect to both the percentage of females following each trajectory and the types of trajectories identified. Moreover, some evidence suggests that rates of female CP may be more susceptible to subtle measurement differences than rates of male CP. Thus, some measures that capture different components of CP may reflect developmental patterns associated with each behavior that are differentially related to later functioning, particularly in females.

Early and Middle Childhood through Adolescence

As shown in Table 3, ten studies assessed CP in both childhood and adolescence. However, there was a great deal of variability in the age ranges covered, the constructs assessed, and ways developmental trajectories were categorized. For example, five studies examined CP from *middle childhood* throughout adolescence. Four of these (Fergusson & Horwood, 2002; Maughan, Pickles, Rowe, Costello, & Angold, 2000; Odgers et al., 2008; Pepler,

Jiang, Craig, & Connolly, 2010) identified a group of females, between 1.9% and 7.5%, who exhibited both early-starting and persistent CP, while the remaining study in a Dutch community sample did not identify an early-starting group (Diamantopoulou, Verhulst, & van der Ende, 2011). In contrast, all five studies identified an early-starting persistent group of males, between 2.6% and 19%. Estimates of females showing adolescent onset CP were even more variable. For example, the proportion of females classified in the adolescent onset group ranged between 2.7% and 27.1% and one study did not identify such a group in females or males (Maughan et al., 2000). Findings for males again paralleled those for females, with between 9% and 49.9% demonstrating adolescent onset CP. Moreover, only two studies identified a group of females following an early-starting desisting pathway (10-26%; Maughan et al., 2000; Odgers et al., 2008); the same studies also identified this group in males (19.9-42.3%). Although all five studies were conducted in community samples spanning from middle childhood to adolescence, there was variation in sample characteristics, participant ages, CP measurement, and analytic strategy; however, there was no systematic variation that could account for the discrepant findings.

As noted above, four of five studies from middle childhood into adolescence identified a group of females with early onset and persistent CP. The one study (Diamantopoulou et al., 2011) that failed to identify an early-starting group of females examined delinquency in a Dutch community sample from ages 11-18, while the other four studies were in Canada, New Zealand, and the U.S., and were initiated at younger ages. Moreover, the authors found only two trajectories of female CP (“high” and “low”), while all other studies in this review identified at least three. The low number of trajectories in this study might suggest their sample lacked variability in CP observed in many of the other samples. However, the source of variation among estimates of females showing early-starting CP in the remaining studies is less clear.

For example, one of the most methodologically sound studies in this age range, which utilized child, parent, and teacher reports of CP and delinquency in a Christchurch, New Zealand, birth cohort from ages 8-20, identified 2.1% of their females as showing chronic CP (Fergusson & Horwood, 2002). However, another study with similar methodology (i.e., use of child, parent, and teacher reports) and also conducted on a New Zealand birth cohort (in Dunedin) and using six CD symptoms to assess trajectories from age 7 to age 15, found that 7.5% of the females were classified in the early-starting, persistent group (Odgers et al., 2008). Thus, even within New Zealand birth cohorts, the results suggest that the percentage of females exhibiting early-starting and persistent CP differs. One possible explanation for the discrepancy is that Fergusson and Horwood assessed children on a greater number of behaviors (i.e., 58 delinquent acts from ages 12-16), asked about different behaviors as children were older, and modeled males and females together. In contrast, the study by Odgers and colleagues (2008) assessed the same six CD symptoms at every age and modeled males and females separately. However, similar to results from early adolescence, male CP rates in the two studies are comparable (9.4% and 8.2% early-starters in Christchurch and Dunedin, respectively).Therefore, differences in the method of (and amount of variability in) CP measurement and classification strategy could have led to the differences in both the patterns and proportions of trajectories identified and female CP rates appear to be more sensitive to these differences than male CP rates.

With respect to adolescent onset CP, the findings of studies from middle childhood to adolescence produced widely varying estimates (2.7%-27.1%). As with childhood onset CP, four of five studies identified this trajectory. Moreover, no consistent aspect of the samples, measurement, or methodology appeared to account for the differences. Therefore, the studies that produced the most extreme estimates are compared below.

Although each study investigated CP development in a predominantly Caucasian sample from middle childhood into adolescence, several other methodological aspects of their studies differed. For example, the study producing the lowest estimate (Pepler et al., 2010) used only child report of delinquency in a mid-to-upper SES sample, while the others used child, parent, and teacher reports in a birth cohort. Thus, the influence of their higher SES sample in combination with adolescents' possible unwillingness to disclose their CP could account for Pepler and colleagues' lower estimate. In contrast, Fergusson and Horwood (2002) relied on multiple informants to assess CP, changed measures to be more developmentally sensitive in adolescence, and covered a larger age range than the other studies. They found that 27.1% of their females showed adolescent onset CP. In this case, the authors' broader measurement could have captured some developmentally normative CP that other studies did not.

Only two of the five studies from middle childhood to adolescence classified a group of girls (or boys) exhibiting early-starting desisting CP. However, two studies that did not identify this trajectory began assessing participants at age 10 and 11, so it is possible many children's behavior would have desisted by the start of the study. Both studies that did identify an early-starting desisting group (Maughan et al., 2000; Odgers et al., 2008) measured symptoms of CD, while the remaining study (Fergusson & Horwood, 2002) used broader measures of CP (e.g., childhood CP and reports of adolescent offending) that changed from childhood to adolescence. Thus, it is possible CP appeared to desist in these studies because their measurement included a relatively narrow range of behaviors.

In fact, one study following a rural community sample in the U.S. from middle childhood to adolescence illustrates the importance of how CP is defined and measured. In this study by Maughan and colleagues (2000), the authors separated aggressive and non-aggressive symptoms of CD, reported on by both parent and child. They found that the proportion of females on the early onset persistent pathway was similar for aggressive and non-aggressive CD symptoms, 2.3% and 1.9%, respectively. Conversely, the authors found that over twice as many females showed an initially high but desisting pattern of non-aggressive CD symptoms (26%) than aggressive CD symptoms (10%) from middle childhood to adolescence (which was similar for males, with rates of 42.3% and 19.9%, respectively). Their findings suggest it may be especially important to assess all CP symptoms to adequately capture developmental patterns of CP.

Finally, five studies (Bongers et al., 2004; Bor et al., 2010; Brennan, Hall, Bor, Najman, & Williams, 2003; Lahey et al., 2006; Moffitt & Caspi, 2001) examined trajectories of CP from age 4 or 5 into adolescence. The authors of these studies investigated CP development in three different birth cohorts (Australia, New Zealand, and the Netherlands), a representative U.S. sample, and a high-risk Australian sample of children whose mothers were depressed during early childhood. Their results demonstrated that between .7% and 13.4% of females exhibited early-starting and persistent CP from preschool-age throughout adolescence (compared to rates of 1.8-19.7% in males), with the high-risk sample producing the highest estimates of females and males with early-starting CP (Brennan et al., 2003).

The study that produced the lowest estimate, Bongers et al. (2004), examined the development of four different types of CP from ages 4 to 17 in a Netherlands birth cohort. Their study estimated the percentage of females showing an early-starting and persistent course of parent-reported aggression (4.4%), opposition (5.9%), property violations (3.1%), and status violations (.7%) and again revealed the importance of how CP is defined and measured. For example, status violations consisted of behaviors such as running away from home and using drugs or alcohol, which are less developmentally relevant (Loeber, Burke, Lahey, Winters, & Zera, 2000) during early and middle childhood than at later ages.

Therefore, it is not surprising that a very low percentage of females demonstrated an elevated pattern of these behaviors from age 4. Alternatively, opposition included behaviors that are more common during early childhood (Campbell et al., 2000) such as temper tantrums and irritability, so a greater percentage of females would be expected to show an early-starting pattern to these behaviors.

With respect to adolescent onset CP, the findings revealed that between 6.9% and 24.3% of females followed this trajectory (5.1-26% for males). In addition, the evidence for an adolescent onset group was consistent in that all five studies from childhood to adolescence supported the existence of this pattern in females and males. Moreover, the study by Bongers and colleagues (2004) accounted for the most extreme estimates, which, as noted above, would be expected developmentally. That is, fewer girls exhibited new symptoms of opposition during adolescence (6.9%) but a large proportion committed status violations at this age (24.3%). Of the remaining studies, estimates of adolescent onset CP were between 10.1% and 18%.

The results appear to be most inconsistent with respect to the early-starting desisting trajectory. Only two of the five studies from childhood to adolescence identified a group of females, between 4.4% and 22.1%, who initially exhibited high levels of CP during childhood but desisted into adolescence. The results were similarly inconsistent for males, with only two of five studies finding a male desisting group, between 11% and 26.5%. However, an important methodological difference between studies may explain some of the discrepant results. For example, two of the studies (Brennan et al., 2003; Moffitt & Caspi, 2001) that failed to identify a desisting group classified children based upon whether their CP scores fell over a standard deviation above the mean during childhood and/or adolescence. If there were females in the “high” group during childhood but not adolescence, they were either omitted or categorized in the never/nonaggressive group. In contrast, one study utilized this method of classification but accounted for a desisting group. The study by Bor and colleagues (2010) identified 9.7% of the females in their Australian birth cohort as having shown elevated CP during childhood but not adolescence. Thus, in addition to construct, the method used to classify trajectories was another source of variation that likely influenced the patterning of results.

In conclusion, studies from early and middle childhood into adolescence were largely consistent in identification of an early-starting persistent and an adolescent onset group; thus, a proportion of females demonstrated CP from early childhood and a *separate* group of females began showing CP at adolescence. However, the findings were inconsistent in both the identification of an early-starting desisting group and the proportions of females following each trajectory. When data on males were also available, the types of trajectories identified were similar, although a larger proportion of males than females tended to be classified as high. Measurement of CP, sample, and classification strategy appeared to play a role in the variation in both the *types* of trajectories identified and the *proportions* of females following each.

Conclusion

Summary and Integration of Findings

In light of common claims in the literature that very few females exhibit early-starting and persistent CP, the primary aim of this review was to evaluate the percentage of females who show this developmental pattern relative to two other trajectories often theorized to be more characteristic of females: early-starting desisting and adolescent onset CP. The findings suggest that between .7% and 13.5% of females in high-risk and community samples

showed early-starting persistent CP, while between 2.7% and 27.1% had an onset of CP in adolescence.

In addition, although it has been argued that females with early-starting CP are not likely to show CP into adolescence and adulthood, evidence for early-starting desisting CP was inconsistent. For example, of the studies that *could have* identified an early-starting desisting trajectory, only 10 out of 29 found a subgroup of girls with initially high CP that desisted throughout childhood. In contrast, 27 out of 31 studies identified an early-starting persistent trajectory. In sum, this review found that a small, but significant proportion of females showed an early onset and persistent course to their CP while a *different* group of females demonstrated adolescent onset CP; evidence for an early-starting desisting pathway was inconsistent.

Early-starting Persisting vs. Early-starting Desisting CP

In addition, seven of ten studies that identified an early-starting desisting CP trajectory found it to be *in addition to*, rather than in place of, an early-starting persisting trajectory. These results are contrary to what would be expected based on theory and evidence that girls experience a stronger biological and social "push" away from CP (Keenan & Shaw, 1997), as well as prior claims that early-starting girls are more likely to follow a desisting than persisting pathway (Denno, 1994; Elliott, 1994; Moffitt, 1994). Instead, the results are consistent with the taxonomies that have been well-validated in males (Moffitt, Caspi, Dickson, Silva, & Stanton, 1996; Shaw et al., 2003) and suggest that girls who show elevated levels of CP by preschool or early school-age are at increased risk of persistence relative to low CP girls. Moreover, based on the inconsistent identification of an early-starting desisting pathway, the findings suggest that few girls who continue to show elevated levels of CP at preschool and school-age go on to exhibit a desisting pattern during adolescence. It is possible that early-starting girls are at increased risk of persistence even in comparison with early-starting boys. However, a formal evaluation of the percentage of early-starting females versus males who continue to show CP throughout development would be necessary to determine whether a gender paradox is evident.

Early-starting Persisting vs. Adolescent Onset CP

The findings also suggest that contrary to what has been previously reported in the literature, a proportion of females, between 1% and 10%, began showing high levels of CP during early and middle childhood and continued to exhibit this pattern into middle and late adolescence. The estimates of females who showed an adolescent CP onset varied widely, but ranged from roughly equal proportions of girls with adolescent and child CP onset to as many as 37:1 girls with adolescent versus childhood onset. However, half of the studies that identified both trajectories found adolescent to childhood onset ratios between 1:1 and 1.5:1. The operationalization and measurement of CP, as well as differences in sample characteristics, seemed to most consistently account for the discrepancies, with broader measurement of CP and the use of community samples producing smaller ratios than narrower measurement and use of at-risk or clinical samples. The pattern of results is consistent with what would be expected based on traditional taxonomy theory. However, more research that utilizes equivalent CP measurement in various samples is needed to clarify what may be true population differences in adolescent to childhood onset CP ratios from artifacts of measurement.

Integration with Research on Males

Similar to findings from studies of all-male or mixed male and female samples (Broidy et al., 2003; Moffitt et al., 1996; Shaw et al., 2003), the development of female CP follows patterns of early-starting persisting, early-starting desisting, and adolescent onset

trajectories. However, consistent with base rate differences in CP, a larger percentage of males tend to follow the early-starting persistent CP trajectory. That is, of the studies reviewed that also included males, between 13.6% and 16.9% during early and middle childhood (Tremblay et al., 2005; van Lier & Crijnen, 2005), between 4% and 11.9% from middle childhood to early adolescence (Broidy et al., 2003; Harachi et al., 2006), and between 1.8% and 19.7% from childhood into adolescence (Bongers et al., 2004; Brennan et al., 2003; Maughan et al., 2000; Moffitt & Caspi, 2001) were classified in the early-starting persistent group. In general, the rates identified for early-starting persistent males were higher than those identified for females, with often over twice as many males than females on the early-starting persistent trajectory. As with females, studies that used broader measurements of CP and higher risk samples produced higher estimates of early-starting CP than studies using narrower definitions and community samples. In addition, the majority of males and females in all studies reviewed exhibited no or low CP (Broidy et al., 2003), albeit a larger percentage of females showed this pattern. The results suggest that males and females follow similar developmental trajectories of CP; however, it is less clear whether early-starting males and females engage in similar *levels* of CP over time.

Although it is beneficial to estimate male and female CP trajectories separately to allow for sex-specific development, one limitation of this strategy is the potential identification of a female “high” group that would actually exhibit lower levels of CP than lower male groups. Unfortunately, most studies did not directly compare CP means between male and female early-starters, although visual inspection of their data suggests girls are not simply being artificially labeled as high. Moreover, in their cross-site review of the development of male and female physical aggression from middle childhood to early adolescence, Broidy and colleagues (2003) did compare boys’ and girls’ mean levels of aggression. Their findings demonstrated that the female high group showed lower levels of physical aggression than the male high group; however, females on the early-starting persistent trajectory had higher levels of physical aggression than all other male and female trajectory groups. Thus, their data support the existence of subgroups of boys and girls with persistently elevated levels of physical aggression.

In addition, although early-starting females may engage in CP at a lower frequency than early-starting males, longitudinal work extending into adulthood suggests their CP is in no way benign. For example, as noted above, Odgers and colleagues (2008) followed their early-starting females to age 32 and revealed that they were characterized by higher levels of crime and poverty as well as lower levels of physical and mental health than females with low CP. Other longitudinal adolescent and adult outcomes linked to early-starting persistent CP in females include increased rates of teen pregnancy (Woodward & Fergusson, 1999), arrests (Tolan & Thomas, 1995), and suicide attempts (Bongers, Koot, van der Ende, & Verhulst, 2008). In sum, data from this review supports the existence of a subgroup of females who demonstrate early-starting and persistent CP from childhood throughout adolescence and additional work suggests this is a group in which it would behoove society to intervene.

Implications for Prevention and Intervention

The findings suggest that a substantive proportion of girls demonstrate early-starting and persistent CP. In addition, these females’ longitudinal teenage and adult outcomes are detrimental to themselves, their families, and society. Only recently has research begun to acknowledge the significance of female CP and investigate whether influential theories (Moffitt, 1993a) of CP development are applicable to females. As findings from this review indicate, research increasingly suggests that age of onset and course-based taxonomies, which have provided a framework with which to understand some of the common

precursors, correlates, and outcomes associated with CP development in males, are applicable to females (Broidy et al., 2003; Lahey et al., 2006; Odgers et al., 2008).

In addition, recent work has shown that many of the same precursors including socioeconomic status and harsh parenting during early childhood are associated with increased risk of CP in both sexes (Côté et al., 2006; Lahey et al., 2006). Thus, because the results of this review suggest that males and females typically show parallel CP pathways and that there are few consistent CP risk factors moderated by sex, it is likely that males' higher base rates of CP are driven by the presence of individual child factors rather than males' increased susceptibility to environmental risk. Further, the current evidence indicates that intervening in mechanisms associated with CP in males would also be beneficial to females. For example, prevention trials targeting child CP through increases in positive parenting and decreases in harsh, coercive parenting (e.g., The Family Check-Up, Dishion et al., 2008) would be expected to be equally beneficial for both sexes, which is consistent with early findings (Gardner et al., 2009). However, relatively few studies examine sex-specific precursors and correlates of CP. Therefore, it is not yet possible to conclude whether some environmental risk factors are uniquely associated with CP in one sex over the other. As science advances our understanding of CP development in both sexes, it may be ideal to one day tailor interventions differently based on the knowledge of different causal mechanisms in males and females.

In sum, the evidence suggests that a subset of girls follow an early-starting and persistent trajectory of CP from early childhood into adolescence, and that these girls are at increased risk for continued violence and mental, physical, and economic problems into adulthood (Bor et al., 2010; Odgers et al., 2008). Moreover, risk factors such as harsh parenting and poverty during early childhood increase the risk of CP for males and females. Thus, prevention and intervention science could benefit by focusing on toddler- and preschool-age boys *and* girls with a history of behavior problems that also exhibit these shared risk factors for continued CP. Work that could increase the percentage of females whose CP desists by middle childhood and adolescence could decrease the incidence of crime, mental health problems, poverty, and teenage pregnancy and, in turn, reduce the number of children in the next generation who are exposed to risk for CP.

Limitations of Extant Literature

One consistent theme throughout this review has been the need for more research on the development of CP in females. Specifically, there is a need for prospective longitudinal work following males and females from *toddlerhood* through adolescence and, ultimately, into adulthood. Although a number of studies examined CP longitudinally for a large part of child and adolescent development (Bongers et al., 2004; Odgers et al., 2008), no study presenting data on all of these developmental stages could be identified. This research design would provide valuable information regarding the developmental trajectories of CP, including the earliest age at which a group of early-starters can be identified reliably. In the current state of the literature, studies that identified a group of early-starters as early as toddlerhood did not provide follow-up information about persistence beyond middle childhood (Campbell et al., 2010; Côté et al., 2006). Additionally, studies following children with early-starting and persistent CP into late adolescence typically began around middle childhood. Studies that cover the toddlerhood to emerging adulthood periods in males *and* females could better capture developmental patterns of CP and shed light on possible biological and environmental influences on CP trajectories that would be important for both theoretical and practical work.

Moreover, there is a great deal of inconsistency between studies' operationalization of CP, ranging from broad measures of externalizing (which were excluded from this review; e.g.,

Aguilar et al., 2000) to very narrow definitions such as physical aggression (e.g., Broidy et al., 2003). As noted above, measurement differences appeared to play a major role in many of the discrepancies found between studies in both types of CP trajectories identified and the percentage of individuals classified in each trajectory. Speaking to the importance of measurement, four studies (Broidy et al., 2003; Caspi et al., 1995; Moffitt & Caspi, 2001; Odgers et al., 2008) presented findings from the Dunedin birth cohort, each of which measured CP differently and produced different results. Although broad CP definitions may be better able to capture different developmental patterns over time, in part because they simply include more behaviors, it is likely that narrower definitions that capture more salient behavior problems throughout development are able to identify a more homogenous subgroup at the greatest risk for problematic outcomes. For example, it may be less important to know that a proportion of children show persistent CP if this persistence is attributable to relatively low-level behavior problems. In contrast, studies that evaluate whether males and females persist on more narrowly-defined but theoretically important (e.g., early physical aggression for later violent offending) dimensions are likely to prove more valuable for identifying a particularly problematic subgroup that should be targeted for intervention. Thus, basic research clarifying whether broad or narrowly-defined constructs demonstrate greater predictive utility for maladaptive outcomes will be crucial to informing future researchers' decisions regarding which measurement strategy would create the most meaningful trajectory groups.

Another consistently important dimension in the studies reviewed was sample characteristics. However, information about changes in the percentages of male and female participants at each wave was often not provided. Although all studies that *did* report attrition analyses found no sex differences in rates of participation (e.g., Bongers et al., 2004; Lahey et al., 2006; Odgers et al., 2008), these data were provided inconsistently and often only for the total sample. While sex differences in attrition would not necessarily be expected, future work should supply demographic details about participants over time so the reader can adequately track retention data. It is also important to note that much of the research included in this review was conducted on predominantly Caucasian, New Zealand birth cohorts, samples from the Netherlands, and Canada. In fact, as noted in the previous paragraph, many of the studies in this review presented results from the Dunedin sample. In addition, at least seven studies (Broidy et al., 2003; Côté et al., 2001, 2006, 2007; Fontaine et al., 2008; Joussemet et al., 2008; Tremblay et al., 2005) came from the same group of researchers. Although this work has been vital in elucidating information about the age of onset and developmental course of CP in females, many of the results may not generalize to diverse, higher risk U.S. samples.

From an ecological perspective (Bronfenbrenner, 1979), nationality, among other contextual factors such as race and socioeconomic status, would play a crucial role in both rate and course of CP as well as the outcomes likely to be associated with elevated rates of CP during childhood. For example, social safety nets in some countries may protect children from facing the type of deep poverty and accumulation of risk for CP faced by many children in the urban U.S. Therefore, early-starting CP may be likely to persist in contexts where children have limited access to community resources and social supports (e.g., inner-city Baltimore; Schaeffer et al., 2006), but higher rates of desisting CP might be found in cultures where there are opportunities for positive alternatives (e.g., The Netherlands; Bongers et al., 2004).

Moreover, theoretically, behaviors that are seen as problematic in some cultures may be quite adaptive and not reflective of maladjustment in others. One prime example of such an association is the finding that physical discipline is associated with increased child CP in communities in which physical discipline is rare, but that there is no association between

physical discipline and CP in communities where physical discipline is normative (Deater-Deckard & Dodge, 1997). Thus, based on theory and evidence that contextual differences contribute to differences in rates and predictive validity of CP, future work should include samples that are socioeconomically, racially, and ethnically diverse. Work that utilizes similar approaches to CP measurement and accounts for the role of contextual variations across multiple samples (e.g., high-risk, clinical, and community) will be important to differentiate artifacts of measurement from true sample differences in patterns of CP development.

In summary, although the literature on the CP development in females has come far, numerous limitations remain. Longitudinal work that assesses broad and narrow definitions of CP and includes males *and* females from multiple contexts is important for researchers to continue to build upon what has been learned about CP development and begin to diversify research to ensure findings are generalizable to the broader population.

Future Directions

As the field begins to answer questions about the development of CP in both sexes, many new ones are being uncovered. First, variation in CP measurement and associated CP trajectories were consistently linked throughout this review; however, there is a need for basic research examining whether relatively broad vs. narrow CP measurement approaches are capturing different constructs and whether one is better suited for predicting a given outcome of interest than another. For example, does assessment of relatively extreme physical aggression during childhood have higher predictive utility for later criminality than CP measures that include temperamental and disruptive behaviors? Or do measures that assess the latter provide higher predictive utility for general psychopathology compared to more narrow constructs? Answering these questions would have theoretical and practical implications for tailoring childhood CP measurement capturing subgroups most relevant to specific outcomes of interest.

Second, it is apparent that variation in methodological approaches, including modeling technique and whether sexes are pooled or estimated separately, can have a significant influence on a study's findings. Person-centered analyses are appealing in their ability to identify subgroups underlying heterogeneity that may previously have been overlooked; however, these approaches are not without limitations (e.g., see Skardhamar, 2010) and reification of groups is cautioned in the absence of strong theory and additional validation. In contrast, researchers can be biased by generating groups based on previously-derived theoretically- or empirically-generated criteria (e.g., DSM diagnosis), which have their own set of limitations (Regier, Narrow, Kuhl, & Kupfer, 2009) and can lead researchers to overlook important heterogeneity in their sample (e.g., a desisting group). Similarly, pooling males and females for trajectory analysis may underestimate the number of females in the high group while sex-specific analyses are subject to overestimation. In sum, each methodological variation carries its own set of advantages and disadvantages. Thus, convergence of results across methods is critical to drawing conclusions about sex differences in developmental patterns of CP.

Third, as noted throughout this review, early-starting desisting CP is inconsistently identified and poorly understood. Many questions remain including identifying the mechanisms underlying early-starting desisting CP. How do contextual factors influence the proportion of children who show persisting vs. desisting CP? How do children following an early-starting but desisting trajectory fare in terms of mental health, academic, and social functioning? Based on the predictive utility of childhood CP for later antisocial behavior (Campbell et al., 2000; Shaw & Gross, 2008), advancing our understanding of predictors and outcomes associated with a childhood limited course is both theoretically and practically

meaningful, as understanding the mechanisms associated with desisting CP could lead to improved intervention strategies.

Summary

In conclusion, this review demonstrated that males and females follow largely similar developmental trajectories of CP, albeit with different frequencies. In addition, contrary to what has been stated in the literature, a group of females engage in CP from early childhood and continue to do so throughout adolescence. Moreover, their long-term outcomes are detrimental to themselves and to society. Thus, it is important to understand factors contributing to this developmental pattern in females. The findings also support the notion that, as with males, a proportion of females begin engaging in CP at adolescence, while some females who had childhood CP desist by adolescence. However, the identification of an early-starting desisting group was inconsistent. Moreover, the proportion of females following early-starting persisting, desisting, and adolescent onset trajectories varied widely, seemingly as a function of measurement and sample differences. Increasing our understanding of the link between sex and CP development has the potential to improve our understanding of the causes of CP. To this end, researchers should continue to investigate the longitudinal development of CP in males *and* females while being mindful of methodological variations that contribute to their findings.

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Table 1

Studies in Early and Middle Childhood Samples

1st Author(s)	Year	Sample	Female N	Age	Behavior Assessed (Reporter)	Childhood Onset Modeling	Adol: Child Onset	M/F Separate (Y/N)[a]	Trajectories/Groups n (%)
Early Childhood									
Tremblay et al.	2005	**Community** -Quebec births -Race/ethnicity not given -Mid-to-upper SES	261	5-42 mos	Physical Aggression (3 items[b] – Parent)	Semi-parametric modeling	N/A	N	1. High 29 (11.1%) 2. Modest 146 (55.9%) 3. Low (33%)
Middle Childhood									
McFadyen-Ketchum et al.	1996	**Community** -From 15 public schools -81.6% European American -35.8% single parent	234	5-8	Aggression (TRF[c] – Teacher, Peer Nominations)	T score > 50 on TRF = high; direction of change	N/A	Y	1. High increasing 15 (6.4%) 2. High decreasing 28 (12.0%) 3. Low increasing 90 (38.5%) 4. Low decreasing 101 (43.2%)
van Lier & Crijnen	2005	**Community** -The Netherlands -69% Caucasian	141	7-9	Aggressive Behavior (Peer nominations)	General growth mixture modeling	N/A	N	1. Early-onset increasers 7 (5%) 2.Moderate-persisters 37 (26.2%) 3. Low stable 97 (68.8%)
Schaeffer et al.	2006	**Community** -Baltimore school sample -71.3% African American -50% low income	466	6-11	Aggressive–Disruptive (TOCA[d] – Teacher)	General growth mixture modeling	N/A	Y	1. Chronic high 42 (9%) 2. Low moderate 312 (67%) 3. Low (24%)
Early Childhood to Middle Childhood									
NICHD ECCRN & Arsenio	2004	**Community** -NICHD[a] sample -Multi-site -24% Minority -Middle class	581	2-8	Physical Aggression (6 items CBCL – Parent)	Semi-parametric modeling	N/A	N	1. High 8 (1.4%) 2. Moderate 73 (12.6%) 3. Moderate declining 56 (9.6%) 4. Low 151 (26%) 5. Very low 293 (50.4%)
Côté et al.	2006	**Community** -Canadian representative -NLSCY[b] sample -Accelerated design -Race/ethnicity not given -Middle class	5128	2-11	Physical Aggression (3 items – Parent)	Semi-parametric modeling	N/A	N	1. High stable 677 (13.2%) 2. Moderate desister 2656 (51.8%) 3. Low desister 1795 (35%)

1st Author(s)	Year	Sample	Female N	Age	Behavior Assessed (Reporter)	Childhood Onset Modeling	Adol: Child Onset	M/F Separate (Y/N)[a]	Trajectories/Groups n (%)
Côté et al.	2007	**Community** -Canadian representative -NLSCY subsample -Race/ethnicity not given -Middle class	594	2-8	Physical Aggression (3 items – Parent)	Semi-parametric modeling	N/A	N	1. High stable 80 (13.5%) 2. Moderate-desister 247 (41.8%) 3. Low-desister 229 (38.7%) 4. Low stable 35 (5.9%)

[a]Were males and female trajectories modeled separately?

[b]No specific measure provided: 1) hits, bites, kicks, 2) fights, 3) and bullies others.

[c]TRF = Teacher Report Form Version of the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001).

[d]TOCA = Teacher Observation of Classroom Adaptation–Revised (Werthamer-Larsson, Kellam, & Wheeler, 1991).

[a]NICHD = National Institute of Child Health and Human Development.

[b]NLSCY = National Longitudinal Survey of Children and Youth.

Table 2

Studies in Early and Middle Childhood to Early Adolescent Samples

1st Author(s)	Year	Sample	Female N	Age	Behavior Assessed (Reporter)	Childhood Onset Modeling	Adol: Child Onset	M/F Separate (Y/N)	Trajectories/Groups n (%)
Côté et al.	2001	**2/3 community, 1/3 high risk** -Quebec, public school sample -Mostly White -1/3 had high disruptive behaviors at age 5	885	6-12	Disruptive behavior (SBQ[a] items– Teacher)	Semi-parametric modeling	N/A	Y	1. High 12 (1.4%) 2. Medium-High 85 (9.6%) 3. Medium 280 (31.6%) 4. Low 508 (57.4%)
Broidy et al.	2003	**Community** -Quebec sample, representative -Middle class	1000	6-12	Physical Aggression (3 items[b] – Teacher)	Semi-parametric modeling	N/A	Y	1. High stable 30 (3%) 2. High desisting 120 (12%) 3. Low stable 330 (33%) 4. Very low stable 520 (52%)
		Community -New Zealand birth cohort (Christchurch)	630	7-13	Physical Aggression (3 items[c] – Teacher)	Semi-parametric modeling	N/A	Y	1. High stable 63 (10%) 2. Low stable 302 (48%) 3. Very low stable 265 (42%)
		Community -New Zealand birth cohort (Dunedin)	502	7-13	Physical Aggression (2 items[d] – Teacher)	Semi-parametric modeling	N/A	Y	1. Moderate desisting 216 (43%) 2. Very low stable 286 (57%)
		Community -Child Development Project -19% Minority	281	5-12	Physical Aggression (4 items[e] – Teacher)	Semi-parametric modeling	N/A	Y	1. High stable 28 (10%) 2. Low stable 124 (44%) 3. Very low stable 129 (46%)
Harachi et al.	2006	**Community** -U.S. Northwest -81% Caucasian -7% Asian/Pacific Islander	461	7-13	Aggressive Behavior (Items[a] from TOCA, CBCL – Teacher)	Semi-parametric modeling	N/A	Y	1. High 48 (10.4%) 2. Moderate 62 (13.4%) 3. Low 147 (31.9%) 4. None 204 (44.3%)
Fontaine et al.	2008	**2/3 community, 1/3 high risk** -Quebec, public school sample -Mostly White -1/3 had high disruptive behaviors at age 5	881	6-12	Physical Aggression (SBQ – Teacher)	Semi-parametric modeling	N/A	Y	1. High declining 79 (8.9%) 2. Moderate 409 (46.4%) 3. None 393 (44.6%)
Joussemet et al.	2008	**Community** -Quebec sample, representative	996	6-12	Physical Aggression (SBQ –Teacher)	Semi-parametric modeling	N/A	N	1. High 10 (1%) 2. Moderate 70 (7%) 3. Low 438 (44%)

1st Author(s)	Year	Sample	Female N	Age	Behavior Assessed (Reporter)	Childhood Onset Modeling	Adol: Child Onset	M/F Separate (Y/N)	Trajectories/Groups n (%)
		-Race/ethnicity not given -Middle class							4. Never 478 (48%)
Barker & Maughan	2009	**Community** -Avon, England -96% Caucasian	3537	4-13	Conduct Problems (SDQ[b] – Parent)	Growth mixture modeling	1.5:1	N	1. Early-onset persistent 292(8.3%) 2.Childhood Limited 499 (14.1%) 3. Adolescent onset 417 (11.8%) 4. Low 2327 (65.8%)
Campbell et al.	2010	**Community** -NICHD -Multi-site -24% Minority -Mid/upper SES[c]	533	6-12	Aggressive Behavior (TRF – Teacher)	Semi-parametric modeling	N/A	Y	1. High variable 24 (4.5%) 2. Low Stable 81 (15.2%) 3. No aggression 428 (80.3%)

[a]SBQ = Social Behavior Questionnaire (Tremblay et al., 1991).

[b]Fights with others, bullies/intimidates others, kicks/bites/hits others.

[c]Frequently fights with other children,bullies other children, temper outbursts.

[d]Frequently fights with other children, bullies other children.

[e]Cruelty/bullying/meanness to others, fights with others, physically attacks people, threatens people.

[a]Fights, is cruel or mean to others, threatens people, yells at others.

[b]SDQ = Strengths and Difficulties Questionnaire (Goodman, 2001).

[c]SES = Socioeconomic status.

Table 3

Studies from Early and Middle Childhood into Adolescence

1st Author(s)	Year	Sample	Female N	Age	Behavior Assessed (Reporter)	Childhood Onset Modeling	Adol: Child Onset	M/F Separate (Y/N)	Trajectories/Groups n (%)
Middle Childhood to Adolescence									
Maughan et al.	2000	**Community** -89% White -Rural -Southeast U.S. -1/3 below Federal poverty line	630	9-13 through 13-16	DSM-IV Aggressive CD Symptoms (Child, Parent)	Semi-parametric modeling	N/A	N	1. High stable 15 (2.3%) 2. Declining 63 (10%) 3. Stable low 552 (87.7%)
					DSM-IV Non-Aggressive CD Symptoms (Child, Parent)	"	N/A	N	1. High stable 12 (1.9%) 2. Declining 164 (26%) 3. Stable low 454 (72.1%)
Fergusson & Horwood	2002	**Community** -New Zealand birth cohort (Christchurch)	461	8-20	Conduct Problems (Parent, Teacher (8-10))[a] Juvenile Offending (SRED[b], SRD[c] – Parent, Child (11-20))	Latent class modeling	13:1	N	1. Chronic 8 (2.1%) 2. Early adolescent limited (21%) 3. Adolescent limited (3.7%) 4. Late adolescent limited (2.4%) 5. Low 327 (71%)
Odgers et al.	2008	**Community** -New Zealand birth cohort (Dunedin) -Primarily White	494	7-15	DSM-IV CD symptoms (6)[d] (Parent, Child, Teacher)	General growth mixture modeling	2:1	Y	1. Early-onset persistent 37 (7.5%) 2. Childhood limited 99 (20%) 3. Adolescent onset 86 (17.4%) 4. Low 272 (55.1%)
Middle Childhood to Adolescence (cont'd)									
Pepler et al.	2010	**Community** -Canadian school sample -20.4% Asian-Canadian -Mid-to-upper SES	402	10-17	Delinquency (SRED – Child)	Semi-parametric modeling	1:1.5	N	1. Early onset 17 (4.2%) 2. Late onset 11 (2.7%) 3. Moderate 92 (22.9%) 4. Low 282 (70.2%)
Diamont-opoulou et al.	2011	**Community** -Dutch -Wave design -no race/SES provided	776	11-18	Delinquency (YSR[a] – Child)	General growth mixture modeling	N/A	Y	1. "High" increasing 264 (34%) *did not differ from 0 at age 11 2. Low 512 (66%)
Early Childhood to Adolescence									
Moffitt & Caspi	2001	**Community** -New Zealand birth cohort -Primarily White	445	5-18	Antisocial behavior (Parent (5-11) SRD – Child (15, 18))	LCP defined as > 2 time points 5-11 with ASB,	13:1	Y	1. Life-course persistent 6 (1%) 2. Adolescent limited 78 (18%) 3. Never 361 (81%)

1st Author(s)	Year	Sample	Female N	Age	Behavior Assessed (Reporter)	Childhood Onset Modeling	Adol: Child Onset	M/F Separate (Y/N)	Trajectories/Groups n (%)
						extreme ASB at 15 or 18			
Brennan et al.	2003	**High-risk** -Australian birth cohort subsample -Mothers depressed 0-5 -91% Caucasian	172	5,14,15	Aggressive Behavior (CBCL – Parent)	Combinations of 1 SD above mean at age 4, 14, or 15; those in "middle range" excluded	1:1	Y	1. Early onset persistent 23 (13.4%) 2. Adolescent onset 25 (14.3%) 3. Nonaggressive 124 (72.3%)
Early Childhood to Adolescence (cont'd)									
Bongers et al.	2004	**Community** -Netherlands birth cohorts -Wave design -Caucasian	1060	4-18	Aggression (CBCL – Parent)	Multi-level growth models	N/A	N	1. High decreasing 47 (4.4%) 2. Low decreasing 154 (14.5%) 3. Low 859 (81%)
					Opposition (CBCL –Parent)	"	1:1	N	1. High persisting 63 (5.9%) 2. High decreasing 234 (22.1%) 3.Medium decreasing 335 (31.6%) 4. Adolescent increasing 73 (6.9%) 5. Low decreasing 272 (25.7%) 6. Low (7.8%)
					Property Violations (CBCL –Parent)	Multi-level growth models	N/A	N	1. High persisting 33 (3.1%) 2. Low decreasing 184 (17.4%) 3. Low 843 (79.7%)
					Status Violations (CBCL – Parent)	"	37:1	N	1. High increasing 7 (.7%) 2. Adolescent increasing 258 (24.3%) 3. Medium increasing 204 (19.2%) 4. Low 591 (55.8%)
Lahey et al.	2006	**Community** -U.S. Representative, NLSY subsample -Diverse sample -Accelerated design	2253	4-17	Conduct Problems (Items from CBCL[a] –Parent (4-13)) Delinquency (SRD – Child, (14-17))	Semi-parametric modeling	1.5:1	Y	1. Life-course persistent 155(6.9%) 2. Moderate 622 (27.6%) 3. Normative 834 (37%) 4. Adolescent limited 257 (11.4%) 5. Low 385 (17.1%)
Bor et al.	2010	**Community** -Australian birth cohort -Mostly Caucasian -Working and lower-middle class	2201	5,14	Antisocial Behavior (CBCL – Parent, age 5; YSR – Child age 14)	Considered antisocial at a given age if scored 1 SD > mean	4:1	Y	1. Life-course persistent 41 (2.7%) 2. Childhood limited 166 (9.7%) 3. Adolescent onset 154 (10.1%) 4. Unclassified 1291 (77.5%)

[a] Measure created for study –items from Conners' (1969) and Rutters' (1970) scales.

[b] SRED = Self-Report of Early Delinquency (Moffitt & Silva, 1988).

[c] SRD = Self-Report of Delinquency.

[d] Truancy, stealing, fighting, telling lies, bullying, and destroying property.

[a] YSR = Youth Self Report Version of the CBCL (Achenbach & Rescorla, 2001).

[a] Cheats or tells lies, has trouble getting along with teachers, disobedient at home, disobedient at school, bullies or is cruel or mean to others, breaks things on purpose or deliberately destroys his/her own or another's things, and does not seem to feel sorry after misbehaving.