

What We Have Learned about Early Childhood and the Development of Delinquency

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There has been growing interest in identifying very young children at risk for early and persistent trajectories of antisocial behavior. This interest has been motivated by several studies on early- versus late-starting antisocial youth (Moffitt, 1993; Patterson, Capaldi, & Bank, L, 1991). Several researchers have documented that compared to late starters, who begin delinquent activity in mid- to late-adolescence, early starters show a more persistent and chronic trajectory of antisocial behavior extending from *middle* childhood to adulthood. (Moffitt, 1993; Moffitt & Caspi, 2001). Early starters represent approximately 6-7% of the population, yet are responsible for almost half of adolescent crime and three-fourths of violent crimes (Offord, Boyle, & Racine, 1991). During the past two decades, researchers have become increasingly interested in the possibility that early-starting children can be identified at younger and younger ages (Campbell, Pierce, March, Ewing, & Szumowski, 1994; Richman, Stevenson, & Graham, 1982). The goal of the present chapter is to review what we have learned about factors in early childhood that are associated with the development of serious antisocial behavior in later childhood, adolescence, and adulthood.

Impetus for Focusing on Very Young Children

The impetus for identifying young children and pregnant women (whose children are) at risk for early-starting antisocial pathways (Olds, 2002; Tremblay & Nagin, 2005) is based on findings from two interrelated areas, onset patterns for externalizing behavior and preventive intervention research. First, children who have been found to *not* demonstrate high levels of disruptive behavior during the toddler period are unlikely to begin showing clinically-elevated levels of aggression or other types of externalizing behaviors in later childhood or adulthood,

with very few children initially demonstrating high rates of disruptive behavior after age 5 (Shaw, Gilliom, & Giovannelli, 2000a). An example comes from the Pitt Mother & Child Project (PMCP), a study of 310 ethnically-diverse, low-income boys followed from infancy to adolescence. Among boys in the PMCP identified at or above the 90th percentile (i.e., cutoff for clinical meaningfulness) on broad factors of externalizing symptoms at age 2, 63% remained above the 90th percentile at age 5, and 97% remained above the median (Shaw et al., 2000a). At age 6, 62% remained at or above the 90th percentile and 100% (all 18) remained above the median. In terms of the percentages of children who began showing high rates of externalizing symptoms at school entry, rates were low. Only 13% and 16% of boys below the 50th percentile on Externalizing at age two moved into the clinical range at ages five and six, respectively. Thus, the results suggest that it is relatively uncommon for children to begin showing clinically-meaningful conduct problems as late as ages 5 or 6 without a history of demonstrating such behavior in early childhood.

Second, child externalizing problems and parenting practices associated with its persistence appear to be more malleable during early versus later childhood (Reid, 1993). Specifically, prevention and intervention studies initiated prior to school entry have shown greater efficacy for treating children with clinically-elevated rates of externalizing problems than for older children (Baydar, Reid, & Webster-Stratton, 2003; Olds, 2002; Shaw, Dishion, Supplee, Gardner, & Arnds, 2006). The more positive outlook for intervening earlier is likely attributable to several factors, including the shorter duration of the child's problem behavior (i.e., increased malleability), the decreased likelihood of incurring serious damage to parents' optimism for change, and the greater probability of children 'growing' out of problem behavior

in early versus later childhood.

Despite the potential benefits for early identification and successful prevention of early-starting pathways, caution is warranted. First, aggressive behavior and other types of disruptive behavior are normative during early childhood, particularly in the second and third years when aggressive-like behavior peaks during the life course (Goodenough, 1931; Jersild & Markey, 1935; Shaw et al., 2000a; Tremblay, 1998). Most children learn alternative coping strategies with the advent of increasing verbal skills during the toddler and preschool periods and are not at risk for demonstrating serious forms of antisocial behavior. Related to the issue of stability of disruptive behavior during early childhood is its generalizability to contexts outside of the home at school-age and beyond. In general, only modest links have been documented between parental reports of child disruptive behavior in early childhood and later forms of delinquent activity at school or in the community (Bates et al., 1985; Guerin, Gottfried, & Thomas, 1997; Sanson et al., 1991; Shaw, Bell, & Gilliom, 2000b). It is therefore recommended that the reader maintain a healthy dose of skepticism in digesting the review that follows in which we explore our ability to identify infants and toddlers at risk for becoming delinquent adolescents and adults.

Outline of Review

After describing criteria for the inclusion of specific studies, we review existing research by timing and domains of risk, beginning with risk factors examined during the prenatal and perinatal periods, then moving to child factors (e.g., early signs of externalizing symptoms, negative emotionality), parental attributes (e.g., childbearing age, psychiatric history), and parenting factors assessed in the first three years of life. For each domain of risk, we then provide a summary of the overall pattern of findings, acknowledge limitations of the review, and

point to future directions that would inform our current state of knowledge.

Criteria for Inclusion

Before reviewing the literature, it is important to specify our criteria for including and highlighting studies. First, our focus is on early childhood, meaning the period spanning from ages 0 to 3, including studies that were originated during the prenatal period. As the primary purpose of the chapter is to investigate correlates of antisocial behavior stemming from early childhood, we chose to emphasize studies that were prospectively initiated during the infancy and toddler period. Several researchers have reliably established pathways of antisocial behavior for studies that were initiated in the late-preschool and school-age periods (Bates, Pettit, Dodge, & Ridge, 1998; Conduct Problems Prevention Research Group, 2002; Nagin & Tremblay, 2001). Studies that were begun when children were preschool-age (4-5 years old), but assessed earlier predictors retrospectively were excluded to optimize methodological rigor. We did include studies formally initiated after early childhood but that used official records to document parent, child, or socioeconomic risk during the prenatal period or infancy (Arsenault, Tremblay, Boulerice, & Saucier, 2002; Raine, Brennan, & Mednick, 1994). As our focus was on predictors of serious antisocial behavior, we also chose to emphasize studies for which follow-ups of antisocial outcomes were extended to at least middle childhood and preferably adolescence or young adulthood. A listing of these studies is provided in Table 1 at the end of the chapter. In addition, studies that assessed more serious and generally more covert types of antisocial behavior (e.g., delinquent activity) were accorded more weight than those assessing less serious and more normative externalizing symptoms, the latter being generally confined to the home setting (e.g., oppositional behavior). We also chose to highlight studies that used multiple

informants and/or methods for measuring early childhood factors and later antisocial outcomes to minimize risk of reporter and method bias. Thus, ideal studies were initiated during infancy or the toddler period and followed children through adolescence or beyond, and included assessments of delinquent activity from an independent reporter or method at later follow-ups. As studies of this type are relatively uncommon (Arsenault et al., 2002; Caspi, Moffitt, Newman, & Silva, 1996; Kandel & Mednick, 1991; Raine et al., 1994; Stattin & Klackenborg-Larsson, 1993), investigations with less optimal assessments of serious antisocial behavior (e.g., Aguilar, Sroufe, Egeland, & Carlson, 2000; Olson, Bates, Sandy, & Lanthier, 2000) and/or shorter follow-ups (Campbell, Pierce, Moore, Marakovitz, & Newby, 1996; NICHD Early Child Care Research Network, 2004; Shaw et al., 2003) also are included, with their limitations noted (e.g., follow-up limited to the school-age period, sole reliance on parental report for reports of youth antisocial behavior). Based on the paucity of studies that meet our ideal standard, it is not surprising that even fewer studies include an experimental or genetically-informed design. However, notable exceptions do exist (Cadoret, Yates, Wi, Troughton, Woodworth, & Stewart, 1995; Moffitt et al., 2002; Olds, Hill, & Rumsey, 1998).

Child Attributes

A wide array of child attributes have been linked to later antisocial behavior, including perinatal factors such as perinatal and delivery complications (Arsenault et al., 2002; Beck & Shaw, 2005; Breslau, Klein, & Allen, 1988; Kandel & Mednick, 1991; Raine, Brennan, Mednick, & Mednick, 1996; Rosanen et al., 1999) and prenatal exposure to substances (Brennan, Grekin, & Mednick, 1999; Gibson, Piquero, & Tibbetts, 2000; Olson et al., 1997; Wakschlag et al., 1997) in addition to early child behaviors, such as early disruptive behavior, temperament

characteristics (Aguilar et al., 2000; Bates et al., 1985; Caspi et al., 1996; Guerin et al., 1997; Sanson et al., 1991; Shaw et al., 2003), attachment security (Aguilar et al., 2000), and language and intellectual skills (Stattin & Klackenberg-Larsson, 1993; Stevenson & Goodman, 2001; Werner & Smith, 1992).

While theoretically one might presume that early symptoms of antisocial behavior (e.g., aggression, oppositionality) might merit special consideration in this review because such behaviors represent measures of stability of the target outcome variable, the evidence is rather modest for such continuity, particularly in the first two years of life. In conceptualizing continuity of child effects, both direct and interactive pathways have been hypothesized to predispose children with specific risk attributes to become antisocial youth (Moffitt, 1993; Raine, 2002). As such, the range of child behaviors thought to increase the probability of later antisocial outcomes has been broader than aggressive and oppositional behavior (e.g., lack of inhibition, negative emotionality). In addition, early-identifiable individual differences on specific child attributes are postulated to be moderated by the quality of the child's environment, including family, peer, and community factors (Shaw et al., 2000a).

Many of the studies that have measured child attributes and followed youth through adolescence have taken advantage of medical records from the prenatal period to examine associations with later criminal activity. Unfortunately, as most of these studies were initiated when children reached school-age or older (Arsenault et al., 2002), child and family characteristics were not measured during the early childhood period, or were evaluated in a superficial and/or retrospective manner. These are important limitations in advancing our understanding of the progression of externalizing symptoms in early childhood and shedding

light on how specific environmental factors may moderate the course of antisocial trajectories (Tremblay & Cote, 2005).

Perinatal Factors

Perinatal and Delivery Complications

The largest group of studies on prenatal factors has focused on perinatal and delivery complications, with many of these studies examining interactions with proximal and distal indicators of environmental adversity. Studies examining direct linkages with criminal activity, including indicators of violence, have been mixed. For example, one study found 80% of adult male violent offenders to have scores in the high range on delivery complications (versus 30% for property offenders and 47% for nonoffenders; Kandel & Mednick, 1991). However, closer analysis of the data set suggested that rates of later violence were high only among children with prenatal issues *and* unstable family environments (Mednick & Kandel, 1988). Several other studies have found no direct associations between prenatal and delivery complications and later antisocial behavior (Arsenault et al., 2002; Beck & Shaw, 2005; Denno, 1990; Farrington, 1997; Raine, Brennan, & Mednick, 1994), including assessments of serious antisocial activity in middle childhood, adolescence, and adulthood. However, echoing the findings of Mednick and Kandel (1988), those individuals experiencing both perinatal issues *and* some form of psychosocial risk consistently show higher rates of antisocial behavior across informant, method, and developmental period studied (Arsenault et al., 2002; Beck & Shaw, 2005; Hodgins, Kratzer, & McNeil, 2001; Laucht et al., 2000; Piquero & Tibbetts, 1999; Raine, Brennan, & Mednick, 1997; Raine et al., 1994). Domains of psychosocial adversity have ranged from more distal indicators of socioeconomic status (e.g., family income, parental education), generally measured

during the school-age period (Arsenault et al., 2002; Laught et al., 2000), to more proximal measures of parenting quality assessed during the toddler period (Beck & Shaw, 2005), with consistent support for a biosocial framework across studies. The findings by Raine and colleagues (1994) typify this group of studies. Among Danish males, risk of violent crime was found to be predicted by the interaction of perinatal complications and maternal rejection, where ‘rejection’ was defined as “public institution care of infant,” “attempt to abort fetus,” or an “unwanted pregnancy.” Beck and Shaw (2005) provided more intensive measurement of parenting factors (e.g., nurturant parenting measured observationally at age 2) and more distal environmental risk during early childhood (e.g., neighborhood quality, stressful life events, family size and income). Again, no direct effects were found between perinatal complications and youth report of antisocial behavior at age 10; however, a significant interaction emerged between family adversity and perinatal complications, such that low-income boys with high perinatal complications and family adversity were at elevated risk for antisocial behavior.

Prenatal Exposure to Substances

A substantial number of studies have also been conducted on the effects of prenatal smoking and later antisocial behavior. Similar to research on perinatal complications, interactions have been found between prenatal smoking and social adversity (Gibson & Tibbetts, 2000; Rosanen et al., 1999). In addition, direct effects of prenatal smoking on serious antisocial behavior have been consistently documented after accounting for distal environmental adversity experienced during the school-age period (Fergusson, Horwood & Lynskey, 1993; Brennan, Grekin, & Mednick, 1999; Piquero, Gison, Tibbetts, Turner, & Katz, 2002; Rosanen et al., 1999). In addition, heavy and early prenatal smoking has distinguished early- versus late-starting

antisocial youth (Brennan et al., 1999; Gibson et al., 2000) such that smoking predicted early-starting, life-course persistent antisocial behavior but not late starting antisocial patterns.

A similar result has been found for prenatal exposure to alcohol, particularly when children have been subsequently diagnosed with Fetal Alcohol Syndrome (FAS) or Fetal Alcohol Effects (FAE) in early childhood (LaDue, Streissguth, & Randels, 1992; Steinhausen, Willms, & Spohr, 1993; Streissguth et al., 1991), with greater consumption or binge drinking early in the pregnancy associated with higher rates of self- and parent-reported antisocial behavior in adolescence and adulthood (Jacobson & Jacobson, 1994; Olson et al., 1997; Carmichael Olson, O'Connor, & Fitzgerald, 2001). In one clinical sample of 415 adolescents who had been diagnosed with FAS or FAE, 60% had already been arrested (Streissguth et al., 2004). Children of parents who drink moderately to heavily but show no symptoms of FAS or FAE also appear to be at increased risk for antisocial outcomes. However, as parents often continue drinking during the offspring's childhood and their family environments tend to be suboptimal, it is difficult to tease apart the effects of prenatal exposure from being reared by an alcoholic parent (Olson, O'Connor, & Fitzgerald, 2001). Again, the effects of prenatal alcohol use on antisocial outcomes appear to be moderated by the quality of the environment, including high levels of family conflict, child maltreatment, and parental psychiatric diagnosis (Ellis, Zucker, & Fitzgerald, 1997; Zucker, Ellis, Bingham, & Fitzgerald, 1996; Loukas, Zucker, Fitzgerald, & Krull, 2003).

Prenatal exposure to cocaine has showed less consistent results, although few of these studies have followed offspring into adolescence. Nonetheless, among 36 studies reviewed, after accounting for the effects of alcohol, cocaine exposure generally was not associated with school-age externalizing problems (Frank, Augustyn, Knight, Pell, & Zuckerman, 2001). Studies of the

long-term effects of other substances on child antisocial behavior are limited. In one study, prenatal marijuana exposure was associated with increased 'delinquency,' but follow-up of child antisocial behavior was extended only to age 10 and relied exclusively on parent reports of antisocial behavior (Goldschmidt, Day, & Richardson, 2000).

Early Child Behavior

Continuity of Early Disruptive Behaviors

Several types of behavior in early childhood have been hypothesized to be associated with later serious antisocial behavior. Moffitt (1993) and others (e.g., Rothbart, Ellis, Rueda, & Posner, 2003) have emphasized behaviors that have been linked to neuropsychological impairment and deficits in executive functioning in older children (e.g., impulsivity, inhibitory control, attention). Others have drawn attention to early signs of specific types of disruptive behavior, particularly aggression (Tremblay & Nagin, 2005). In practice, researchers have investigated broadly defined indices of negative emotionality (Aguilar et al., 2000; Bates et al., 1985; Sanson et al., 1991) and disruptive behavior (Caspi et al., 1995, 1996; Henry et al., 1996; Shaw et al., 2000; Stevenson & Goodman, 2001; White, Moffitt, Earls, Robins, & Silva, 1990), and recently, more narrowly-defined symptoms, such as fearlessness (Shaw et al., 2003) and physical aggression (Tremblay et al., 2004). Unfortunately, as studies investigating these more narrowly-defined constructs have been initiated more recently, longitudinal data on adolescent outcomes are wanting. A challenge in establishing direct linkages between any of these behaviors and serious antisocial behavior in adolescence is continuity, both homotypic and heterotypic. Homotypic continuity refers to the stability of early and later attributes of the same overt manifestations of behavior, while heterotypic continuity focuses on the sequencing of

overtly different behaviors that serve similar underlying functions (Burke, Loeber, Lahey, & Rathouz, 2005). In research on developmental psychopathology in general and antisocial behavior in particular, much work has been focused on heterotypic continuity, by examining how early forms of disruptive behavior in early childhood (e.g., aggression, oppositional behavior) might lead to age-specific forms of antisocial behavior in adolescence and young adulthood (e.g., substance use, unsafe sexual behavior).

In general, the stability of most types of child behavior assessed during infancy in relation to the same or comparable behavior in adolescence is modest, including behaviors known to have high levels of stability and heritability (e.g., intelligence). It is therefore unclear why one might postulate that the stability of disruptive behavior, including aggression, would be high between infancy and adolescence. In fact, when different informants have been used to measure continuity between initial disruptive behavior in children less than 2 years of age and later assessments of disruptive behavior or temperamental attributes associated with disruptive behavior (e.g., negative emotionality, attention), continuity has been modest to nonexistent (Aguilar et al., 2000, Bates et al., 1985; Rende, 1993; Shaw, Owens, Giovannelli, & Winslow, 2001). However, consistent with studies of other types of behavior shown to be stable during childhood (e.g., intelligence, sociability), when measured between the ages of 2 and 3, disruptive behavior and temperamental attributes linked to undercontrolled behavior begin to show modest to moderate correlations with antisocial behavior assessed in late middle childhood and adolescence (Campbell et al., 1996; Caspi et al., 1995; Henry et al., 1996; Olweus, 1979). In most cases the magnitude of association decreases markedly when a second informant or method is used at the follow-up. Interestingly, studies that have found the strongest support for stability,

or at least heterotypic continuity in behavior, have assessed behavior in early childhood using observational methods (Caspi et al., 1995).

A study that typifies the level of association between early maternal reports and later outcomes was conducted by Shaw and colleagues (2000), in which maternal reports of externalizing at ages 2, 3.5, and 5 (i.e., CBCL Aggression factor) were correlated with clinically-elevated levels of teacher reports of externalizing at age 8 (i.e., at or above the 90th percentile on the Aggression factor of Achenbach Teacher Report Form). As displayed in Figure 1, those boys viewed by teachers as antisocial at age 8 could not be discriminated from maternal reports of externalizing at age 2 ($d = -.1$), only modestly so at age 3.5 ($d = .3$) and moderately so at age 5 ($d = .5$). The results, albeit limited to follow-up at age 8, suggest that relying solely on maternal reports of child disruptive behavior for identifying toddlers who will show early starting pathways may be misguided. Other studies aimed at investigating heterotypic or homotypic continuity between initial maternal reports of disruptive behavior or negative emotionality between 6 months and 2 years in relation to later externalizing problems during the school-age period or adolescence *using a second informant* have yielded similarly disappointing results (Bates et al., 1985; Fagot & Kavanagh, 1990; Olson, Bates, Sandy, & Lanthier, 2000; Sanson et al., 1991; Shaw et al., 1999), generally indicating nonsignificant associations between maternal reports of infant and toddler behavior and later teacher or youth report of antisocial activity.

Moving to slightly older children has yielded more promising findings. Two pioneering studies that followed selected youth from age 3 to the school-age period have demonstrated moderate continuity of child disruptive behavior, including ADHD symptoms. Richman, Stevenson, and Graham (1982) identified the top 14% of 3-year-olds from a parental

questionnaire of behavior problems, and followed them in comparison to a control group of children from similar backgrounds. Problems persisted in 62% at age 8 compared to 22% of the controls. In a follow-up of the original Richman sample, including 828 of the original 955 children (i.e., one-in-four random sample of London cohort), Stevenson and Goodman (2001) examined associations between age-3 maternal reports of 24 individual problem behaviors and adult criminal convictions when participants were ages 23-24. Of the 24 behaviors, four were associated with later total number of criminal convictions in univariate analyses: soiling, activity level, daytime enuresis, and management difficulty, with daytime enuresis and temper tantrums associated with adult *violent* convictions. It is important to note that no statistical controls were introduced to control for the number of analyses computed (6 of 48 significant or 12.5%). However, when other significant factors were controlled for in multivariate analyses (i.e., child gender, child social development), activity level and management difficulties continued to be associated with all adult offenses and temper tantrums continued to be associated with violent offenses.

Campbell and colleagues have followed two cohorts of hard-to-manage children from preschool through school-age (Campbell et al., 1996). In the first cohort, for children identified at age 3, moderate continuity in behavior problems was found at ages 6, 9, and 13. Fifty and 48% of those with problems at age 3 showed clinically-significant problems at ages 6 and 9, respectively. Campbell (1994) followed a second cohort of overactive and inattentive boys and found comparable rates of continuity from preschool to school-age. Rates of continuity need to be tempered by the use of parent report at both time points for both studies above. In Campbell's second study, teacher reports were also used at follow-ups and showed significant, but more

modest levels of continuity in child disruptive behavior.

Perhaps the most impressive example of continuity in early disruptive behavior and later criminality comes from the work of Moffitt, Caspi, and colleagues (Caspi et al., 1995; Henry et al., 1996; Moffitt, 1990; Moffitt et al., 1996; White, Early, Robins, & Silva, 1990). Following a birth cohort of 1,037 New Zealand children from Dunedin, the authors used rater impressions of children's behaviors during 90 minutes of psychological tests (e.g., intelligence tests) at age 3 to examine associations with later reports and official criminal records of antisocial behavior during middle childhood, adolescence, and adulthood. Children who demonstrated a pattern of 'lack of control' during the tested period were found to show higher rates of externalizing symptoms at ages 9, 11, 13, and 15 according to parent and teacher reports. In addition, children who showed undercontrolled behavior at 3 were more likely to show a record of convictions for violent (but not nonviolent) offenses at age 18 (Henry et al., 1996), to meet diagnostic criteria for antisocial personality disorder (i.e., odds ratio (*OR*) of 2.9), and be a recidivist offender (*OR* of 2.2) at age 21 (Caspi et al., 1996).

Consistent with the data on perinatal complications, children who showed this early undercontrolled behavior and followed a persistent and severe course of antisocial behavior also were more likely to live in families marked by psychosocial adversity, including low parental educational and occupational status, low income, and higher rates of teen pregnancy, single-parent status, large family size, and poor maternal mental health (Campbell, Shaw, & Gilliom, 2000; Moffitt, 1990). Thus, individual differences in child behavior appear to be moderated by the context of the child's proximal and distal caregiving environment. In addition, as child behavior was not initially assessed until age 3, it is likely that ratings of child 'temperament'

were already moderated by the quality of the caregiving environment, which we can surmise was generally poor in these families, including the quality of prenatal care.

Infant Attachment Security

According to attachment theory, children who develop insecure attachments with caregivers during early childhood would be expected to develop distrust towards others and an increased probability for demonstrating later noncompliant and hostile disruptive behavior (Greenberg & Speltz, 1988; Shaw et al., 2000, Sroufe, 1983). Specifically, those with insecure avoidant (1983) and disorganized (Lyons-Ruth, Alpern, & Repacholi (1993) attachment classifications towards mothers have been postulated to be at risk for showing an early-starting antisocial pathway. Similar to the study of other child factors in the prenatal period and infancy, risk for showing a persistent pattern of externalizing symptoms is thought to be moderated by the quality of the child's environment beyond the infant and toddler years, and by the presence of other types of child risk factors (e.g., low intellectual abilities) and contextual adversity (Greenberg, 1999). Several studies have documented associations between the avoidant or disorganized infant classification during infancy and preschool-age conduct problems, particularly within high-risk samples (Erickson, Sroufe, & Egeland, 1985; Keller, Spieker, & Gilchrist, 2005; Lyons-Ruth et al., 1993; Shaw, Owens, Vondra, Keenan, & Winslow, 1996; Shaw & Vondra, 1995), with less consistent results for lower-risk, middle-class samples (e.g., Bates et al., 1985; Fagot & Kavanaugh, 1990; Lewis, Feiring, McGuffog, & Jaskin, 1984). However, only one high-risk sample has established an association between insecure infant attachment and antisocial behavior in adolescence (Aguilar et al., 2000; Appleyard, Egeland, Manfred, & Sroufe, 2005; Renken et al., 1988). Children in this Minnesota-based, low-income

sample with avoidant attachments at 12 and/or 18 months of age were more likely to show an early-starting and persistent pattern of externalizing symptoms (i.e., not delinquent activity or criminal offenses) from early childhood through age 16. As attachment insecurity has been linked to parenting practices, more discussion on this topic is included in the section on early parenting and antisocial outcomes.

Intellectual Skills and Language Development

Among school-age children, adolescents, and adults, a consistent albeit at times modest, association has been found between lower intellectual skills and antisocial behavior (Binder, 1988; Fergusson, Horwood, & Ridder, 2005; Moffitt, 1993, Moffitt & McGee, 1989; Raine, 1993). Prospective studies of intellectual abilities are limited in early childhood, in part because of the lower predictive validity for IQ when assessed during early versus later childhood. However, a few longitudinal studies initiated in early childhood have collected data on formal verbal or spatial skills, or language development (Moffitt, 1990; Raine, Yaralian, Reynold, Venables, & Mednick, 2002; Stattin & Klackenber-Larsson, 1993; Werner & Smith, 1992). In the Moffitt study using the Dunedin, NZ cohort, visuomotor deficits at age 3 were associated with an early-starting and persistent pattern of antisocial behavior through early adolescence. A similar pattern was identified by Raine and colleagues (2002), in which a subsample of 330 of a larger cohort of 3-year-old children from Mauritius (i.e., total $N = 1,795$) were tested at age 3 and followed until age 17. Those children with spatial and not verbal deficits were more likely to show a persistent pattern of antisocial activity. The authors hypothesize that spatial deficits interfere with children's ability to form social relationships with parents (i.e., attachment) because of disruptions in the right hemisphere of the brain where affect regulation and

expression are modulated. Werner and Smith (1992), following a birth cohort of 614 youth from Kauai, found court records of delinquency during adolescence were predicted by self-help skills for boys and below-average intellectual skills for girls, both of which were assessed at age 2. Below-average intellectual skills for girls was the strongest predictor of adolescent antisocial behavior during the early childhood period ($r = .38$).

Finally, Stattin and Klackenber-Larsson (1993) followed a sample of 122 unselected Swedish boys from birth to adulthood, assessing parent reports and examiner ratings of language development from 6 to 24 months and child intellectual skills at age 3 in relation to official records of criminal behavior up to the age of 30. Overall intelligence at age 3 was related to frequency of offending during adulthood. In addition, examiner ratings of language ability at 6, 18, and 24 months were also negatively associated with adult registered offending (i.e., correlations between $-.16$ and $-.19$, $p < .05$ at all time points).

Overall, there is some evidence to suggest that deficits in spatial and verbal abilities in early childhood are associated with later serious antisocial behavior. Effect sizes tend to be modest, as they are for other early childhood factors described above, and appear to be moderated by the quality of the environment. Specifically, those in the Moffitt (1990) study showing low visuomotor skills and persistent antisocial pathways also were likely to live in adverse psychosocial contexts. In the Stattin and Klackenger-Larsson (1993) study, deficits in language ability were associated with family SES and the time parents spent playing with and reading to the child.

Parental Attributes

Several parental attributes and 'social address' factors (e.g., socioeconomic status) that

have been associated with antisocial behavior in school-age children and adolescents (Bovet, 1951; Loeber & Dishion, 1983) also have been linked to externalizing problems in early childhood (Shaw, Vondra, Dowdell Hommerding, Keenan, & Dunn, 1994; Shaw, Winslow, Owens, & Hood, 1998; Tremblay et al., 2004). In addition, factors such as maternal depression, parental history of antisocial behavior, parental educational attainment, occupational status, and income, all measured in early childhood, have been associated with early *and* later antisocial behavior in school-age children and adolescents (Cadoret et al., 1995; Fergusson & Woodward, 1999; Moffitt & Caspi, 2001; Nagin & Tremblay, 2001; Nagin, Pogarsky, & Farrington, 1997; Shaw et al., 2001). As most of the aforementioned variables are presumed to be fairly stable (SES, parental *history* of psychiatric illness and antisocial behavior), many can be comparably, or even more accurately measured, in early versus later childhood, including maternal childbearing age (Nagin et al., 1997, 2001), and the parent's own adolescent and early adult history of criminality and psychiatric disorders (Cadoret et al., 1995; Kandel & Mednick, 1991).

Maternal Child-bearing Age

Evidence for the effects of early childbearing age have been consistently found across cultures (Fergusson & Woodward, 1999; Moffitt & Caspi, 2001; Morash & Rucker, 1999; Nagin et al., 1997, 2001), with most studies demonstrating associations with adolescent or adult antisocial activity among offspring of mothers who began having children as a teenager. It is important to note that in many of these studies, early childbearing was defined by the age mothers had their first child, but not necessarily the target child being studied (Nagin et al, 1997, 2001). Theoretically, teen mothers would be less prepared to handle the psychological challenges of childrearing, have fewer economical and educational resources, and a low likelihood of

changing their socioeconomic standing for the better because of childrearing responsibilities. Thus, teen parent status is likely a marker variable for multiple indicators of risk. Consistent associations have been documented between early childbearing and offspring's trajectories of persistent antisocial behavior through adolescence (Moffitt & Caspi, 2001; Nagin & Tremblay, 2001) and juvenile and adult offending (Fergusson & Woodward, 1999; Nagin et al., 1997). Given the hypothesized relationships between childbearing age and SES, it is important to note that in most studies, early childbearing status appears to continue to account for significant, albeit modest, variance in offspring antisocial outcomes after accounting for socioeconomic factors. In addition, early childbearing age also has been found to moderate the effects of prenatal smoking, as offspring of teen parents who smoke prenatally have an increased risk of violent crime and being a repeat offender above and beyond the direct effects of teen parenthood or prenatal smoking (Rosanen et al., 1999).

Parental Psychiatric History

Similar direct and interactive effects have been found for parental history of antisocial activity or psychiatric illness (Cadoret et al., 1995; Kandel & Mednick, 1991; Shaw et al., 2000). For example, Kandel and Mednick (1991) found that the association between pregnancy complications and adult violent offending was amplified when there was a history of parental psychiatric disorder. As displayed in Figure 2, Shaw and colleagues (2000) found a direct link between maternal depressive symptoms when children were 1.5 and 2 years of age and clinically-elevated reports of school-based conduct problems (CP) using the Teacher Report Form when children were age 8 ($d = .73$ at age 1.5), associations that were appreciably stronger than for child aggressive behavior measured via parent report during the same age period.

Interestingly, the magnitude of effects of depression on age-8 CP decreased with the child's increasing age ($d = .27$ when maternal depression was measured at age 5.5). In one of the few studies to incorporate a genetically-informed design, Cadoret and colleagues (1995) did not find a direct link between biological parent's history of antisocial behavior and offspring reared by adopted parents, but biological parent's history of antisocial behavior was associated with offspring's adult antisocial behavior if the quality of the adoptive environment was adverse (i.e., cumulative index of family stress including marital problems, parental divorce/separation, parental anxiety/depression or substance abuse, and legal problems). As environmental adversity was measured retrospectively, these findings need to be interpreted with caution. Nonetheless, the results converge with findings from other studies suggesting that impairments in the biological parents' functioning increase risk for offspring's antisocial behavior, particularly within environments characterized by other risk factors (Keenan & Shaw, 1994; Tremblay & Nagin, 2005). From a genetic perspective, the parent's antisocial activities could represent a propensity for demonstrating impulsive or aggressive behavior. In a similar vein, parental depression could represent a nonspecific marker for psychopathology that is transmitted to the child. It is also likely that antisocial and depressed parents would not be the most responsive caregivers, in the case of the antisocial parent, modeling impulsive and aggressive coping strategies for children, and using verbally and physically aggressive discipline methods. Research on depressed parents also documents higher rates of hostile, passive, and inconsistent patterns of childrearing than among nondepressed parents (Shaw & Bell, 1993; Zahn-Waxler, Iannotti, Cummings, & Denham, 1990).

Parenting and Family Process Factors

Aspects of caregiving have been highlighted as central causal factors in the development of early-starting antisocial pathways, as postulated by social learning and attachment theorists (Greenberg & Speltz, 1988; Patterson, 1982; Patterson, Reid, & Dishion, 1992; Shaw et al., 1993, 2000). From a social learning perspective, parenting management practices that model and reinforce disruptive behavior are hypothesized to be associated with increasingly frequent and severe externalizing symptoms that begin during the ‘terrible twos’ and escalate during the preschool and school-age years. As noted above, with respect to attachment theory, parenting characterized by insensitivity and low responsiveness has been linked with avoidant and disorganized infant attachments and subsequent externalizing problems (Aguilar et al., 2000; Erickson et al., 1985; Lyons-Ruth et al., 1993). In addition, direct measures of maternal unresponsivity and low positivity during infancy and the toddler period have been linked to later externalizing problems (Gardner, 1987; Martin, 1981; Shaw et al., 1994, 1998, 2000; Wakschlag & Hans, 1999). However, the follow-up for most of these studies has been generally limited to the late preschool or early school-age periods. In addition, parenting practices have been hypothesized to mediate associations between more distal risk factors (e.g., maternal age, single-parent status, low SES) and child antisocial outcomes (Conger, Ge., Elder, Lorenz, & Simons, 1994; Patterson, 1982), but again few studies addressing the issue of mediation have been initiated when children were three years of age or younger (Fergusson & Horwood, 1999).

Fortunately, there are a few studies on parenting and antisocial outcomes that have spanned from early childhood to adolescence (Aguilar et al., 2000; Caspi et al., 2002; Fergusson & Woodward, 1999; Moffitt & Caspi, 2001; Olds et al., 1998). As in studies of other risk factors (e.g., perinatal complications), official records have been utilized to extend the measurement

period, in particular for child maltreatment (Thornberry, Ireland, & Smith, 2001). However, as it is difficult to gauge when child maltreatment began and over what period of time it occurred, studies are included only when data on childhood maltreatment was initiated during early childhood (Aguilar et al., 2000; Caspi et al., 2002).

In reviewing the literature on early parenting practices and adolescent antisocial behavior, similar themes emerge with risk factors from other domains reviewed earlier. In terms of direct effects, two studies have shown that aspects of parenting differentiate early-starting children from other groups through adolescence. Using the Dunedin cohort, Moffitt and Caspi (2001) found a nonsignificant trend for greater deviant mother-child interaction at age 3 for early-starters versus adolescent-limited youth. Aguilar and colleagues (2000), using the Minnesota, low-income cohort, found that early-starting youth were significantly more likely to be physically maltreated between the ages of birth and two than nonoffending youth, and tended to have parents who were more psychologically unavailable, less involved, and more hostile at age 3. One other study has traced direct associations between early parenting and adolescent outcomes. Using the same factor of observed harsh parenting at age 2 that discriminated maternal-reported trajectories of conduct problems from ages 2 to 8 (Shaw et al., 2003), significant associations with youth (National Youth Survey's Self Report of Delinquency; Elliott, Huizinga, & Menard, 1989) and teacher report (Delinquency factor from Achenbach Teacher Report Form) of antisocial behavior have emerged for boys at ages 11 and 12 ($r_s = .20$, and $.20$, $p < .01$, for youth and teacher reports, respectively). As both the Aguilar and Shaw studies were conducted on samples of low-income children, it is likely that the effects of parenting were amplified by the context of social adversity that characterized the vast majority of participants in

both samples. Similar interactive effects have been documented in the Dunedin cohort and other studies, where children with early-starting trajectories have been characterized by multiple contextual risk factors (Moffitt, 1990) in addition to compromised parental functioning (Shaw et al., 1994, 1998).

Although not a direct measure of parenting, but related to quality of caregiving (Emery, 1988), are data from family the Kauai longitudinal study on family instability. Werner and Smith (1992) found a composite of serious marital conflict, father absence, parental separation, divorce, and desertion to be the strongest early childhood predictor of adolescent delinquency for boys.

Two other series of studies involving parenting are worth reviewing because of their unique methodological features. The first incorporated a genetically-informed design to examine potential gene-environment interactions with respect to child maltreatment or harsh parenting (Caspi et al., 2002). Using a subsample of boys in the Dunedin cohort, the authors obtained DNA to examine interactions between extreme parenting and monamine oxidase A (MAOA), a neurotransmitter-metabolizing enzyme linked with aggression in mice and humans. With respect to rates of adolescent conduct disorder, and antisocial personality disorder and convictions for violent offenses by age 26, although direct effects of maltreatment or harsh physical discipline were found for each outcome, these associations were significantly amplified when expression of MAOA activity was low. Although the precise age and duration of maltreatment could not be specified, this study remains critical because it offers a method by which risk for antisocial trajectories can be identified based on gene *and* environmental context, echoing other interactive effects that have been found between biologic and social context variables (Arsenault et al., 2002; Beck & Shaw, 2005; Raine et al., 1994).

The second study is a longstanding program of prevention research initiated by Olds and colleagues (Eckenrode et al., 2001; Olds, 2002; Olds et al., 1998a, 1998b, 2004) studying three cohorts of parents with very young children at heightened risk for maladaptive outcomes, including antisocial behavior. The preventive intervention was designed to begin during the prenatal period and extend through the child's first two years, focusing on reducing adverse maternal behaviors during pregnancy (e.g., smoking, alcohol and drug use) and promoting positive mother-child relationships during infancy via a nurse visitation program. In the first study, a group of 400 European American, rural expectant mothers were randomly assigned to intervention or control groups. Group differences were found in several domains among the 315 offspring followed to age 15, with youth in the intervention group demonstrating significantly fewer arrests and convictions than adolescent offspring in the control group. Interestingly, the strongest results of the intervention were found among low-SES, single-parent families. In understanding the potential mechanisms associated with treatment effects, the authors attribute the changes to reductions in maternal health-related behaviors during pregnancy (i.e., smoking, drinking, alcohol), improvements in maternal health and lifestyle choices during the child's early years (e.g., 43% lower rates of subsequent pregnancy, 84% higher participation in work force, and 82% fewer arrests than control mothers), and significant reductions in rates of child abuse and neglect from birth to age 15 (79% lower rate than control group). Child maltreatment within the sample was associated with early-starting delinquency (as defined by contact with the criminal justice system by age 15), but even among maltreated children in the intervention group, risk of arrest was significantly less than it was for maltreated children in the control group (Eckenrode et al., 2001).

Results from the initial Olds study in Elmira, NY have been followed-up in two samples of urban (i.e., Memphis, TN, and Denver, CO), more ethnically-diverse families. Children have not reached adolescence in either of these cohorts, but results from the Memphis sample suggest similar, but more muted effects on child problem behavior (i.e., maternal but not teacher reports show intervention effects, Olds et al., 2004) and maternal functioning (e.g., fewer subsequent pregnancies and pregnancy-induced hypertension) up to age six. The Olds' program is critical because it suggests that pathways leading to serious offending are potentially malleable when interventions are initiated prenatally and during infancy. Importantly, the intervention targets multiple issues, including the mother's health behaviors, the quality of the environment parents are generating for the child (e.g., maternal work skills, number of subsequent children born in the next couple of years), and parenting skills. Methodologically, Olds' program is groundbreaking because it includes an experimental design and a long-term follow-up of child antisocial outcomes, both of which are extremely rare for interventions initiated during early childhood.

Although several interventions have been designed to address the prevention of conduct problems among preschool- and school-age children (Conduct Problems Prevention Research Group, 2004; Webster-Stratton & Hammond, 1997), very few have targeted the 'terrible twos' when rates of disruptive behavior increase and parents might be quite motivated to find alternative coping strategies. A new intervention that combines elements of family-based behavioral training with motivational interviewing has recently showed some success in reducing rates of child externalizing symptoms from ages 2 to 4. Motivational interviewing is a clinical method developed by Miller and Rollnick (2002) to treat adults with alcohol problems that provides clients with direct feedback on how their problem behavior has adversely affected their

lives (e.g., relationships, employment), generating motivation for clients to provide an internal impetus for change. Dishion and Kavanagh (2003) adapted the method for working with adolescents and families, and it has since been adapted to young children and parents in the midst of the terrible twos. Using an experimental design, in which 120 toddler-age boys with socioeconomic, family, and child risk factors were randomly assigned to an intervention or control condition, reductions in destructive and aggressive behavior and improvements in maternal involvement and positive, proactive parenting were found at ages 3 and/or 4 using Dishion's Family Check Up (Gardner, Shaw, Dishion, Supplee, & Burton in press; Shaw, Dishion, Supplee, Gardner, & Arnds, 2006). Interestingly, families characterized by a profile associated with early-starting conduct problems (Shaw et al., 2003), namely high levels of maternal depressive symptoms and child fearlessness, showed the greatest between-group improvement in conduct problems at age 4. These results mirror those of Olds and colleagues (1998), demonstrating more improved outcomes for families with higher levels of initial risk. Although follow-up of this sample is needed and we are currently validating the model with a larger number of boys and girls from urban, rural, and suburban contexts ($N = 731$), the initial results support the notion that efficacious interventions tailored to prevent early starting pathways can be initiated in early childhood.

So What Have We Learned about Early Childhood and Delinquent Behavior

Using conservative standards, it is difficult to draw firm conclusions about what we know regarding early childhood indicators of serious antisocial behavior because of the relative dearth of prospective studies that have been conducted spanning from early childhood to adolescence (e.g., Aguilar et al., 2000; Moffitt & Caspi, 2001; Olds et al., 1998a). Even among studies

meeting our most stringent criteria, all have important limitations in terms of the quality of the measurement of the environment during early childhood (Moffitt, Olds), or the measurement of serious antisocial behavior during adolescence (Aguilar). Despite these critical caveats, based on convergent evidence from multiple studies, we can make some tentative statements about risk factors in early childhood and their level of association with later serious antisocial behavior.

1. Consistent, albeit modest, associations have been documented between characteristics of the prenatal environment (e.g., tobacco and alcohol use, maternal age, perinatal complications) and later serious antisocial activity, and these associations tend to be magnified in the context of social adversity during early childhood (e.g., SES, quality of parenting, cumulative family adversity).
2. Associations between child disruptive behavior in early childhood and adolescent antisocial outcomes begin to emerge around age 2 and have been more reliably found when child disruptive behavior is assessed at age 3 and using observational methods. Among children with high levels of early disruptive behavior at ages 2-3, only a subgroup go on to demonstrate early-starting, chronic pathways of antisocial behavior, and these youth tend to come from families marked by multiple types of family adversity (low SES, compromised parental functioning and caregiving quality).
3. A few studies have documented associations between history of parental antisocial behavior and/or psychiatric illness during early childhood or the prenatal period and later antisocial outcomes, but as methodologically-refined studies in this area are scarce (e.g., measurement of parental functioning in early childhood and consideration of effects of parental functioning in middle childhood; follow-up of antisocial behavior through

adolescence), corroboration of these associations using more rigorous research designs is needed.

4. Associations between hostile, rejecting, and abusive parenting in early childhood and serious antisocial outcomes in adolescence have been documented in a few studies. Associations tend to be consistent, albeit modest, and similar to the risk factors listed above, have been found to be moderated by the presence of other risk factors (e.g., perinatal risk, expression of low MAOA activity in child, environmental adversity).
5. Only Olds' program of research has demonstrated that interventions initiated in early childhood and the prenatal period can be associated with significant decreases in *adolescent* delinquent behavior, changes that appear to be mediated by modifications in maternal health and well being during the prenatal period and caregiving practices and maternal health/lifestyle choices during early childhood.

So what do we know about assessing risk for serious antisocial behavior in early childhood? We know that it is possible to identify at least a 'trace' of what is to follow for many children by focusing on individual risk factors, and that our probability of identification is significantly enhanced by accounting for factors in the child's social context (Greenberg, 1999; Rutter, Cox, Tupling, Berger, & Yule, 1975; Shaw et al., 1994, 1998). Specifically, both direct and interactive effects have been found for the quality of the mother's prenatal care and substance use (e.g., tobacco, alcohol, Olds et al., 1998), the parents' history of antisocial activity and psychological well-being (Cadoret et al., 1995; Kandel & Mednick, 1991; Shaw et al., 2000a), the quality of early caregiving (Aguilar et al., 2000; Shaw et al., 2000, 2003), and beginning around age 2, the child's level of disruptive behavior (Caspi et al., 1995; Henry et al.,

1996; Shaw et al., 2003).

Three points are worth highlighting from this conclusion. First, overall this list of risk factors is remarkably similar to those that have been identified for preschool- and school-age children, and with the exception of peer influence (Dishion, Andrews, & Crosby, 1995), similar to risk factors associated with antisocial behavior during adolescence (Tremblay & Cote, 2005). Second, in terms of emphasis, the one exception to the comparability of risk factors for older children is the child's level of disruptive behavior. Whereas for older children, disruptive behavior would be the most reliable predictor of future antisocial behavior, this is not the case for children under the age of 2 (Aguilar et al., 2000) and only approaches this level at age 3 (Campbell et al., 1996; Moffitt & Caspi, 2001; Shaw et al., 2000a). Why would continuity in disruptive behavior increase beginning around age 2? Clearly multiple factors are involved, including children's cognitive capacities for carrying out planful behavior and appreciating the consequences of their aggressive behavior (Maccoby, 1980), as well as their lack of physical mobility and coordination during the first 18 months of life (Shaw & Bell, 1993). There are also the issues of informant bias and contextual continuity. Parents typically see their own children for more hours of the day than other caregivers (with the exception of children in full-time day care) and should therefore be knowledgeable informants of their child's behavior. However, because parental exposure to other same-age children and knowledge of normative behavior is often limited (particularly at this age period before play dates with other children become more frequent and longer in duration), and many parents assume that their child's behavior is fairly stable and not heavily influenced by their own responses, their perceptions of child externalizing symptoms may show modest continuity across context or over time. Relatedly, when caregivers

in other contexts respond differently than parents to children's emerging disruptive behavior, it would not be surprising to see variation in continuity in contexts, variation that would be magnified over time.

The issue of modest continuity in disruptive behavior in the first two years has critical implications for designing prevention programs in early childhood, which would suggest that our emphasis be on modifying *multiple* risk factors in the child's proximal environment rather than focusing primarily on child behavior. Appropriate targets would include maternal health practices during pregnancy (e.g., tobacco and alcohol use), and parents' well being and caregiving practices during early childhood (Olds et al., 1998a; Shaw et al., 2000a, in press).

In addition, although direct and interactive effects of specific risk factors have been highlighted throughout the review, it is also important to stress the cumulative impact of some risk factors. Rather than representing interactions, a select number of risk factors appear to contribute independent variance to the prediction of antisocial behavior after accounting for variances associated with other correlates of antisocial behavior. These factors include maternal age (Nagin et al., 1997), child maltreatment and harsh parenting (Aguilar et al., 2000; Shaw et al. 2003), and prenatal tobacco (Brennan et al., 1999) and alcohol (Carmichael Olson et al., 2001) use. Thus, the impetus for highlighting the impact of multiple risk factors rests not solely on interactive effects, but also on the cumulative impact of individual risk factors on delinquent behavior.

Purposeful yet Promising Omissions from the Review

Several factors that have shown short-term associations with antisocial behavior were not discussed or only mentioned briefly in the review, primarily because there is a dearth of data on

their predictive validity between early childhood and adolescence. Thus, such factors as parental conflict (Jouriles et al., 1991; Tuppett, Yates, Dodds, Aroufe, & Egeland, 2003), marital quality (Shaw et al., 1994), maternal social support (Shaw et al., 1998, 2000), sibling conflict (Garcia, Shaw, Winslow, & Yaggi, 2000), and proactive parenting (Gardner, 1987) have all been related to conduct problems in early childhood or the preschool period. In some cases, longitudinal associations have been established extending to the early school-age period or beyond, but this is clearly the exception rather than the rule (see Werner & Smith, 1992 for an exception regarding associations between early marital instability and adolescent delinquency). These variables could also be potential targets for intervention if prospective studies can confirm their long-term associations with delinquent behavior, which are likely to be amplified in the context of social adversity. Other factors in early childhood with less empirical but strong theoretical relevance include the involvement and parenting quality of fathers and nontraditional alternative caregivers (Garcia Coll & Magnuson, 2000), culture and socialization practices (Deater-Deckard, Dodge, Bates, & Pettit, 1996; McLoyd, Cauce, Takeuchi, & Wilson, 2000), and the quality of day care settings (NICHD Early Child Care Research Network, 2004) and neighborhoods (Caspi, Taylor, Moffitt, & Plomin, 2000). Regarding the role of fathers, as single-parent families continue to become more normative for European American, African American, and other minority families, it becomes imperative to develop a better understanding of how paternal involvement in single-parent families is associated with more serious antisocial outcomes for offspring.

While there has been a greater emphasis on characteristics and caregiving practices of mothers versus fathers, there has been a dearth of attention devoted to studying predictors of early childhood predictors of girls' delinquent behavior relative to boys. Initially, this was

partially understandable because of higher rates of serious and chronic delinquent behavior for boys. However, as a significant number of girls go on to show serious antisocial behavior, and many of these same girls often bear children at an early age while continuing to engage in risky health behavior while pregnant (e.g., smoking, alcohol use, Nagin et al., 1997) and become responsible for rearing these children, from a prevention perspective it is imperative that resources be dedicated to furthering our understanding of risk factors in early childhood associated with girls' delinquent behavior (Serbin et al., 1998).

Two other issues also merit attention based on their potential implications for prevention and intervention research. The first involves distinguishing between different types of disruptive behavior, specifically physical aggression and less violent types of externalizing symptoms (e.g., oppositionality). In particular, Tremblay and colleagues (1999, 2000) have argued that physical aggression *may* follow a dissimilar developmental course and have different consequences for the individual and society than other forms of disruptive behavior (e.g., noncompliance). As no studies have actually examined this issue prospectively from early childhood through adolescence, it remains a point of speculation. In the author's own intervention work, we have found physical aggression to be malleable in early childhood among a high-risk sample of boys using a brief, family-based intervention (Shaw, Gardner, Dishion, Supplee, & Wilson, 2006). In fact, while significant reductions in child aggression were found between ages 2 and 4, decreases in other types of disruptive behavior were only found to persist until age 3. These preliminary results suggest that physical aggression might be easier to modify than other forms of disruptive behavior in early childhood, and is clearly more malleable to change in early childhood than during later periods of childhood.

The second issue that has been the source of much debate is the primacy of early childhood relative to other developmental periods. Over the past two decades, there has been much speculation about the need to ensure that children's first year is not marked by environmental adversity because of the fear of irreparable harm and a lifelong destiny of psychopathology. This perspective is in sharp contrast to data from prospective studies showing nonexistent associations between measures of disruptive behavior in the first year of life and later antisocial behavior. However, moving to the toddler period, there are now a couple of examples where assessments of the child's *social context* in early childhood have been found to show greater predictive validity of later antisocial outcomes than assessments of social adversity in the preschool or early school-age period (Appleyard et al., 2005; Shaw et al., 2000). In the Appleyard study of Minnesota, low-income children, a cumulative index of contextual adversity in early childhood continued to be associated with adolescent antisocial behavior after accounting for the effects of contextual risk in middle childhood. In the Shaw et al. (2000) study of urban, low-income boys, effects of risk factors such as maternal depression, social support, parenting hassles and parenting all showed greater effect sizes on teacher-reported clinically-elevated aggression at age 8 when measured between and 1.5-2 years than when assessed between 3.5-5.5 years of age. Results from these studies suggest that the primacy issue merits further attention, particularly in reference to the social context of low-income children during the second and third year.

Why would one expect to find greater associations with later antisocial outcomes during the toddler versus the preschool or school-age periods? One possible explanation is the challenges associated with the 'terrible twos,' which involve critical increases in children's

mobility without concomitant advances in cognitive or emotion regulation skills (Shaw & Bell, 1993). This disconnect in children's physical and cognitive/emotional skills creates a period of transition for parent-child dyads, generating higher levels of child aggressive and noncompliant behavior and parental distress than the relatively calmer periods of infancy or the preschool and school-age periods (Fagot & Kavanagh, 1993). While one could argue that a period of upheaval might over-identify children living in families at risk for early-starting pathways, it might also provide a sampling of how children and their parents might respond to similar transitions during development (e.g., transition to formal schooling, transition to adolescence) or life events in the family (e.g., marital transition, family move, death of a parent). Thus, the terrible twos might be a prime time for identifying parent-child dyads at risk for early-starting antisocial pathways, particularly among children living in least favorable environments (Moffitt, 1990). However, as only a couple of studies have validated this finding, further research is needed to uncover whether the toddler period will prove to be an opportune time to prevent serious delinquent behavior in adolescence.

Future Directions: Where Do We Go from Here?

In an ideal world where time and funding resources were not an issue, new genetically-informed, prospective studies of boys *and* girls from high-risk contexts would be mandated, focusing on factors that have yet to be adequately assessed in the few existing prospective studies (e.g., early child maltreatment x MAOA interactions, paternal involvement, culture, role of early aggression versus other disruptive behaviors). Although piecing together findings from adjacent developmental periods is tempting, and accelerated longitudinal designs provide a time- and cost-effective alternative to traditional longitudinal studies (Bell, 1954), to fully answer the

question of whether early childhood factors contribute to delinquency, neither of these methods are adequate substitutes for prospective longitudinal research in understanding *how* factors in early childhood contribute to the development of delinquency. Additionally, it is also important to gauge how much new knowledge would be uncovered by initiating new studies in early childhood, studies that would take approximately 20 years to undertake. Certainly such investigations could provide novel and critical information about understudied factors (e.g., paternal involvement, culture, primacy of early childhood versus other age periods), and from a qualitative perspective, we clearly have only begun to scratch the surface in identifying gene-environment interactions associated with antisocial outcomes (Cadoret et al., 1995; Ge et al., 1996; Moffitt, 2005), interactions that might be identifiable in early childhood. Nonetheless, despite the relatively few studies from which conclusions for the current review were drawn, we suspect that they will, in all probability, continue to be valid two decades from now. Specifically, it is likely that significant, albeit modest, direct, cumulative, and interactive associations with delinquent behavior will continue to be evident among a small number of risk factors in early childhood.

Perhaps the best probability for qualitatively enriching our understanding of the precise mechanisms involved in transforming a defiant toddler into a juvenile delinquent may lie through conducting intervention research, preferably within genetically-informed designs. Such designs would make it possible to profile a child's genetic and environmental risk to test the efficacy of interventions specifically tailored to the family's and child's context (Dishion & Kavanagh, 2003). Rather than being limited to stimulating debates about the genetic or environmental basis of antisocial behavior, genetically-informed designs offer the opportunity to examine the 'nature'

of gene-environment interactions (Leve, Shaw, & Reiss, 2005). In the context of an experimental trial, this would allow interventionists to examine how malleable gene-environment interactions are in early childhood before child behavior becomes less impregnable to change (Reid, 1993).

In closing, prospective studies examining early childhood correlates of delinquent behavior indicate that consistent, albeit modest, associations have been uncovered between multiple facets of child and environmental attributes in early childhood and later serious antisocial behavior. Moreover, several of these factors appear to be malleable (e.g., prenatal smoking and drug use, parenting). Whether altering these factors in early childhood will prevent the development of serious offending during adolescence and adulthood remains to be seen, but initial findings from Olds' and colleagues' (1998) work indicate it is possible. Future prevention studies can corroborate whether such efforts will be evident working with more diverse and impoverished populations.

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Table 1. Summary of Studies.

Citation(s)	Study	Birth Years of subjects	Description of sample, inc. age of first prospective data	Results
Cadoret, Yates, Troughton, Woodworth, & Stewart, 1995	University of Iowa Adoption study	1945-1974 (approx.)	Adoptees from four adoption agencies in Iowa, who were between 18 and 47 years of age. For experimental group, biological parents were either drug users or had antisocial personality disorder. Sample was 95 males and 102 females.	Main effect for biological pathway (parent with Antisocial Behavior, ASB) was not found for adult ASB, but main effect for environment and adult ASB found. Prenatal exposure to alcohol did correlate with adult ASB. Interaction effect found where ASB increased when adoptee was in adverse home environment and had bio background of ASB.
Nagin, Pogarsky, & Farrington, 1997	Cambridge Study in Delinquent Development in London	1952-1953	Longitudinal survey of 411 males from a working-class area in London. Most are white, Caucasian. Data collection was 8 to 32 years.	Greatest risk of criminal behavior occurred in children from large families born to women who began childbearing early. Looked at theories to explain – found support for poor parenting-role model (physical neglect, poor supervision) and diminished resources (inadequate income, parent separation by age 10)
Morash & Rucker, 1999	London Longitudinal Study, Philadelphia Cohort Study, National Longitudinal Survey of Youth, National Survey of Children	LLS: 1952-1954 PCS: 1959-1962 (approx.) NLSY: 1957-1965 NSC: 1965-1969	Four longitudinal data sets: London Longitudinal Study (LLS), Philadelphia Cohort Study, National Longitudinal Survey of Youth (NLSY), and National Survey of Children (NSC).	In some analyses, youth of early child-bearing mothers received more negative teacher ratings (inc. conduct disorders and delinquency) and greater penetration into the justice system. One sample (NLSY) only found effects (higher delinquency scores) for the white subsample.

Hodgins, Kratzer, & McNeil, 2001	Population study in Stockholm	1953	Cohort of 15,117 people born in Stockholm in 1953. People who were institutionalized, mentally retarded, or admitted to a psychiatric ward were discarded.	Obstetric complications were not related to offending (as measured by criminal convictions at multiple ages: before age 15, 15-17, 18-20, and 21-30) in the absence of poor parenting. Pregnancy complications combined with inadequate parenting in early years increased violent and non-violent offending but crime rate in those experiencing both (50.5%) was not much higher than those just experiencing inadequate parenting (42.6%).
Werner & Smith, 1992	Population study in Kauai, Hawaii	1955	614 children born on the island of Kauai and followed from prenatal period to adolescence.	For boys, strongest early childhood predictors of court records of offending were family instability (e.g., divorce/separation, marital conflict, and father absence) and below-average self-help skills. For girls, the strongest predictor was below-average intellectual skills.
Stattin & Klackenberg-Larsson, 1993	Clinic for the Study of Children's development and Health in Stockholm	1955-1958	A longitudinal study of 212 subjects (122 males, 90 females) studied from birth to adulthood selected from a clinic in Stockholm. Males make up the study group for this study.	Boys' intelligence scores at age 3 were significantly related to future criminality as measured by official records ($p < .01$). Criminality was significantly correlated with language ability, vocalization, vocal communicativeness, and language maturity. With the exception of maturity of language at age 3, relationship between language and criminality remained significant after controlling for SES. After controlling for SES, parents' involvement with child's play promoted early language ability.
Weikart, 1998	High/Scope Perry Preschool Project	1958-1959	Intervention, longitudinal study of 123 disadvantaged, African American children from families of limited education, low income, many single parents, and high risk of school failure.	At ages 3 and 4, children were randomly assigned to 1.) an active learning, preschool program and 1.5 hour home visit or 2.) a nonprogram group. By age 27, only one-fifth as many program group members had been arrested five or more times – 7% vs. 35%.

Raine, Brennan, & Mednick, 1997	Danish perinatal study (Rigshospitalet in Copenhagen)	September 1959-December 1961	Prospective, longitudinal study of 4,269 males in Denmark	Significant interaction effect found between birth complications and early maternal rejection for violent crimes as measured by the Danish National Criminal Register. Aspects of maternal rejection that predisposed subjects to violence were being reared in a public institution and attempt to abort fetus. Main effect (but no interactions) was found for poor social circumstance.
Raine, Brennan, Mednick, & Mednick, 1996. Raine, Brennan, & Mednick, 1994	Danish perinatal study (Rigshospitalet in Copenhagen)	September 1959 to December 1961	1996 article: A sample of 397 Danish subjects. Data collected in hospital at birth, at 1 year, and follow-up at ages 17 to 19. 1994 article: full sample of 4,269 males	1996 article: Rates of crime were particularly high in subgroup who had both biological and psychosocial risk factors. Rate was 2.0-2.5 times higher than poverty or bio. risk alone. Group that had the highest social risk actually showed lower crime rates than bio only or biosocial group. Results held true for crime records and maternal report of externalizing behavior. 1994 article: Found significant interaction effect for birth complications in combination with negative psychosocial environment (specifically early child reject) and violent crime in early adulthood. Neither risk factor alone was associated with increased violence. This interaction was not found for nonviolent crime.
Kandel & Mednick, 1991	Danish perinatal study (Rigshospitalet in Copenhagen)	September 1959 to December 1961	A subsample of children from this study, with two high risk groups due to parent psychiatric histories (n=144) and one control group (n=72). Earliest data was collected at birth.	Pregnancy complications did not account for variance in offending status. Delivery complications did distinguish between nonoffenders and violent offenders, but not nonoffenders and property offenders. When controlling for SES and other factors, delivery complications accounted for 1.6% of the variance in violent offending. There was a significant interaction between parental psychiatric diagnosis and delivery complications with violent offending.
Brennan, Grekin, & Mednick, 1999	Danish perinatal study (Rigshospitalet in Copenhagen)	September 1959 to December 1961	Prospective, longitudinal study of 4,269 males in Denmark	Maternal smoking was a predictor of both violent and nonviolent crimes. Maternal smoking during pregnancy predicted arrests of offspring who were life-course-persistent but not adolescence-limited, even after controlling for parental criminality, maternal rejection, pregnancy and delivery complications, SES, and parental psychiatric history.

Tibbetts. & Piquero, 1999	Collaborative Perinatal Project (Philadelphia)	1959-1962	Data was from the Longitudinal Study of biosocial Factors Related to Crime and Delinquency In Pennsylvania. Used 3 sources: Collaborative Perinatal Project (Philadelphia); records from Philadelphia public schools; records from Philadelphia police department. Population was primarily black, inner city youth in Philadelphia. Analysis included 207 offenders (144 boys and 63 girls).	Low birth weight was significantly, positively associated with an early age of onset (defined as police contact that resulted in arrest prior to age 14); higher SES was negatively associated with early onset. Interaction of low birth weight x SES and low birth weight x weak family structure had significant and positive effects on early onset.
Piquero, Gibson, Tibbetts, Turner, & Katz, 2002. Gibson, Piquero, & Tibbetts, 2000. Gibson & Tibbetts, 2000	Collaborative Perinatal Project (Philadelphia)	1959-1962	Prospective longitudinal cohort of 987 low SES, inner-city African American boys and girls who were raised in Philadelphia through age 17.	2002 article: Participants whose mothers smoked more than 20 cigarettes per day were more likely to be LCP (life-course persisters, both juvenile and adult convictions). Gender and SES also showed effects on LCP offending. Gibson, Piquero, & Tibbetts: Maternal smoking distinguished between the LCP and AL (Adolescent Limited) group. High maternal smoking distinguished offenders from nonoffenders, after controlling for low birth weight, prenatal/perinatal complications, IQ, family adversity, SES. Gibson & Tibbetts: Both maternal cigarette smoking and absence of a father were associated with early onset of offending. The interaction between the two variables exerted a significant effect on early onset.
Gibson & Tibbetts, 1998	Collaborative Perinatal Project (Philadelphia)	1959-1962	See above. Subsample of 832 used for this analysis (416 boys).	One-minute Apgar score had a significant and negative relationship with offending behavior (official police record). Maternal cigarette smoking was not significantly associated with offending behavior. Two variables were significantly (but weakly) correlated ($r=-.09$). Interaction between the two variables was significantly associated with offending behavior.

Serbin, Cooperman, Peters, Lehoux, Stack, & Schwartzman, 1998	Concordia Longitudinal Risk Project	1962-1972 (approx. children recruited in grades 1, 4, 7 between 1976-1978)	Longitudinal study – Concordia Longitudinal Risk Project. First followed a group of 1700 inner-city youth from low-income neighborhoods, then continued following through the birth of their children.	Maternal years of education significantly predicted children’s CBCL scores, mothers’ childhood behavior predicted child behavior when educational levels were controlled for statistically.
Rasanen, Hakko, Isohanni, Hodgins, Jarvelin, & Tiihonen, 1999	Northern Finland 1966 Birth Cohort	1966	Northern Finland 1966 Birth cohort – general population birth cohort followed from mid-pregnancy to age 28.	After controlling for other factors, mothers who smoked during pregnancy were twice as likely as those who did not smoke to have a son who committed at least one violent crime or more than one offense before the age of 28. Maternal smoking did not increase risk of nonviolent offenses. If multiple risk factors were present, the odds of committing violent crime increased to ninefold and recidivism up to 14-fold, but nonviolent criminal behavior increased to a much lesser degree (2.9 to 5.8)
Streissguth, Bookstein, Barr, Sampson, O’Malley, K., & Young, 2004	Fetal Alcohol Follow-up Study at the University of Washington	1966-1989 (approx.)	Clinical sample of 415 patients enrolled in study, were at least 6 years old.	Life history interviews conducted with parents or guardians found that 60% of FAS patients had gotten in trouble with the law, 50% had been confined in detention, jail, prison, or a psychiatric or alcohol/drug inpatient setting, 49% had participated in inappropriate sexual behavior on repeated occasions, and 35% had drug/alcohol problems.
Raine, Reynolds, Venables, Mednick, & Farrington, 1998	Mauritius study	1969	Study of all children born in Mauritius (island in Indian Ocean) in 1969. 1795 children (51.4% male). Recruited at age 3.	Children rated by parents as high on aggression at age 11 had higher scores on stimulation-seeking, fearlessness, and body size at age 3 (although larger body size at age 11 did not correlate with aggressiveness).
Stevenson & Goodman, 2001	London, Waltham Forest borough, study	1969-1970	A random sample of children living in London. 828 boys and girls, first data collected at age 3.	Behaviors at age 3 predicting adult criminality (as measured by court convictions) included soiling, daytime enuresis, activity, and management difficulties. Daytime enuresis and tantrums were related to violent convictions. Gender, social development, and total behavior score were related to convictions. When social factors were controlled for, only temper tantrums and management difficulties were still associated with adult convictions.

Caspi, Henry, McGee, Moffitt, & Silva, 1995. Caspi, Moffitt, Newman, & Silva, 1996. Henry, Caspi, Moffitt, & Silva, 1996.	Dunedin Multidisciplinary Health and Development Study	April 1972-March 1973	Dunedin Longitudinal study. Earliest data was perinatal with a follow-up at age 3.	1995 Caspi et al. & 1996 Henry et al. articles: Lack of control temperament at both ages 3 and 5 was significantly correlated with teacher and parent reports of antisocial behavior at ages 9 and 11 and with externalizing problems at ages 13 and 15. Children rated as having lack of control temperament were more likely to be convicted of violent offenses, and temperament interacted with number of caretakers to predict nonviolent convictions. 1996 Caspi et al. article: Children classified as undercontrolled (difficult) at age 3 were 2.9 times as likely to be diagnosed with antisocial personality disorder, 2.2 times as likely to be recidivistic offenders, and 4.5 times as likely to be convicted for a violent offense. Inhibited boys only were more likely to be convicted for a violent offense (but only one).
Moffitt, 1990	Dunedin Multidisciplinary Health and Development Study	April 1972 to March 1973	Dunedin longitudinal study.	Group comprised of children who were delinquent at age 13 & 15 and had Attention Deficit Disorder by age 11 were most likely to have significant motor skills deficits at age 3, greatest levels of family adversity, and lower IQ at age 5. ADD nondelinquent group did not have these increased risk factors.
Moffitt & Caspi, 2001	Dunedin Multidisciplinary Health and Development Study	April 1972 to March 1973	Dunedin longitudinal study	Similar risk factors were present for males and females in both LCP (life course persistent) and AL (Adolescent Limited) ASB groups. Factors (measured before age 3) that distinguished LCP from AP group at significance: mother's age, mother-child observation (deviant interaction at age 3), neurological abnormality, rated difficult to manage at age 2, and observed as under-controlled at age 3.
Caspi, McClay, Moffitt, Mill, Martin, Craig, Taylor, & Poulton, 2002	Dunedin Multidisciplinary Health and Development Study	April 1972 to March 1973	Dunedin longitudinal study.	Direct effects of maltreatment or harsh physical discipline were found for rates of adolescent conduct disorder, antisocial personality disorder, and convictions for violent offenses by age 26. These associations were significantly amplified when expression of MAOA activity was low.
Thornberry, Ireland, & Smith, 2001	Rochester Youth Development Study	1973-1977 (approx.)	Ongoing panel study of adolescent development. Subjects recruited in 7 th and 8 th grades from census tracts with highest resident arrest rates, data collected every 6 months.	Children experiencing maltreatment only in early childhood were no more involved in delinquency, drug use, or externalizing behaviors. However, experiencing maltreatment in both childhood and adolescence increased risk of all outcomes. When looked at by type of abuse, childhood neglect (occurring between birth and 11) was related to delinquency and externalizing problems in early adolescence while physical abuse had a greater effect on late adolescence.
Olson, Streissguth,	Seattle	1974-	Population based cohort of	Prenatal alcohol exposure was related to adolescent self-reported antisocial

Sampson, Barr, Bookstein, & Thiede, 1997	Longitudinal Prospective Study on Alcohol & Pregnancy	1976	464 children followed longitudinally from birth to 14 years.	behaviors and delinquent behaviors from the CBCL. Highest risks occurred when drinking was in early pregnancy and if it was binge drinking.
Aguilar, Sroufe, Egeland, & Carlson, 2000	Minnesota Parent-child Project	1975-1977	20-year longitudinal study of high-risk population drawn from the Minneapolis Public health Clinic	Sample classified into four groups – Never antisocial, antisocial in childhood but not adolescence, antisocial in adolescence but not childhood (AO), and antisocial in both (EOP). No significant differences by group found for any of the early temperament or neuropsychological variables. EOPs significantly more likely to have a single mother at birth, be physically abused between birth and 2 years, and show more avoidant attachments at 12 and 18 months.
Appleyard, Egeland, Manfred, & Sroufe, 2005	Minnesota Parent-child Project	1975-1977	Ongoing, prospective, longitudinal study investigating developmental outcomes of at-risk, urban children; subjects selected on basis of poverty status.	Early cumulative risk variables (birth to 64 months), including child maltreatment, inter-parental violence, and SES stress, significantly predicted externalizing problems at age 16 and continued to affect outcomes even after holding middle childhood risk constant. The number of risk in early childhood predicted linear increase in behavior problems. Middle childhood risks (1 st to 6 th grade) did not have same predictive power.
Yates, Dodds, Sroufe, & Egeland, 2003	Minnesota Parent-child Project	1975-1977	Minnesota Parent–Child Project, a 25-year longitudinal study of developmental adaptation in a sample of young mothers living in poverty and their firstborn children. Home visits conducted six times in the first year, with an additional lab visit at 12 months.	There were modest relations between preschool exposure to partner violence (age 18 to 64 months) and teacher and youth reported externalizing behavior at age 16. Life stress (as measured between 12 months and 3rd grade) also significantly predicted 16-year behavior problems.
Wakschlag, Lahey, Loeber, Green, Gordon, & Leventhal, 1997	Developmental Trends Study	1975-1980	Developmental Trends Study – longitudinal study of 177 clinic-referred boys in Pennsylvania and Georgia. 71% white, 29% African American.	Mothers who smoked more than half a pack daily were more than 4 times as likely to have a child with Conduct Disorder (CD) than mothers who did not smoke. When other variables were controlled for, maternal smoking and maternal AS personality disorder were still correlated with CD outcomes. In a second logistic analysis, maternal smoking more than half a pack daily, maternal age, harsh discipline, and little supervision predicted CD.

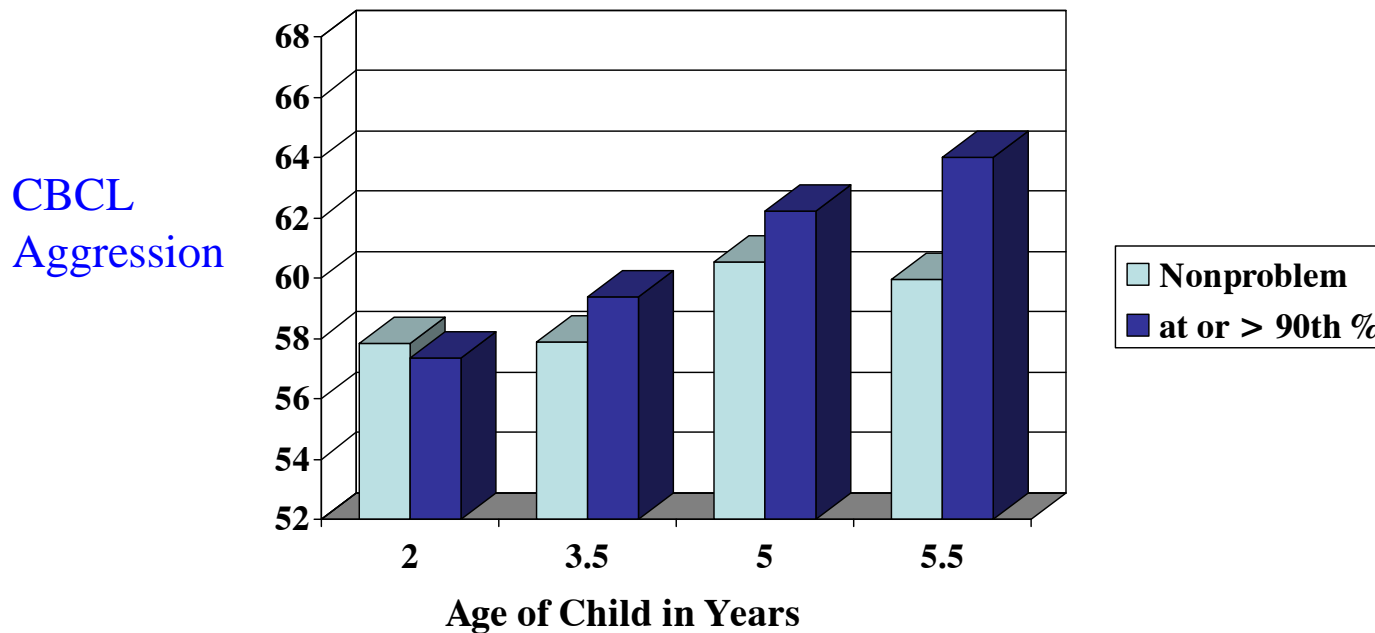
Breslau, Klein, & Allen, 1988	Cleveland Hospital study	1976	Cohort of children admitted to the neonatal intensive care unit in 1976 (Cleveland) with birthweight <1500 grams (considered Very Low Birthweight VLBW)	Very Low Birth Weight (VLBW) boys scored significantly higher than their controls on total Behavior Problems scales, including items that measured delinquent behaviors. 29% scored in the clinical range on the externalizing scale vs. 9% of controls. Teachers did not rate VLBW boys significantly higher on TRF although proportions in clinical range were different (40% vs. 22%). VLBW girls did not score significantly higher on mother or teacher report.
Rende, 1993	Colorado Adoption Project	1976 (oldest kids)	164 subjects participating as control subjects in the longitudinal Colorado Adoption Project (CAP). 91 males, 73 females.	The theory hypothesized that the sociability dimension of temperament would be related to delinquency. While other dimensions were associated with their predicted outcomes (emotionality with anxiety/ depression, activity with attention problems), there was little evidence for associations between Emotionality-Activity-Sociability traits and delinquent behavior for girls or boys.
Olson, Bates, Sandy, & Lanthier, 2000	Bloomington Longitudinal Study	1976-1977	Bloomington Longitudinal Study – 168 subjects, primarily middle class, 57% male. First data collection at 6 months.	Early caregiver behaviors at 13 and 24 months correlated with externalizing behaviors in school age as rated by mom and teacher as well as ext. behaviors at age 17 as rated by mom and self. Toddler difficultness and resistance to control predicted school-age externalizing problems. This relationship held for resistance to control and mom's rating of difficult to manage and Ext. beh at 17.
Bates, Pettit, Dodge, & Ridge, 1998	Bloomington Longitudinal Study (BLS) & Child Development Project (CDP)	BLS: 1976-1977 CDP: 1982-1983	Used data from two longitudinal data sets – Bloomington Longitudinal Study (BLS) (started assessing mother-child interaction at age 1 to 2 years) and the Child Development Project (CDP) (data collection not started until age 5, temperament assessed retrospectively)	There were direct main effects of temperamental resistance to control and middle childhood externalizing problems for both data sets. Interaction effects: when mothers were relatively low in restrictive control, there was a stronger relation between early temperament and later externalizing problems (per mother and teacher report) than when mothers were high in control. Conclusion was that parenting factors moderated the relationship between temperament and ext. behaviors.
Bates, Bayles, Bennet, Ridge, & Brown, 1991	Bloomington Longitudinal Study (BLS)	BLS: 1976-1977	Bloomington Longitudinal Study (BLS) – see above	For boys and girls, both difficult temperament and resistance to control in infancy predicted externalizing problems at age 8. For girls (but not boys), hyperactivity at age 3 predicted externalizing behavior. Restrictive, punitive control in mother-child interaction at 24 months predicted boys' externalizing.

Fergusson & Woodward, 1999	Christchurch (New Zealand) Health and Development Study	1977	Christchurch health and Development Study – longitudinal study of 1265 children born in Christchurch, New Zealand during the middle of 1977. Studied at birth, 4 months, annual intervals to 16 years, and 18 years.	Higher maternal age was associated with consistent decreases in rates of juvenile offending and convictions. Intervening process variables largely explained the association between maternal age and later outcomes, suggesting that it is not the age of parents but the ability of parents to provide a supportive and nurturant family environment that determines child outcomes.
Fergusson, Horwood, & Lynskey, 1993	Christchurch (New Zealand) Health and Development Study	1977	15-year longitudinal study of a birth cohort of 1265 New Zealand children (Christchurch Health and Development study)	There were positive, significantly significant associations between maternal smoking (pre and post natal) and child behavior problems. After controlling for other variables, smoking after pregnancy was no longer related to behavior problems, but there were still small associations between smoking during pregnancy (20 or more cigarettes per day) and behavior scores.
Arsenault, Tremblay, Boulerice, & Saucier, 2002	Montreal study – boys from lowest SES schools in Montreal	1978	Longitudinal study in Montreal of 1,037 white, French-speaking boys	There was an interaction between specific obstetrical complications (DRS, those considered deadly risk situations) and psychosocial risk in predicting adolescent violent and nonviolent delinquency. DRS increased likelihood of delinquency, depending on level of family adversity. DRS also helped explain the continuity of violent behavior from ages 6 to 17.
Nagin & Tremblay, 2001	Montreal study – boys from lowest SES schools in Montreal	1978	Longitudinal study in Montreal of 1,037 white, French-speaking boys	Risk factors of low maternal education and teenage motherhood increased odds of being in the high aggression trajectory and of staying in the chronic trajectory.
Ross, Lipper, & Auld, 1990	New York Hospital study	1978-1979	87 children admitted to the neonatal intensive care unit at New York Hospital. 80% white, 18% black	When compared to a normative sample, premature boys had significantly higher behavior problems scores at ages 7 and 8. Premature girls did not differ from normative sample. Within the premature children sample, those with higher SES had lower scores for behavior problems than those with low SES.
Olds, Henderson, Cole, Eckenrode, Kitzman, Luckey, Pettitt, Sidora, Morris, & Powers, 1998	Olds Elmira study	1978-1980	400 pregnant women were enrolled and assigned to a treatment group with home visitations from nurses or a control group with no home visitation	At age 15, those families with nurse visitation reported fewer incidents of running away, fewer arrests, fewer convictions/ violations of probation, fewer lifetime sex partners, fewer cigarettes smoked per day, and fewer days when alcohol was consumed. Parents reported fewer behavioral problems related to drug and alcohol use. The most positive results were concentrated among children born to women who were unmarried and from low-SES households.

Campbell, Pierce, March, Ewing, & Szumowski, 1994. Campbell, Pierce, Moore, Marakovitz, & Newby, 1996	Hard to manage preschoolers	1980-1983	112 subjects recruited between ages of 3 and 4 from local preschools, child care centers, and parent-referred. 69 of the 112 had elevated ratings of overactivity, inattention, and impulsivity.	1994: Boys with problem behaviors at age 4 continued to exhibit higher levels of activity, impulsivity, and externalizing behaviors at age 6. Behaviors were generally consistent across all contexts: home, laboratory, and school. 1996: Hard to manage preschool children at age 3 showed moderate continuity of behavior problems at ages 6, 9, and 13. Fifty and 48% of those with problems at age 3 showed clinically-significant problems at ages 6 and 9, respectively.
Shaw, Bell, & Gilliom, 2000	Pitt Mother & Child Project	1989-1992	310 ethnically-diverse, low-income boys followed from infancy to adolescence	Among boys identified at or above the 90th percentile on broad factors of externalizing symptoms at age 2, 63% remained above the 90th percentile at age 5, and 97% remained above the median. At age 6, 62% remained at or above the 90th percentile and 100% (all 18) remained above the median. There was a direct link between maternal depressive symptoms when children were 1.5 and 2 years of age and clinically-elevated reports of school-based conduct problems (CP) using the Teacher Report Form when children were age 8.
Beck & Shaw, 2005	Pitt Mother & Child Project	1989-1992	310 ethnically-diverse, low-income boys followed from infancy to adolescence	No direct effects were found between perinatal complications and youth report of antisocial behavior at age 10; however, a significant interaction emerged between family adversity and perinatal complications, such that low-income boys with high perinatal complications and family adversity were at elevated risk for antisocial behavior.
Shaw, Gilliom, Ingoldsby, & Nagin, 2003	Pitt Mother & Child Project	1989-1992	310 ethnically-diverse, low-income boys followed from infancy to adolescence	Observed harsh parenting at age 2 discriminated maternal-reported trajectories of conduct problems from ages 2 to 8 and showed significant associations with youth and teacher report of antisocial behavior at ages 11 and 12.

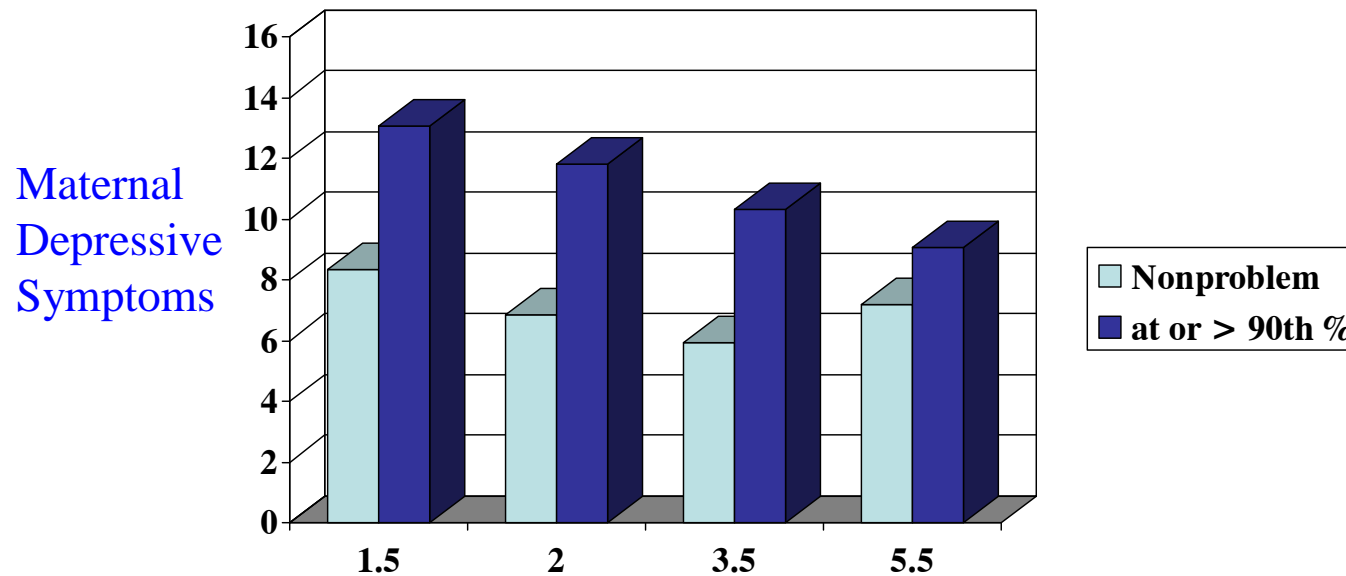
Olds, Kitzman, Cole, Robinson, Sidora, Luckey, Henderson, Hanks, Bondy, & Holmberg, 2004	Olds Memphis study	1990-1992	1139 women were assigned to one of four treatment conditions (3 receiving some form of home visitation and 1 control group). Low income unmarried women were actively recruited – 92% of sample black, 98% unmarried, 64% were < or = 18 years, 85% were at or below federal poverty level	At age 6, nurse-visited children were reported by their mothers to have fewer problems in the borderline or clinical range of the CBCL Total Problems scale (1.8% vs. 5.4%, $p=.04$). However, a reduction in behavioral problems on the CBCL was not corroborated by teachers' reports of child behavior.
Shaw, Dishion, Supplee, Gardner, & Arnds, 2006	Early Steps Pilot study	1998-2000	120 toddler-age boys with socioeconomic, family, and child risk factors	Reductions in destructive and aggressive behavior and improvements in maternal involvement and positive, proactive parenting were found at ages 3 and/or 4 using Dishion's Family Check Up. Families characterized by a profile associated with early-starting conduct problems showed the greatest between-group improvement in conduct problems at age 4.

Figure 1. Trajectories Leading to Clinically-Elevated Scores on the TRF Aggression at age 8: CBCL Aggression at Ages 2, 3.5, 5, and 5.5



Effect size = $-.1 - .48$ sd
Shaw, Bell, & Gilliom, Clinical Child
and Family Psychology Review (2000)

Figure 2: Trajectories Leading Clinically-Elevated Scores on the TRF Aggression at age 8: Maternal Depressive Symptoms at Ages 1.5, 2, 3.5, & 5.5



Effect size = .27 - .73 sd