

DESISTANCE FROM CHILDHOOD PHYSICAL AGGRESSION

by

Miles Gilliom

BA, Brown University, 1994

MS, University of Pittsburgh, 2000

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This dissertation was presented

by

Miles Gilliom

It was defended on

April 22, 2004

and approved by

Celia A. Brownell, PhD

Susan B. Campbell, PhD

Rolf Loeber, PhD

Daniel S. Nagin, PhD

Daniel S. Shaw, PhD
Dissertation Director

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This longitudinal study of disadvantaged boys ($N = 258$) had three aims. The first aim was to identify individuals who desisted from high early physical aggression (PA). A group-based trajectory analysis with different, age-sensitive measures of PA revealed that most aggressive young boys desisted (i.e., dropped to normative levels of PA) by middle childhood. Second, the study sought to discover predictors of desistance. In particular, analyses tested the proposition that desisters experience high child risk, low caregiving risk, and positive life transitions. The results provided partial support for this view. As anticipated, desisters were indistinguishable from chronically aggressive boys in PA and impulsivity at age 2. Contrary to expectation, however, desisters resembled boys with persistently low PA on a measure of fearfulness and exhibited intermediate risk (i.e., between chronics and lows) on toddlerhood measures of maternal depression, harsh parenting, and family adversity. Furthermore, life transition variables (e.g., changes in parenting, relationships with teachers and peers) failed to discriminate desisters from chronics or lows after accounting for early child and family factors. The third aim was to determine whether boys who desisted from early aggression experienced continuing difficulties in the form of social skills deficits or nonaggressive conduct problems. As expected, desisters improved in both domains according to maternal, teacher, and youth reports. In fact, by the end of middle childhood, desisters were indistinguishable from lows on these measures, with one exception: Mothers of desisters rated their sons higher on nonaggressive conduct problems.

PREFACE

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TABLE OF CONTENTS

INTRODUCTION	1
Definitional and Methodological Issues	2
Evidence for Desistance from High Levels of Early Aggression	6
Explanations of Desistance from High Levels of Early Aggression	15
Desistance from Aggression in Relation to Other Aspects of Adjustment.....	29
Goals of the Present Study	32
Hypotheses	33
METHOD	34
Participants.....	34
Procedures.....	35
Measures	36
Data Analytic Plan	48
RESULTS	54
Descriptive Statistics and Bivariate Correlations	54
Estimated Trajectories of Maternal-Reported Physical Aggression.....	66
Predictors of Desistance.....	80
Desistance from Physical Aggression in Relation to Social Skills and Nonaggressive ASB ..	85
DISCUSSION	97
Trajectories of Physical Aggression	98
Predictors of Desistance.....	101
Desistance in Relation to Other Aspects of Adjustment.....	108
Limitations	110
Future Directions	111
Conclusions.....	114
BIBLIOGRAPHY	116

LIST OF TABLES

Table 1. Models of Desistance from Childhood Physical Aggression	18
Table 2. Study Constructs and Measures	37
Table 3. Means and Standard Deviations of Study Variables	56
Table 4. Correlations Among Physical Aggression Variables.....	59
Table 5. Correlations Among Predictor Variables.....	60
Table 6. Correlations Among Social Skills Variables	61
Table 7. Correlations Among Nonaggressive Antisocial Behavior Variables	62
Table 8. Correlations Between Predictor Variables and Maternal-Report Physical Aggression Variables	63
Table 9. Correlations Between Social Skills Variables and Maternal-Report Physical Aggression Variables	64
Table 10. Correlations Between Nonaggressive Antisocial Behavior Variables and Maternal-Report Physical Aggression Variables.....	65
Table 11. Bayesian Information Criteria by Model Type for Toddlerhood and School-Age Physical Aggression.....	67
Table 12. Estimated Trajectory Parameters, Percentages, and Posterior Assignment Probabilities for Toddlerhood and School-Age Trajectory Groups.....	69
Table 13. Estimated Conditional Probabilities of School-Age Trajectory Group by Toddlerhood Trajectory Group.....	73
Table 14. Physical Aggression (PA) Scores by Overall Trajectory Group	75
Table 15. Growth in Teacher-Reported Physical Aggression by Overall Trajectory Group.....	78
Table 16. Self-Reported Physical Aggression by Overall Trajectory Group	79
Table 17. Logit Analysis: Predicting Membership in Overall Trajectory Groups	83
Table 18. Logit Analysis: Predicting Membership in Overall Trajectory Groups Using Life Course Variables.....	86
Table 19. Summary of Model Specifications for Mother- and Teacher-Rated Social Skills and Nonaggressive ASB.....	88
Table 20. Growth in Mother-Reported Social Skills by Overall Trajectory Group	89
Table 21. Growth in Teacher-Reported Social Skills by Overall Trajectory Group	91
Table 22. Growth in Mother-Reported Nonaggressive ASB by Overall Trajectory Group.....	93
Table 23. Growth in Teacher-Reported Nonaggressive ASB by Overall Trajectory Group.....	95
Table 24. Self-Reported Nonaggressive Antisocial Behavior by Overall Trajectory Group	97

LIST OF FIGURES

Figure 1. Trajectories of physical aggression in toddlerhood.....	70
Figure 2. Trajectories of physical aggression in the elementary-school years.	71
Figure 3. Teacher-rated physical aggression by overall trajectory group.....	79
Figure 4. Mother-rated social skills by overall trajectory group.	90
Figure 5. Teacher-rated social skills by overall trajectory group.	92
Figure 6. Mother-rated nonaggressive antisocial behavior by overall trajectory group.	94
Figure 7. Teacher-rated nonaggressive antisocial behavior by overall trajectory group.	96

INTRODUCTION

From a life-span, developmental perspective, the major features of aggressive behavior include its onset, escalation, persistence, and desistance over time. To date, social scientists have focused almost exclusively on why people become and remain aggressive. Consequently, little is known about individuals who desist from aggression. This state of affairs is unfortunate: In failing to consider desistance, we may be overlooking a source of insight on key issues in aggressive development. Specifically, research on desistance may help clarify which aggressive individuals are at risk for continuing problems, which factors are most likely to reduce aggression, and what vulnerabilities, if any, linger in aggression's wake (Bushway, Piquero, Broidy, Cauffman, & Mazerolle, 2001; Loeber & Hay, 1997).

In their review of youth aggression and violence, Loeber and Stouthamer-Loeber (1998) observed that desistance is most common in early childhood and in adolescence through early adulthood. Researchers have begun to clarify discontinuities in aggression in adolescence (Brame, Nagin, & Tremblay, 2001; Maughan, Pickles, Rowe, Costello, & Angold, 2000; McCord, 1983; Nagin & Tremblay, 1999; Nagin & Tremblay, 2001a); however, no studies have focused on desistance from aggression in young children. The present study began to address this gap by examining desistance in a sample of low-income boys followed prospectively from toddlerhood through middle childhood. This population was targeted because of elevated rates of violence among disadvantaged males (Loeber, Farrington, Stouthamer-Loeber, Moffitt, & Caspi, 1998) and because of the more extensive research base on boys' aggression (Coie & Dodge, 1998).

The study had three goals. The first was to identify desisting trajectories. From research on the stability and instability of youth aggression, I hypothesized that most aggressive young boys desist across early and middle childhood. The second goal was to identify predictors of desistance. From person-environment interaction and life course models of development, I hypothesized that desisters experience early temperamental risks, supportive home environments, and positive life transitions. The third goal was to examine desistance in relation to long-term social adjustment. From research with older children, I hypothesized that desistance from early aggression is accompanied by sustained reductions in social skills deficits and nonaggressive antisocial behavior.

This literature review has four parts. The first part covers definitional and methodological issues. Desistance cannot be understood apart from a conception of aggression and the aggressive individual. Thus, before turning to desistance, the section addresses aggression, with an emphasis on developmental changes in aggressive behavior. The second section reviews the evidence for desistance from aggression in childhood. The third part examines processes associated with early desistance. I organize this section into several explanatory frameworks, including dimensional models, person-environment interaction models, and life course models. In addition, I propose an integrative model based on findings from the review. The final section extends the focus to other aspects of children's adjustment.

Definitional and Methodological Issues

Aggression. Youth aggression is part of the fabric of American life. Between 1989 and 1998, person offenses (i.e., those involving assault, robbery, rape, and homicide) handled by the U.S. juvenile courts increased 64%, from 214,300 to 403,800 cases per year (Black, 2001). The

large majority of juveniles involved in person offenses were males under 16 years of age. Externalizing behavior problems, which include aggression (as well as hyperactivity and defiance), are the most common basis for clinic referral among young children (Lavigne, Gibbons, Christoffel, & Arend, 1996; Luby & Morgan, 1997).

In spite of its ubiquity, youth aggression is not easily defined. Coie and Dodge (1998) review problems encountered by even basic definitions. For example, must harmful intent be present for an act to be considered aggressive? If so, difficult questions arise in defining and measuring intentionality. Can aggression be considered universal, or are judgements of such actions always constrained by contextual norms? Is aggression a unitary construct, or are there distinct forms of aggression that arise in different circumstances or at different stages of development?

Researchers have dealt with these problems in several ways. Most take a general approach in defining aggression (e.g., “acts that inflict bodily or mental harm on others” [Loeber & Stouthamer-Loeber, 1998, p. 242]), avoiding the issues of intent, context, or heterogeneity. This approach is defensible from a practical standpoint: Despite the complexity of the judgement process and the opportunities for error, ratings of global aggressiveness usually can be made reliably across independent observers (Cairn & Cairns, 2000). Other writers adjust the definition to the specific aspects of aggression under study (Bandura, 1973; Hartup & deWit, 1975). Still others refer to various forms of aggression, including physical and verbal aggression (Berkowitz, 1962; Dodge & Coie, 1987; Hartup, 1974).

The definition used here draws on all three of these approaches. Specifically, I focus on *age-graded behaviors that cause bodily harm to others*. This definition bypasses problems of

inference associated with intentionality, narrows the discussion to physical aggression (PA), and casts aggressive activity as a developmentally heterogeneous category of behavior rather than as a static entity. Because investigators seldom refer to developmental issues in the definition and analysis of aggression (Coie & Dodge, 1998; Hartup, 1974; Loeber & Hay, 1997), the latter qualification deserves further discussion.

Increasingly, developmentalists recognize that broad patterns of behavior are coherent over time, even as the topographic manifestations shift with the developmental status of the individual (Kagan, 1969; Patterson, 1993). Such so-called heterotypic continuity is highly relevant to the study of childhood PA. In particular, aggressive propensities typically reveal themselves as hits, kicks, or bites in toddlerhood (2-3 years) (Brownlee & Bakeman, 1981; Hay, 1984; Tremblay, 2001), as physical fighting during the preschool and elementary school years (4-11 years) (Cairns & Cairns, 1994; Loeber, Green, Lahey, & Kalb, 2000), and as physical or sexual violence in adolescence (Elliott, Huizinga, & Morse, 1987). Patterson (1993) invoked the chimera to describe this phenomenon, analogizing to the creature from Greek mythology that grows new appendages on an underlying frame. In short, aggressive behaviors change with development, but appear to do so in an orderly manner.

The present definition of aggression has two key methodological implications. First, measures of aggression must be developmentally sensitive. That is, they must target behaviors that are germane to the age of the research participants. Depending on the time span of the study, different ages may require different scales. Second, measures of aggression should measure aggressive behaviors. This statement is not presented facetiously: Popular 'aggression' scales include items tapping a variety of nonaggressive behaviors, such as oppositionality and temper

tantrums (e.g., Achenbach, 1991). As Tremblay (2000) notes, these problems are correlated with aggression; however, they are distinct in terms of their developmental course and their costs for the individual and society. The confounding of different types of antisocial behavior may mask features and predictive relations specific to each domain (Vaillancourt, Brengden, Boivin, & Tremblay, 2003).

Desistance. The term ‘desistance’ appears regularly in the literature on youth aggression and antisocial behavior, typically without explicit reference to its intended meaning. Webster’s Dictionary defines desistance as “the act or process of desisting; cessation.” In turn, cessation is defined as “a temporary or final ceasing.” Roget’s Thesaurus lists both words under the concept of “change from action to rest.” At a basic level, then, to refer to something as desisting is to assume that it may vary in force or activity over time, and that it can reach a phase of temporary or permanent quiescence.

Further clarification emerges from the field of criminology. Loeber and LeBlanc (1990) specified four components of desistance from criminal behavior: deceleration (a reduction in the frequency of offending), de-escalation (a reduction in the seriousness of offending), specialization (a reduction in the variety of offending), and reaching a ceiling (remaining at a certain level of seriousness in offending without escalating to more serious acts). More recent statements stress the notion of desistance as a process that supports the termination of offending (Bushway et al., 2001; Laub & Sampson, 2001; Maruna, 1997; Weitekamp & Kerner, 1994). This emphasis distinguishes between the outcome (i.e., termination, defined by Cohen and Canela-Cacho [1994] as the point at which the risk of offending reaches that of the general population) and the path by which it is reached.

As with aggression, the chosen definition of desistance must correspond with the research question at hand. The focus here is on pathways by which aggressive children come to resemble non-deviant peers. Thus, I define desistance as a *process by which aggression decreases in frequency, severity, and variety to age-typical levels*. This definition of desistance has two main implications for research. First, given the emphasis on change over time, studies of desistance should employ longitudinal methods that are sensitive to its temporal dimensions. Sampling rates and data analysis techniques should be selected with an eye toward tracing major developmental pathways and discontinuities throughout the years.

Second, an emphasis on process necessitates consideration of the specific mechanisms involved in desistance. Genetic, biological, psychological, and social-contextual factors influence the onset and persistence of PA (Coie & Dodge, 1998; Loeber & Hay, 1997; Parke & Slaby, 1983). Undoubtedly, research on desistance also will require an integrated, multi-level approach. Whether the same mechanisms that account for the onset and persistence of PA also account for its desistance is an open question (Rutter, 1988).

Evidence for Desistance from High Levels of Early Aggression

Do aggressive young children typically give up their injurious ways? If so, when does the desistance process start? Is desistance gradual or abrupt? Research on the stability of PA is informative regarding these questions. Three types of stability research can be identified: studies of absolute stability, studies of relative (or inter-individual) stability, and studies of inter-individual differences in absolute stability (Nesselroade & Baltes, 1979). Each type of research offers a different perspective on the issue of desistance.

In reviewing the stability research, I emphasize studies that employ longitudinal designs and measures of PA that are both age-sensitive and exclusionary of other kinds of problem behavior. Unfortunately, few studies have incorporated all of these features. Prospective research beginning in the first years of life is particularly scarce. According to Tremblay (2000), this gap stems from the powerful influence of social learning theory on contemporary investigators. Social learning theory asserts that children learn aggressive and antisocial behaviors from deviant parents, siblings, and peers, violent media, etc. (Bandura, 1973). Very young children lack the cognitive capacities and social experiences to participate in this process, it is assumed; consequently, early childhood is of little interest from a social learning perspective. The accuracy of these claims aside, much of what we know about early aggression is based on a small body of cross-sectional data. By necessity, then, I supplement my review with studies that possess only one or two of the methodological desiderata listed above.

Absolute stability of early aggression. Absolute stability refers to the extent to which the level of an attribute varies over time (Nesselroade & Baltes, 1979). This concept is applied at the level of the population—it refers to the average or normative developmental trajectory. As such, it provides a backdrop for understanding atypical trajectories. No single study has examined the normative course of PA from infancy through adolescence. However, a coherent picture begins to emerge when studies of shorter spans are considered together.

First, PA emerges toward the end of the first year of life. This period coincides with the onset of walking, reciprocal play, and interest in controlling one's own activities and possessions. At 6 months, infants seldom object when peers grab their toys or invade their space (Hay, Nash, & Pederson, 1983; Maudry & Nekula, 1939). After one year, however, they may

respond to peer provocations with physical resistance, protest, and aggressive retaliation (Caplan, Vespo, Pedersen, & Hay, 1991).

Second, PA is most common at around 2 years of age. Maudry and Nekula (1939) observed Austrian children 6 to 25 months of age in dyadic interaction with same-aged peers. Interpersonal aggression (i.e., hitting, pushing, biting) comprised 9.6% of social behaviors in 19-25 month old children. The comparable percentages for children ages 6-8 months, 9-13 months, and 14-18 months were 2.8%, 3.4% and 8.4%, respectively. In each age-group, aggression usually occurred during object struggles. In a British study of second-born children, Dunn and Munn (1985) observed participants' PA toward the elder sibling at ages 14, 18, and 24 months. The results indicated a linear increase in aggressive behavior. Brownlee and Bakeman (1981) recorded instances of preschool boys' hitting during free play. Hourly rates for 1-, 2-, and 3-year-old boys were 4.9, 7.8, and 4.9, respectively. Cummings, Iannotti, and Zahn-Waxler (1989) observed children's aggressive interactions with a friend at 2 and 5 years of age. Rates of PA were higher at age 2 (3.4 instances in 25 minutes) than at age 5 (2.19 instances in 25 minutes).

Why is PA so common in toddlerhood? Several authors have noted that PA represents one of a very limited number of means available to young children for obtaining goals and dealing with frustration (Feshbach, 1970; Maccoby, 1980; Tremblay, 2000). Moreover, it is often effective at this age: Victims usually yield and adults seldom intervene (Patterson, Littman, Bricker, & Walker, 1967). Consistent with this line of reasoning, Coie and Dodge (1998) noted that the decline in PA during the preschool years coincides with advances in verbal problem-solving (Kagan, 1981; Shantz, 1987) and emotion regulation (Gilliom, Shaw, Beck, Schonberg,

& Lukon, 2002; Kopp, 1989), the onset of parental discipline (Shaw & Bell, 1993), and the internalization of parental standards (Kochanska, Coy, & Murray, 2001).

Rates of PA drop further across middle childhood and adolescence. Loeber and colleagues found steady decreases in physical fighting from ages 6 to 10 years in a male Canadian sample (Loeber, Tremblay, Gagnon, & Charlebois, 1989) and from ages 6 to 17 years in a male Pennsylvania sample (Loeber & Hay, 1997). Cairns and colleagues (Cairns & Cairns, 1994; Cairns, Cairns, Neckerman, Ferguson, & Garipey, 1989) obtained similar results in a sample of North Carolina school children. Interestingly, this drop occurs even as the range of issues over which children disagree expands. Disputes over physical resources and personal space still occur (although much less frequently than during early childhood). Additionally, social issues, including the desire for revenge and satisfaction derived from causing discomfort in others, are now grounds for confrontation (Feshbach, 1964). Nevertheless, PA declines, in part because older children are better at avoiding conflict (Cairns & Cairns, 1994; Savin-Williams, 1979), in part because they often use verbal and relational aggression when conflict does occur (Cairns & Cairns, 1994; Crick, 1996), and in part because the consequences associated with PA, including injury and official or social sanctions, grow more severe with increasing age (Loeber & Hay, 1997; Rutter, Giller, & Hagell, 1998).

In summary, the normative trajectory for PA is defined by an early peak followed by a steady decline across childhood and adolescence. Very young children seem to rely on these behaviors to assert and protect their rights. However, PA often carries high costs in the form of pain and punishment. Thus, children typically discard aggression as new social strategies become available.

Relative stability of early aggression. In each of the foregoing studies, children differed appreciably from one another in levels of PA. An important question, then, is the extent to which these inter-individual differences are carried forward in time. Put another way, is the toddler who frequently hits others likely to become the child who is expelled for fighting in elementary school and the adolescent arrested for assault? This question concerns the relative stability of PA.

Relative stability is typically represented by a single sample statistic, usually a correlation coefficient or odds ratio, that summarizes the degree of association between measures at two time points. Again, no study has extended from infancy through adolescence; however, two investigations suggest that individual differences in PA begin to show stability near the end of the second year. Keenan and Shaw (1994) observed a sample of boys and girls from low SES families. Ratings of behavior during laboratory assessments when the children were 18 and 24 months of age yielded significant correlations for physical aggression toward mothers and toward examiners ($r_s = .23$ and $.45$, respectively). In a study of the stability of peer-directed PA between ages 2 and 5, Cummings and colleagues (1989) found a high correlation for boys ($r = .59$) and a moderate correlation for girls ($r = .36$). The relative stability estimates obtained in these studies are slightly lower than those found across similar spans in middle childhood and adolescence (Loeber, 1982; Olweus, 1979). Results from the Pittsburgh Youth Study show that the year-to-year stability of boys' PA increases steadily from age 6 (odds ratio = 10.3) and stabilizes at around age 9 (odds ratio = 18.6) (Loeber & Hay, 1997). Several large studies have examined the relative stability of PA from middle childhood into maturity. In a comprehensive

meta-analysis, Lipsey and Derzon (1998) found that aggression between ages 6-11 was a significant predictor ($r = .21$) of serious and violent offending between ages 15-25.

Although the associations reported above are noteworthy from a statistical standpoint, interpretations regarding their substantive meaning have varied. Some writers emphasize the “traitlike” stability of aggression (Coie & Dodge, 1998, p. 801). In his well known review, Olweus (1979) concluded that the relative stability of aggression among males rivals that of intelligence. More recently, several investigators have formulated “early-starter” models of aggressive and antisocial development (Loeber, 1988; Moffitt, 1993; Patterson, 1993). These models distinguish between (a) a small group of youngsters (predominately boys) with onset of extreme aggression in early childhood, who are at high risk for chronic and violent antisocial careers, and (b) a much larger category of adolescent-onset youth (including a far higher proportion of girls) for whom forays into antisocial behavior are both time-limited and relatively free of violent acts. From this perspective, high levels of early PA portend a very negative prognosis.

Others writers note that because correlation coefficients fall well below 1.00, the stability data indicate both continuity and discontinuity (Loeber & Stouthamer-Loeber, 1998). That is, there may exist individual differences in absolute stability (Nesselroade & Baltes, 1979). Some children may maintain relatively high or relatively low levels of PA while others follow escalating or desisting trajectories. The challenge is to identify and disaggregate these diverse groups.

Inter-individual differences in absolute stability of early aggression. Investigators have examined individual-level trajectories of PA in several different ways. One approach is to

apply *ad hoc* cutting scores to separate high- and low-scoring individuals at two or more time points. The dichotomized variables and resulting longitudinal cross-classifications produce homogeneous “boxes” into which individuals are categorized. Haapasalo and Tremblay (1994) used this method with a sample of Canadian boys from low-SES neighborhoods. Teachers rated boys’ fighting at ages 6, 10, 11, and 12. About 8% were stable-high fighters. In comparison, about 12% of boys desisted from fighting; that is, they were high fighters in kindergarten but not at subsequent time points. About 9% were high fighters with late onset. Kingston and Prior (1995) and Shaw, Gilliom, and Giovannelli (2000) used a similar approach with two samples of young children. In both studies, the measure of aggression included a variety of nonaggressive items (e.g., competitiveness, disobedience, hyperactivity). Nonetheless, the results revealed stable, desisting, and late-onset groups similar to those identified by Haapasalo and Tremblay (1994).

Although cutting scores are easy to use, they impose certain limitations on trajectory analyses. One is a lack of descriptive information regarding change. Because individuals are coded as either “high” or “low” at each measurement point, the method provides no indication of the time path by which changes are achieved (Bushway et al., 2001). A second limitation is the risk of “overfitting” or “underfitting” the data—creating categories that reflect only random variation or that fail to identify unusual but still real developmental patterns (Nagin, 1999).

Growth curve modeling (GCM) provides a useful alternative to *ad hoc* cutting scores. GCM enables the investigator to estimate the average developmental trajectory within the sample and to calibrate variability about the average. The output includes detailed information about the level and shape of trajectories and the extent of variation among individuals. This approach has

not been used with early PA; however, studies of externalizing problems reveal population-level decreases across early childhood and inter-individual differences in initial level and rate of change (Munson, McMahon, & Spieker, 2001; Spieker, Larson, Lewis, Giller, Gilchrist, 1999).

In some applications, the requirements and assumptions of GCM may be at odds with characteristics of the growth process. For example, GCM requires measurement invariance across time points (Burchinal & Appelbaum, 1991; Willett & Sayer, 1994). This requirement may not be tenable if the behavior of interest takes different forms over the span of the study. Additionally, GCM is predicated on the assumption that individual trajectories vary regularly around some common prototypical function (Nagin, 1999; Raudenbush, 2001). In practice, there may be reason to expect several distinctive developmental patterns. The high, desisting, and late-onset groups identified by Haapasalo and Tremblay (1994), Kingston and Prior (1995), and Shaw and colleagues (2000) suggests that this may be the case with early PA.

Latent class growth curve modeling (LCGCM) represents a third approach to understanding individual-level trajectories. This method combines strengths of cutting scores and GCM while avoiding some of their weaknesses. Like cutting scores, LCGCM may be used to identify population subgroups that follow divergent trajectories. In contrast to cutting scores, LCGCM permits the investigator to test for (rather than assume) the presence of trajectory groups within the data (Nagin, 1999). Like GCM, LCGCM yields rich descriptive information about change. In contrast to GCM, LCGCM can accommodate different, age-appropriate measures (Nagin & Tremblay, 2001b).

Several investigators have used LCGCM to examine PA in middle childhood and adolescence (Brame, Nagin, & Tremblay et al., 2001; Broidy et al., 2003; Maughan, Pickles,

Rowe, Costello, & Angold, 2000; Nagin & Tremblay, 1999; Nagin & Tremblay, 2002). Despite differences in sample composition, length of follow-up, and measures of PA, the results are remarkably consistent across studies. In each case, analyses revealed a large “low” group that begins at modest levels and slowly decreases over time (approx. 50-75% of the population); a small “chronic” group that remains high throughout the observation period (7-20%); and, most salient to this discussion, a “high-desister” group that begins at a high level (but slightly lower than the chronic group) and then rapidly declines (15-30%). On the basis of one study that included both sexes (Maughan et al., 2000), it appears that boys constitute a minority of the low group and a majority of the chronic and high-desister groups. Importantly, the trajectory groups differed on independent measures of PA. For example, Nagin and Tremblay (1999) related trajectories based on teacher ratings of PA to self-reported physical violence. As expected, self-reported violence was highest in the chronic group and lowest in the desisting and low groups.

The LCGCM results help to clarify several issues related to the stability of PA. First, consistent with prior findings on absolute stability, most children appear to experience a modest peak in PA early in life, followed by a gradual decline. Second, consistent with early-starter models of aggression, a small group of children appears to show persistently elevated PA from early childhood through adolescence. Third, high levels of early PA do not always lead to chronic violence; in fact, most highly aggressive young children seem to desist. Fourth, high-level desisters appear to account for most of the relative *instability* of childhood PA—no study found evidence of late-onset, high-level PA.

These conclusions are tentative because an important piece of the puzzle—early childhood—is missing. In fact, the available data suggest a dynamic process already well underway when observations began. The high desisting group, in particular, is in the midst of a major transition, whereas other children are undergoing less dramatic change. To fully characterize continuities and discontinuities in PA, the field needs longitudinal analyses beginning in the first years of life. This information will help clarify the origins of aggressive trajectories, and, more specifically, cast light on high-level desistance, at once the most dynamic and least understood pathway.

Explanations of Desistance from High Levels of Early Aggression

If desistance from high levels of early PA is a regular event, then its occurrence merits explanation. A viable model of early desistance must meet two basic criteria. First, it must explain levels of PA that are initially high, relative to peers, as well as the subsequent decline. Second, it must take into account the developmental landscape of the early years. Between infancy and middle childhood, children progress from depending on caregivers to functioning autonomously at home to interacting with teachers and peers. Factors that influence the course of early PA likely will arise from or impinge on these developmental processes (Cicchetti & Richters, 1993; Sroufe & Rutter, 1984).

A review of the literature reveals three frameworks that meet these requirements: dimensional models, person-environment interaction models, and life course models. The frameworks accommodate the same set of set of developmental variables, including individual characteristics of the child (e.g., fearlessness, negative emotionality, impulsivity), parent-child relationship variables (e.g., parenting style), family variables apart from the parent-child

relationship (e.g., parental adjustment, family adversity), and experiences outside of the home (e.g., relationships with teachers and peers). However, they offer different perspectives on (a) how these variables lead to desistance, and (b) which variables are most influential in the desistance process.

In the pages that follow, I describe these alternative explanations and evaluate them in light of relevant research. The latter task is complicated by several factors. First, no studies have considered all three models simultaneously; thus direct comparison is impossible. Second, several important long-term longitudinal studies focused on trajectories of antisocial behavior rather than PA per se. Third, most studies of aggressive or antisocial trajectories have used a single measure across the entire observation period. This practice may reduce the developmental validity of long-term trajectory analyses. Despite these shortcomings, the literature offers several clues about the mechanisms underlying desistance from early aggression.

A few comments on the content of this section are warranted. First, the focus here is on factors that distinguish one kind of trajectory (i.e., high-level desistance) from other kinds of trajectories. Thus, I highlight research that identifies developmental patterns within the population, with particular emphasis on studies that take advantage of recent methodological advances (e.g., LCGCM) to accomplish this task. Second, for ease of expression, I adopt the term “desisters” to refer to children who follow the high-level desisting trajectory. I refer to children with persistent PA as “chronics” and those with normative to low levels of PA as “lows.”

Dimensional models of desistance. Dimensional models rest upon the observation that aggression and its risk factors are skewed to the right. Advocates of this perspective claim that

desisters are merely those individuals who fall in the middle range of the skewed tail: They are sufficiently prone to PA to use these behaviors frequently in early childhood, but not so aggression-prone to persist into middle childhood and adolescence (Laub & Sampson, 2001). Loeber (1982) made a convincing case for this perspective two decades ago in a review on the stability of aggressive and antisocial behavior in school-age children and adolescents. He concluded that the highest degree of intra-individual stability is found in those who are most deviant in childhood. Gottfredson and Hirschi (1990) provide a similar formulation. They argue that desistance from antisocial behavior is a universal occurrence. Those who desist early simply have a lower propensity for these activities than those who desist later. To the extent that propensities are established early in life, subsequent experiences will have little or no influence on desistance. Scarr (1992) offers another version of the dimensional model. Working from an evolutionary perspective, she proposes that socialization is derailed by poor parenting and other psychosocial risk factors only when they exceed the “normal expected environmental range.” According to this framework, desisters include children who experience risk that falls within “normal” limits.

If the dimensional perspective is correct, then desisters should fall reliably between lows and chronics on measures of PA and early risk factors for PA (see Table 1, column 2). The research findings offer mixed support of this framework as an account of early desistance. With respect to initial differences in PA itself, the pool of relevant evidence is very small because few investigators have made this comparison among trajectory groups. The LCGCM studies described above found that desisters exhibited lower levels of PA than chronics at the beginning of data collection (i.e., 6-9 years of age); however, this is to be expected if desisters begin their

decline in early childhood. Campbell's (1987) study of young children referred for disruptive and impulsive behavior provides circumstantial evidence regarding initial differences in PA. She observed that children whose problems had improved by age 6 were no less likely to fight at age 3 than those whose problems persisted. However, these groups were not defined by patterns of PA. The critical test—early comparison of children who persist versus desist in aggression—has not been undertaken.

Table 1.
Models of Desistance from Childhood Physical Aggression

Variable domain	Dimensional	Person-Environment Interaction	Life-Course
Early child risk (including early PA)	C > D > L	C = D > L	C = D > L
Early parenting/family risk	C > D > L	C > D = L	C = D > L
Positive life transitions	–	–	C < D = L

Note. C = Chronics, D = Desisters, L = Lows.

The adequacy of the dimensional perspective grows clearer when we broaden the focus to include early risk factors. Several studies have found that children who desist from PA (or from antisocial behavior) are intermediate between lows and chronics on risk variables; however, these differences are not always robust. For example, in earlier analyses with this sample, Shaw and colleagues (Shaw, Gilliom, Ingoldsby, & Nagin, 2003) examined boys' conduct problem trajectories between ages 2-8 in relation to a variety of early risk factors, including fearless temperament, child IQ, rejecting parenting, maternal depression, and indicators of family adversity. In multivariate analyses, desisters and chronics were significantly

more fearless than lows, while desisters were significantly less fearless than chronics. Desisters fell between chronics and lows on most of the remaining variables; however, in no other instance were desisters reliably different from both groups.

In other studies, the anticipated pattern emerged inconsistently, or did not emerge at all. Nagin and Tremblay (2002) found that Canadian boys who desisted from PA between ages 6 and 15 years scored between chronics and lows on an age-6 index of parental/family risk (teenage motherhood, low maternal educational attainment, and parental separation/divorce). However, desisters ranked highest on an index of cognitive and behavioral risk (oppositonality, hyperactivity, inattention, low IQ). Aguilar and colleagues (Aguilar, Sroufe, Egeland, & Carlson, 2000) examined several dozen early risk features in low-SES children grouped by trajectories of conduct problem from ages 6 to 16 years. Desisters scored above, between, and below the chronic and low groups with equal frequency.

To summarize, although relevant data are limited in quantity, it appears that the dimensional perspective cannot provide a full account of early desistance. Early risk variables, considered in isolation from one another, do not reliably discriminate desisters from other children in the manner anticipated by theory. More complex models may be required.

Person-environment interaction models of desistance. Person-environment interaction models also emphasize early characteristics of the child and the child's environment. From this perspective, the key to understanding developmental trajectories lies in the interplay of variables from these two domains, rather than the level of risk of any particular variable. Moffitt's (1993) early-starter model of aggressive and antisocial behavior is a well-known example of this approach. In Moffitt's view, early starters suffer from subtle neuropsychological deficits, present

before or soon after birth and evident as irritable or overactive temperament, that increase aggressiveness in the first years of life. Whether aggressive behavior problems persist depends on the nature of the caregiving environment. Under adverse conditions such as harsh, inept parenting, parental psychopathology, and family adversity, excessive early PA crystallizes into a “life course-persistent” pattern. In contrast, in a context of parental warmth, consistent discipline, and low household stress, early starters learn to inhibit aggression and use prosocial problem-solving strategies. Thus, within a person-environment interaction framework, the desisting trajectory reflects high levels of child risk paired with low levels of environmental risk (for parallel accounts, see Calkins, 1994; Campbell, Shaw, & Gilliom, 2000; Kochanska, 1997; Patterson, 1993; Shaw & Bell, 1993; Stattin & Trost, 2000).

If this model is correct, desisters should resemble chronics on early child characteristics and lows on early parental and family characteristics (see Table 1, column 3). The available data are generally consistent with this hypothesis, particularly with respect to child and parenting variables. As noted above, Shaw and colleagues (2003) observed that disruptive boys who desisted were more fearless at age 2 years than lows. In addition, desisters and lows were less likely to experience rejecting parenting at age 2 than chronics. Nagin and Tremblay (2001) found that the presence of hyperactivity and oppositionality in kindergarten differentiated boys with high initial rates of PA (i.e., desisters and chronics) from those low on initial PA. In contrast, teenage status of the mother and low maternal education distinguished those who remained elevated through age 15 from the aggressive boys who subsequently desisted.

A study by McFadyen-Ketchum and colleagues (McFadyen-Ketchum, Bates, Dodge, & Pettit, 1996) provides further evidence of interactive effects. These investigators created 2

two-by-two classification matrices, one for each sex, based on kindergarten aggression/disruptiveness scores (high versus low) and change, relative to peers, between kindergarten and third grade (increasing versus decreasing). Among initially aggressive/disruptive children, those who increased did not differ on kindergarten aggression scores from those who decreased. For boys, these two trajectory groups were distinguished by coercive parenting at the beginning of kindergarten, with significantly lower levels among the decreasing group. Notably, boys who followed the high-level decreasing trajectory were no more likely to experience coercive parenting than those who began at lower levels.

When the results of Aguilar and colleagues (2000, see previous section) are reconsidered within an interactional framework, the pattern of early risk associated with desisters begins to exhibit regularity. Specifically, desisters consistently scored high on measures of child risk and low on measures of parenting risk. For example, desisters were elevated, relative to other groups, on a composite measure of 9 indicators of neuropsychological and temperamental risk collected between birth and age 3 years (there was no overall group effect, however). In contrast, none of the desisters experienced physical abuse or maternal unavailability between birth and age 2 years (among the chronics, 13% were physically abused and 21% experienced maternal unavailability).

Taken together, these data suggest that efforts to explain desistance must take into account interactive patterns across early child and family variables. The findings consistently implicate the combination of difficult child characteristics and competent parenting in the desisting pathway. Additional studies that measure a variety of child and family attributes in the

first years of life and extend through childhood are needed to validate the person-environment interaction model.

Life course models of desistance. The life course framework offers yet another perspective on desistance. According to the dimensional and person-environment interaction accounts, the course of early PA is largely predetermined by initial characteristics of the child and family. In contrast, life course models emphasize the influence of ongoing events (Caspi & Moffitt, 1995; Elder, 1995). Caspi and Moffitt (1995) note that continuities in children's maladaptive behavior are dependent, in part, on the continuity of experiences that serve to elicit or reinforce such behaviors. It follows, then, that discontinuities in these experiences, or the onset of positive experiences, may lead to improvements in adjustment that are independent of initial conditions.

Elder (1998) described two kinds of life events that may produce turning points in children's developmental trajectories. Family context transitions refer to changes in the social and psychological circumstances of the family system. Changes in socioeconomic adversity and parental depression are two examples from this category that are of longstanding interest to researchers (Elder, 1995). Social role transitions, in contrast, are experienced by individual children and involve changes in identity, environments, and routines. Role transitions of childhood include school entry and, relatedly, entrance into peer networks (Higgins & Parsons, 1983). Rutter (1994) argued that role transitions do not always lead to turning points and may, in fact, accentuate preexisting behaviors. Improvements are likely if role transitions contain a press for new ways of behaving (e.g., significant social bonds) and provide clear cues on how to

behave adaptively (see also Caspi & Moffitt, 1995; Laub & Sampson, 2001; Sampson & Laub, 1993).

If the life course framework is correct, then desisters should have high levels of early risk followed by favorable family context and social role transitions later in childhood (see Table 1, column 4). Although no studies could be located that examined changes in family context variables in relation to changes in children's aggression, several investigators have used this approach to study young children's behavior problems. Richman, Stevenson, and Graham (1982) identified the top 14% of 3-year-olds from a parental survey of troublesome behavior (including both externalizing and internalizing problems) and followed them through age 8. Persistent problems were predicted by ongoing stressful life events and maternal depression. This relationship held after taking into account family difficulties at age 3.

Similarly, Campbell and colleagues (Campbell, Breaux, Ewing, & Szumowski, 1986; Campbell, March, Pierce, Ewing, & Szumowski, 1991) found that persistent problems were predicted in multivariate analyses by initial levels and changes in family stress and maternal depression. Egeland and colleagues (Egeland, Kalkoske, Gottesman, & Erickson, 1990) observed that stable behavior problems from preschool through early elementary school were associated with high, stable self-reported maternal depression, whereas children who improved came from families where mothers reported significant decreases in depressive symptoms. Finally, in a national longitudinal sample, McLeod and Shanahan (1994) found that a decreasing poverty trajectory over 5 years significantly predicted decreasing trajectories of conduct problems in elementary school, apart from prior exposure to poverty.

Presumably, the impact of positive family transitions on child behavior is mediated, at least in part, by improvements in parenting (Elder, 1998). Very few studies that tracked family circumstances over time included repeated measures of parenting. Part of the challenge is that parenting practices change in response to the changing needs and capabilities of the child. As children grow more autonomous and planful, parental control of child behavior typically shifts in emphasis from ongoing behavioral regulation to dyadic problem solving (Kopp, 1991; Shaw & Bell, 1993). In their study of boys' externalizing problems, Campbell and colleagues (Campbell, Pierce, Moore, Marakovitz, & Newby, 1996) assessed maternal parenting at age 4 with a measure of negative control and at age 9 with a measure of negative discipline strategies. Family stress was measured at ages 4, 6, and 9. Maternal control at age 4 was a robust predictor of changes in externalizing problems from ages 4 to 9, such that lower levels of negative control predicted decreases in externalizing. In addition, decreases in family stress between ages 4 and 6 were marginally predictive of decreases in externalizing problems. Consistent with a mediational model, the link between changes in stress and externalizing problems disappeared after controlling for negative discipline at age 9.

Thus, to the extent that ongoing family processes have been incorporated into longitudinal research on early problem behavior, they have sharpened predictions and have suggested turning points in development. Based on a very small body of evidence, this appears to be true of social role transitions as well. Hughes, Cavell, and Jackson (1999) examined links between the quality of the teacher-student relationship and changes in conduct problems in a sample of early-elementary students. Children who experienced a positive relationship showed

significant decreases in peer-reported problems over a 2-year period. In contrast, antagonistic teacher-student relationships predicted increases in problems.

Friendships with nondeviant peers appear to supply additional opportunities for turning points. Fergusson, Lynskey, and Horwood (1996) used cutting scores to divide a large New Zealand sample into trajectory groups based on antisocial behaviors at ages 7-9 years and 14-16 years. Delinquent peer affiliations in adolescence was the key differentiator between (a) chronics and late-onsets and (b) desisters, with higher rates in the former groups. Similarly, Ingoldsby (2002) studied boys from this sample and found that friends' deviancy at ages 8 and 10 years was associated with changes in antisocial behavior across early and middle childhood. This pattern held when child and family risk factors were taken into account.

Intervention research supports some of the aforementioned findings regarding life events and desistance. Several research groups have identified samples of aggressive and disruptive school children and then delivered multimodal interventions based on developmental models of conduct problems (e.g., August, Realmuto, Hektner, & Bloomquist, 2001; Conduct Problems Prevention Research Group, 2002; Reid, Eddy, Fetrow, & Stoolmiller, 1999; Tremblay, LeMarquand, & Vitaro, 1999). Intervention components include parent training, home visits for social support, social skills training, academic tutoring, and classroom teacher consultation. On average, intervention participants exhibited modest, sustained improvements in behavior. Consistent with a life course model, these changes were mediated, in part, by reductions in psychosocial risk (Conduct Problems Prevention Research Group, 2002).

In sum, the available evidence suggests that life events play a role in the reduction of school-age conduct problems. Improvements in family circumstances appear to improve

children's own functioning. School entry seems to produce similar results when children form a positive relationship with their teacher. Friendships with peers also may prompt a turning point, if friends are not deviant themselves. Whether these effects are applicable to early PA remains to be seen.

Toward an integrated explanation of desistance. Lacking studies that compare alternative explanations of desistance, we cannot draw strong conclusions about why the behavior of some aggressive children improves. In the meantime, it appears unlikely that any of the foregoing models will provide a fully satisfactory account. Rather, the available findings offer some support for both the person-environment interaction and life course frameworks. Thus, I conclude the section by attempting to build an integrated account of desistance from early PA. The integrative model seeks to link research findings to a broader developmental framework. By considering the list of factors and experiences implicated in desistance against a backdrop of normative developmental transitions, we may be able to specify more clearly how and when these elements exert their influence.

The model begins in the perinatal period with the establishment of temperamental characteristics. Desisters, like chronics, are predisposed to be fearless, reactive to frustration, and impulsive (Nagin & Tremblay, 2001a; Shaw et al., 2003). Both groups present substantial challenges to caregivers, in general, and to mothers, in particular, who handle the bulk of childcare duties in most families. However, the model posits that caregivers of desisters are more sensitive, warm, and flexible in responding to these challenges than caregivers of chronics (Shaw et al., 2003), owing in part to better psychological adjustment and social circumstances in the former group (Nagin & Tremblay, 2001a). The model also assumes that despite an early history

of warm and consistent parenting, desisters will engage in PA at rates that initially match those of chronics. This assumption reflects the fact that internalized controls are very weak in all children until soon after the second birthday (Kochanska, Murray, & Harlan, 2001; Kopp, 1991). Before this point, individual differences in PA should be less a reflection of socialization than of dispositional features carried into early social contexts. High levels of fearlessness, emotional reactivity, and impulsivity appear to increase (a) rates of social interaction, (b) the likelihood of conflict during interactions, (c) the likelihood of high-intensity responses (including aggression) during conflict, and (d) the persistence of aggression in the face of retaliation or protest (Billman & McDevitt, 1980; Hay & Ross, 1982; Raine, Reynolds, Venables, Mednick, & Farrington, 1998; Rothbart, Ahadi & Hershey, 1994).

Rates of PA peak at age 2 years, and parents' efforts to inhibit PA intensify accordingly. In fact, parents of toddlers are more likely to enforce rules concerning PA than any other form of misbehavior (Ross, Filyer, Lollis, & Perlman, 1994). The upshot is that desisters and chronics both experience high rates of parental correction. The model holds that these efforts will yield different effects in the two groups, partly because of differences in parents' approach, and partly because of differences in the history of the parent-child relationship. Whereas parents of chronics are harsh and inconsistent in responding to PA, parents of desisters tend to use firm but non-coercive control and to reward prosocial behavior (McFadyen-Ketchum et al., 1996; Shaw et al., 2003). Desisters, for their part, are motivated to adopt parental standards in order to maintain positive parent-child interactions begun in infancy (Kochanska, 1997).

The socialization process proceeds slowly across early childhood. With time, desisters come to view PA as an unacceptable approach to social problems and gradually acquire

alternative strategies. Although parenting practices play a fundamental role in this transition, family-level processes also are involved. Specifically, the model assumes that improvements in family adversity and parental psychological adjustment facilitate desistance by decreasing household stress and enabling parents to better attend to their children (Campbell et al., 1991, 1996; Richman et al., 1982). Of course, it is probably no accident that such changes tend to occur in families with proactive parents. These individuals may take a similar approach in their personal and professional affairs, for their own well-being and that of their children. Thus, they may be apt to address their own mental health problems, seek better jobs, or move to better neighborhoods. In this manner, positive context transitions flow from and build upon the efforts of attentive caregivers.

As early childhood draws to a close, the social world of the child expands to include school and neighborhood contexts (Higgins & Parson, 1983). By this stage, desisters have improved substantially but continue to use PA more often than most of their peers (Nagin & Tremblay, 1999). Teachers and friends help narrow the gap still further. The model holds that positive relationships with teachers and friendships with non-aggressive peers provide new reasons to curb aggression and new opportunities to learn and practice prosocial behaviors (Hughes et al., 1999; Ingoldsby, 2002). As with improvements in family circumstances, positive social role transitions probably are not chance events in the lives of desisters. Owing to skills and attitudes gained at home, they are likely to take an active role in establishing ties with teachers and nondeviant peers. Thus, desisters, like their parents, help engineer experiences that lead to the reduction of PA.

In all, this model attempts to synthesize processes that may underlie a rise and subsequent fall in childhood aggression. The model assumes that mechanisms that decrease PA are linked in a causal chain: One leads to another, but each exerts a unique influence on the overall trajectory. It is possible, of course, that desistance offers multiple points of entry. For example, some aggressive children may experience pervasive risk throughout early childhood and then desist upon entering a highly structured and supportive school environment. Prior research suggests, however, that desistance is most likely when pressure for change extends across home, school, and peer contexts.

Desistance from Aggression in Relation to Other Aspects of Adjustment

Thus far, the discussion has focused on changes in PA while neglecting other aspects of children's adjustment. Aggressive young children are at risk for a variety of concurrent and long-term problems, including social dysfunction and nonaggressive antisocial behavior (Coie & Dodge, 1998); thus, to maintain this narrow focus would be indefensible. To date, few researchers have considered aggression trajectories in relation to other kinds of behavior. Consequently, the broader implications of desistance from PA are unclear. On the one hand, desisters may truly 'go straight' by attaining age-appropriate social skills and shedding other forms of antisocial behavior. This view is implicit in the foregoing explanatory framework, which links desistance to internalization of prosocial standards. On the other hand, improvements may be limited to aggression, while other difficulties persist. This brief, final section examines these alternatives, with a focus on social skills and nonaggressive antisocial behavior.

Desistance and social skills. Social skills refer to behaviors that enable children to interact effectively with others. Important social skills of early and middle childhood include the

ability to behave positively and altruistically, the ability to attend to others and be willing to comply with their requests, and the ability to assert one's needs without violating the rights of others (Rubin, Bukowski, & Parker, 1998). Do young desisters develop these skills? Although there is no comprehensive model for the development of social competence, most theorists suggest that experiences in family and peer contexts are influential (Rubin et al., 1998). Specifically, social skills are thought to emerge in the course of ongoing, coordinated interchanges with social partners. Evidence reviewed in the previous section suggests that desisters acquire such experiences in the early home environment and with friends in middle childhood. It is not clear, however, whether desisters have similar opportunities in early peer contexts. Two literatures bear on this issue.

The first relevant literature concerns peer responses to PA. This work indicates that many aggressive children are rejected by their peers (Asher & Coie, 1990; Coie & Cillessen, 1993). Although most studies of social status have focused on school-age children, the relationship between rejection and PA has been found as early as age 4 (Hartup, 1983). Moreover, persistent aggression during toddlerhood elicits negative responses from peers, particularly when boys are the aggressors (Fagot, 1984). These findings raise the possibility that desisters miss formative socialization experiences during their brief foray into extreme aggression. Because of early behavioral tendencies, they may be precluded from peer interaction, negotiation, and other activities that support the development of social skills.

A second line of work suggests that conflict, including aggressive conflict, can support the development of social competence, given the right circumstances (Dunn, 1988; Shantz, 1987; Vaughan, Vollenweider, Bost, Azria-Evans, Snider, 2003). Specifically, conflict seems to

provide unique, “hands-on” opportunities to learn about social rules, acceptable and unacceptable behavior, the consequences of one’s actions, and the feelings of others, particularly when adults and older children cultivate discourse about these topics (Dunn, 1988; Shantz, 1987). From this perspective, desisters may be well situated to benefit from early conflicts with other children.

Only one published study examined changes in PA in relation to social skills. Loeber and colleagues (1989) followed disruptive kindergarten boys over a four-year period. Teachers provided annual ratings of PA and social skills. In kindergarten, high fighters who remained aggressive did not differ in social skills from those who desisted. With time, the two groups diverged: Chronics grew less skillful while desisters grew more skillful. This study offers an encouraging perspective on the social outcomes of desisters. However, all of the participants were disruptive at intake; thus, it is unclear whether desisters’ social skills reached normative levels. The field needs studies of non-referred samples to address this issue.

Desistance and nonaggressive antisocial behavior. Physical aggression often occurs within a broad constellation of antisocial behavior problems (Coie & Dodge, 1998). Scores of cross-sectional studies indicate that aggressive children are more angry and oppositional than their peers. Moreover, persistent childhood aggression is a reliable antecedent of both violent and nonviolent adolescent delinquency (Loeber & Stouthamer-Loeber, 1998; Moffitt, 1993). On the basis of these findings, one might predict that desistance from early PA coincides with decreases in concurrent nonaggressive antisocial behavior problems and risk for adolescent delinquency. However, several alternative outcomes are feasible.

First, PA is generally considered more serious or socially unacceptable than other conduct problems of childhood (Tremblay, 2000). Parents who are successful in inhibiting child PA may be willing to tolerate oppositional or defiant behaviors (Ross et al., 1994). Second, some children may “progress” from public, overt forms of antisocial behavior (e.g., aggression) to more sneaky, covert forms (e.g., theft, truancy, property destruction) (Loeber, 1982; Loeber et al., 1989). In this case, desistance from PA would simply reflect a transition to antisocial behaviors that are less likely to result in apprehension by parents or authorities.

The available data suggest that desistance from PA heralds a general reduction in antisocial behavior. Maughan and colleagues (2000) found that about 95% of children who followed a declining aggression trajectory in early adolescence also followed a declining or low trajectory for non-aggressive conduct disorder symptoms. Nagin and Tremblay (1999) observed that about two-thirds of boys who desisted from high-level PA between ages 6 and 15 years followed a similar trajectory for opposition. In addition, desisters reported low rates of lifetime nonaggressive delinquency at age 17. Loeber and colleagues (1989) found that only 8% of desisting fighters engaged in high levels of nonaggressive antisocial behavior at the end of a four-year period, compared to 75% of chronically aggressive boys. Thus, desistance from aggression in older children is associated with reductions in nonaggressive antisocial behaviors and low rates of nonaggressive delinquency. Whether this pattern also applies to young children is unknown.

Goals of the Present Study

In trying to understand the development of chronic PA, researchers have overlooked aggressive children whose behavior improves. Although desistance is interesting in its own

right—indeed, any good theory of aggression ought to be able to account for it—understanding desistance also may help parents and clinicians decide whether and how to intervene with an aggressive child. To shed light on desistance from early PA, this study addressed the following questions:

1. In a population of children who are at risk for aggressive behavior problems because of male gender and low-income status, how many aggressive individuals desist?
2. To what extent do child characteristics, family factors, and life course transitions distinguish desisters from boys who follow chronic or low trajectories?
3. Are boys who desist from high levels of PA at risk for longstanding social skills deficits or nonaggressive conduct problems?

In order to examine these issues, this study applied LCGCM (Nagin & Tremblay, 2001b) to developmentally sensitive maternal-report measures of PA collected at ages 2 through 11 and related the resulting trajectory groups to selected covariates. To ensure that the groups generalized beyond maternal report, the study incorporated observational measures of early child and family characteristics and teacher- and self-report measures of child behavior in mid- to late-childhood.

Hypotheses

1. From prior research on stability and instability in childhood PA, I hypothesized that most aggressive young boys desist (i.e., attain age-typical levels of PA) across early and middle childhood.
2. From person-environment interaction models, I predicted that during toddlerhood, desisters are distinguished from lows (but not chronics) by higher PA, fearlessness, negative emotionality,

and impulsivity, and from chronics (but not lows) by more positive maternal control and lower maternal depression and family adversity.

3. From life course models, I predicted that (a) desisters are distinguished from chronics (but not lows) by positive family context transitions in the form of decreases in maternal depression and family adversity, and that (b) the effects of these changes are mediated by improvements in parenting.

4. From life course models, I predicted that desisters are distinguished from chronics (but not lows) by positive social role transitions in the form of positive teacher-child relationships and friendships with nondeviant peers.

5. From research with older children, I hypothesized that desistance from early PA is accompanied by sustained improvements in (a) social skills and (b) nonaggressive antisocial behavior.

METHOD

Participants

Mothers with male infants were recruited from Women, Infants, and Children (WIC) sites in the Pittsburgh metropolitan area (Shaw et al., 1998). WIC provides nutritional supplements for low-income families with young children. Mothers were asked to take part in a longitudinal study of child and family development. Of 421 families approached at WIC sites, 310 participated in the first assessment when boys were 1.5 years old. Eight subsequent assessments occurred at intervals ranging from 6 months to 2 years. Overall, retention was high, with an average participation rate of 85% (range: 63-97%). Participation was lowest at age 3 (63%). At age 3, mothers completed questionnaires by mail in lieu of a face-to-face assessment.

At the time of the first assessment, mothers ranged in age from 17 to 43 years, with a mean age of 28. The sample comprised primarily European American and African American children (54% and 40%, respectively); a small number of biracial and Hispanic children also participated. Sixty-five percent of mothers were either married or living with a partner, 26% were single, and 9% were separated, divorced, or widowed. Mean per capita monthly income was \$241 (\$11, 568 per year for a family of four).

In order to model toddlerhood and elementary-school trajectories, measures of PA were required at two or more time points between ages 2 and 3½ *and* between ages 5 and 11, resulting in a sample of 258 boys. To determine whether attrition may have biased the sample selection, I compared families who were included in versus excluded from the analyses. These two groups did not differ on any study variables. Further, boys who were included but had incomplete assessment histories did not differ on any study variables from boys with full data.

Procedures

Families took part in assessments when boys were 1.5, 2, 3, 3.5, 5, 6, 8, 10, and 11 years of age. Data were gathered during lab visits at ages 1.5, 2, 3.5, 6, and 11; during home visits at ages 2, 5, 8, and 10; and via mail at age 3. At each visit, mothers completed questionnaires about boys' behavior, family circumstances, and personal functioning. At ages 6, 7, 8, 9, 10, and 11, teachers completed questionnaires on boys' behavior and the teacher-child relationship. Boys were interviewed about their best friends' physically aggressive behavior at ages 8 and 10 and about their own antisocial behavior at ages 10 and 11.

Lab visits also included structured interactive tasks and free play periods. Structured tasks were selected to vary in stress level so that mother and child behavior could be observed across a broad spectrum of conditions. All tasks were recorded on videotape for future coding.

At age 1.5, lab tasks included a teaching paradigm (Matas, Arend, & Sroufe, 1978) in which mothers and sons worked together on puzzles or games, a clean-up paradigm (Martin, 1981) in which mothers instructed sons to put away toys, and the Strange Situation (see Ainsworth, Blehar, Waters, & Wall, 1978). The age-2 visit also included a clean-up; in addition, boys were observed in a behavioral inhibition paradigm. The behavioral inhibition paradigm was adopted from Kagan (1997). Examiners cleared the lab room of toys, gave mothers several questionnaires, and, before leaving, activated a 2 min tape recording of scary gorilla noises. The audio recording was compiled from scenes from the movie “Gorillas In the Mist” in which gorillas howled in a threatening manner. The tape recorder was stationed in an enclosed cabinet located across the room from the mother and child so that the child could identify the source of the sounds and choose to approach or stay away.

Measures

The measures targeted three domains: (1) boys’ PA, (2) potential predictors of desistance (child and family factors, the quality of the teacher-child relationship, and best friends’ PA), and (3) aspects of boys’ adjustment apart from PA (social skills and nonaggressive conduct problems) (see Table 2 for an overview of all measures). Some measures were formed by averaging several related scales or different administrations of the same scale. If the set of measures upon which a composite was incomplete for a given participant, the available measure(s) was used to represent the construct in question. This procedure maximized the

Table 2

Study Constructs and Measures

Construct	Ages	Informant	Measures	Scale development
Physical aggression				
Toddlerhood	2-3.5	Mother	TBCL, CBCL/2-3	Sum of selected items
School age	5-11	Mother	CBCL/4-18	Sum of selected items
School age	6-11	Teacher	TRF	Sum of selected items
School age	10-11	Child	SRD	Sum of selected items
Potential predictors of desistance				
Fearlessness	2	Observational	Behavioral inhibition coding	Factor score from individual codes
Negative emotionality	1.5	Observational	Negative emotionality coding ICQ	Composite of individual codes
	1.5, 2	Mother		Composited mean of Difficultness factor
Impulsivity	2	Mother	CBCL 2-3	Sum of selected items
Maternal control – toddlerhood	1.5, 2 2	Observational Obs./Interv.	EPCS HOME	Composite of observed maternal control And Nurturance scale
Maternal control – preschool	5	Observational	Post-visit examiner ratings	Composite of global maternal warmth, hostility, authoritarian control, rational guidance, reasoning, psychological aggression, and physical aggression
	5	Mother	CRPR	
	6	Mother	CTS	
Maternal depression - toddlerhood	1.5, 2	Mother	BDI	Total score
Maternal depression - preschool	5, 6	Mother	BDI	Total score
Family adversity – toddlerhood	1.5, 2	Mother	Demographic interview	Composite of family income, overcrowding, and neighborhood problems score
	1.5, 2	Mother	Demographic interview	
	2	Mother	Neighborhood questionnaire	

Table 2 (cont.)

Construct	Ages	Informant	Measures	Scale development
Family adversity – preschool	5, 6	Mother	Demographic interview	Composite of family income, overcrowding, and neighborhood problems score
	5, 6	Mother	Demographic interview	
	5	Mother	Neighborhood questionnaire	
Teacher-child relationship	6-8	Teacher	ACRS	Composite mean of Closeness factor
Best friends' physical aggression	8, 10	Child	Peer measure	Composite mean of selected items
Social skills and nonagg. antisoc. beh.				
Social skills	6-11	Mother	SSRS	Total score
Social skills	6-11	Teacher	SSRS	Total score
Nonagg. antisocial behavior	5-11	Mother	CBCL/4-18	Sum of selected items
Nonagg antisocial behavior	6-11	Teacher	TRF	Sum of selected items
Nonagg antisocial behavior	10, 11	Self	SRD	Composite mean of selected items

number of participants available for analyses. Internal consistency indices (i.e., Cronbach's α) are reported whenever possible.

Boys' physical aggression

Mother's ratings of toddlerhood physical aggression (ages 2-3.5). Mothers rated boys' behavior problems at ages 2, 3, and 3.5 using the Toddler Behavior Checklist (TBCL) (Larzelere, Martin, & Amberson, 1989) and the Child Behavior Checklist for Ages 2-3 (CBCL/2-3) (Achenbach, 1992). Both of these instruments are widely used in research with young children. Twenty-one TBCL items pertaining to disruptive behavior were added to the CBCL/2-3 to expand coverage of these problems. The toddlerhood PA scale consisted of three items—two from the TBCL (bites or kicks other children, fights with siblings or other children), and one from the CBCL (hits others). TBCL and CBCL items were scored on a 3-point scale: (0) not true, (1) somewhat or sometimes true, and (2) very true or often true. The internal consistency index for the toddlerhood PA scale ranged from .67 to .70 ($M = .69$).

Mother's ratings of school-age physical aggression (ages 5-11). Mothers rated behavior problems at ages 5-11 with the Child Behavior Checklist for Ages 4-18 (CBCL/4-18) (Achenbach, 1991). School-age physical aggression was assessed with three items: gets in many fights, physically attacks people, and threatens people. Items were scored on a 3-point scale. Internal consistency for this scale ranged from .66 to .77 ($M = .71$).

Teacher's ratings of physical aggression from ages 6 to 11. Teachers completed the Teacher Report Form (Achenbach, 1991) at ages 6, 7, 8, 9, 10, and 11. Physical aggression at school was measured by three items: gets in many fights; physically attacks people; and threatens people.

Items were scored on a 3-point scale. Internal consistency for this scale ranged from .86 to .88 ($M = .87$).

Boys' self-reported aggression at ages 10 and 11. Boys were administered an interview version of the Self-Report of Delinquency (SRD) (Elliott, Huizinga, & Ageton, 1985) at ages 10 and 11. The SRD has a long history of use in studies of antisocial behavior in middle childhood and adolescence. Boys reported how often they had engaged in various aggressive and delinquent activities in the past year ("never," "once/twice," or "more often"). An aggression scale was created by summing the following items: hit a teacher/grown-up, hit a parent, hit other students/physical fight, hit brother/sister, and threw rocks/bottles at people. A composite measure of self-reported PA was created by averaging the age-10 and age-11 scales ($r = .46, p < .0001$). Internal consistency for both scales was .65.

Potential predictors of desistance

Fearlessness. Coders rated boys' behavior during the age-2 behavioral inhibition paradigm on two molecular and two global scales. The molecular codes were *latency to approach the cabinet* and *time in close proximity to mother*. The global ratings were *distress* and *approach/avoidance*. Distress was defined as facial or vocal expressions of fear and anxiety (e.g., crying; whimpering; statements indicating distress, such as "I'm scared"). Coders took into account both the duration and intensity of distress cues. Ratings of approach/avoidance were based on the extent to which boys approached and investigated the cabinet. Inter-rater reliability was .9 or greater on all scales based on 20% of cases coded by two raters. Shaw and colleagues (2003) created a single index of behavioral inhibition by subjecting the four ratings to principal-components analysis. One factor emerged with an eigenvalue greater or equal to 1. This factor

accounted for 49.22% of the total variance. The factor score was used as the measure of fearlessness. Higher scores indicated greater fearlessness.

Negative emotionality. Child negative emotionality was assessed in two ways. First, observed ratings of negative emotionality were derived from one molecular and three global codes from the age 1.5 lab videotapes (Owens, 1998). For the molecular rating, coders recorded the amount of time the infant spent fussing and crying. The same coders made global ratings of the amount and intensity of negative emotionality. Coders also made a global rating of difficulty, which reflected the infant's overall temperamental difficulty compared to others his age. Interrater agreement in the form of weighted kappa coefficients for all components of the measure was calculated across 10 randomly selected tapes and ranged from .77 to .88, with a mean of .83. Following Owens (1998), the molecular and global ratings were standardized and summed to create an observed negative emotionality score (Cronbach's $\alpha = .90$).

Second, mothers completed the *Difficultness* factor of the Infant Characteristics Questionnaire (ICQ; Bates, Freeland, & Lounsbury, 1979) at ages 1.5 and 2. The ICQ, a popular measure of early temperament, has good reliability and validity characteristics (Bates, Maslin, & Frankel, 1985). The Difficultness factor assesses the intensity and frequency of fussy, irritable child behavior. Difficultness scores at ages 1.5 and 2 were highly correlated ($r = .62, p < .0001$). A composite measure of negative emotionality was created by standardizing and summing the observed negative emotionality score at age 1.5 and the Difficultness scores from ages 1.5 and 2. Composition was justified on the basis of a significant correlation between the observed negative emotionality score and average Difficultness score ($r = .30, p < .001$).

Impulsivity. Mothers rated child behavior problems at age 2 using the CBCL/2-3 (Achenbach, 1992). Impulsivity was measured by three items: can't sit still or restless, can't stand waiting, and gets into everything. Internal consistency for the impulsivity scale was .66.

Maternal control at ages 1.5-2 and 5-6. As noted earlier, the means by which parents exert control over child behavior change as children age. Compared with toddlers, preschool children are better able to understand alternative perspectives and rules of conduct and to monitor their own behavior (Kopp, 1991). Thus, reasoning and discussion play a larger role in the control strategies of most parents of preschool children. The toddler and preschool measures of maternal control were designed to capture this shift. Both measures assess warm and consistent vs harsh and coercive maternal control; however, the toddler measure focused on ongoing behavioral regulation, while the preschool measure tapped dyadic problem-solving strategies.

The measure of parenting in toddlerhood was derived from two sources. First, coders used the Early Parenting Coding System (EPCS) (Winslow & Shaw, 1995) to rate maternal behavior during the clean-up tasks at ages 1.5 and 2. The EPCS captures a range of parenting behaviors typically exhibited in interactions with young children. For the purposes of this study, only codes relevant to positive versus negative control were used. These include two molecular codes—*verbal approval/physical approval* and *critical statements*—and three global codes—*hostility*, *warmth*, and *punitiveness*. Hostility was defined as the expression of anger by the mother toward the child. The warmth code assessed positive affect directed toward the child. Punitiveness was defined as the extent to which the mother was too strict or harsh, considering the child's behavior. Kappa reliability ranged from .83 to .94 for the individual codes. Following Winslow and colleagues (Winslow, Shaw, Yaggi, & Dougherty, 1999), factor scores of observed maternal

parenting at ages 1.5 and 2 were created by conducting a principal components analysis with the 5 variables using a forced one-factor solution. Scores from the two visits ($r = .38, p < .001$) were averaged to create a composite measure. Higher scores on this measure indicated more positive maternal control.

Second, examiners completed the infant version of the Home Observation for Measurement of the Environment (HOME) (Caldwell & Bradley, 1984) during the age-2 home visit. The HOME assesses support and stimulation in the child's home environment using a combination of observational and interview methods. For this study, the parental Acceptance and Responsivity subscales were combined to create a Parental Nurturance score. The Acceptance subscale taps parents' responses to child misbehavior or distress (e.g., parent does not express annoyance with or hostility to the child, parent does not shout at child). The Responsivity subscale measures the tone of physical and verbal responses to the child in ongoing interactions (e.g., parent's voice conveys positive feelings toward child, parent caresses or kisses child at least once). The HOME has good reliability and validity properties (Caldwell & Bradley, 1984). The HOME Nurturance scale and EPCS parenting measure were negatively correlated ($r = -.39, p < .001$). To create a composite index of warm and consistent versus harsh and coercive parenting in toddlerhood, HOME Nurturance standard scores were added to the EPCS score.

The measure of maternal control in preschool was based on examiner ratings at age 5 and maternal report at ages 5 and 6. Immediately following the age-5 assessment, examiners completed standardized global ratings of control based on their observations across the visit as a whole. Two ratings, warmth and hostility, were retained for this study. Also at age 5, mothers completed the Child-Rearing Practices Report (CRPR) (Block, 1965). Block (1965) derived

CRPR subscales that assess different aspects of parental discipline. Two of these subscales were used here: the 3-item authoritarian control subscale (e.g., physical punishment is the best form of discipline, scolding and criticism make a child improve) ($\alpha = .57$) and the 3-item rational guidance subscale (e.g., I talk it over and reason with my child when he misbehaves, I make sure my child knows he is appreciated) ($\alpha = .57$). CRPR subscales meet standard validity and reliability criteria (Block, 1965; Block, Block, & Gjerde, 1986). At age 6, mothers completed the Conflict Tactics Scale-Form N (CTS-N) (Straus, 1979), a widely-used measure of parental strategies used in conflict situations with the child. The CTS-N includes factors for reasoning (3 items; e.g., discussed an issue calmly with child), psychological aggression (7 items; e.g., insulted or swore at child), physical assault/corporal punishment (3 items; e.g., slapped or spanked), and severe assault/maltreatment (6 items; e.g., beat him up). The severe assault scale was dropped due to low variability ($M = .09$, $SD = .05$). The remaining three scales were used in this study. A composite measure of warm and consistent vs harsh and coercive maternal control at ages 5-6 was created by standardizing and summing the observed warmth and maternal hostility (reverse scored) ratings, the CRPR rational guidance and authoritarian (reverse scored) ratings, and the CTS-N reasoning, psychological aggression (reverse scored), and physical assault/corporal punishment (reverse scored) ratings. Composition was justified on the basis of a pattern of moderate but significant correlations among these scales. Higher scores on this measure indicated more positive maternal control.

Maternal depression at ages 1.5-2 and 5-6. Mothers completed the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), a well established and widely used measure of depressive states, when boys were 1.5, 2, 5, and 6 years of age. Instructions were

altered to include depressive symptomatology during the previous six months (instead of the last two weeks) in order to provide a more stable indicator of maternal mood. Scores from the age 1.5 and 2 assessments ($r = .66, p < .0001$) were averaged to create a composite measure of maternal depression during toddlerhood. Similarly, the age 5 and 6 scores ($r = .64, p < .0001$) were averaged to create a composite measure of depression during the preschool years.

Family adversity at ages 1.5-2 and 5-6. Based on prior research showing increased risk for aggressive and disruptive behavior problems as a result of overcrowding at home, economic hardship, and neighborhood disadvantage/crime, composite family adversity measures were created from indices of these factors. Information pertaining to monthly family income and overcrowding was obtained from a demographic questionnaire administered at ages 1.5, 2, 5, and 6. The measure of overcrowding, adapted from the work of (Rutter et al., 1975), was computed by dividing the number of people living at home by the number of rooms. Higher scores reflected higher levels of crowding. Mothers completed the Neighborhood Questionnaire (Stouthamer-Loeber et al., 1993), a 17-item inventory measuring perceptions of neighborhood problems, when boys were 2 and 5. Problems covered include unemployment and homelessness, vandalism, drug use, and violent crime. This instrument has good validity and reliability indicators (Loeber & Wikstrom, 1993). Composite indices were created for toddler and preschool family adversity by standardizing and summing family income (reversed), overcrowding, and neighborhood disadvantage at ages 1.5-2 and 5-6. Correlations among the three measures that constitute the composite measure of adversity ranged from .27 to .35, $p < .01$, at ages 1.5-2 and from .33 to .37, $p < .01$, at ages 5-6.

Quality of the student-teacher relationship. Teachers completed the Student-Teacher Relationship Scale (STRS) (Pianta, 1992) as part of assessments at ages 6, 7, and 8. The STRS is designed to assess teachers' perceptions of their relationship with a particular student. This study uses the 11-item Closeness subscale (e.g., I share an affectionate, warm relationship with this child; If upset, this child will seek comfort from me; This child spontaneously shares information about himself). Internal consistency for this scale was .82. Closeness scores from ages 6-8 were averaged ($r_s > .30, p < .001$) to produce a measure of the quality of boys' relationships with teachers across the early elementary school years.

Best friends' physical aggression. As part of the age-8 and age-10 visits, boys identified their best friends and rated them on short PA scales (Ingoldsby, 2002). For the age-8 scale, three items were drawn from the CBCL/4-18 (Achenbach, 1991): gets in many fights, attacks people, and threatens people. Internal consistency for this scale was .82. For the age-10 scale, four items were adapted from the SRD (Elliot et al., 1985): hits adults, hits other kids, gets into physical fights, and threatens to hurt others. The age-10 questionnaire required boys to identify best friends at school and at home. In cases where boys identified different best friends across contexts, the PA scores for these two individuals were averaged. Internal consistency for the age-10 scale was .74. The age-8 and age-10 measures were averaged ($r = .30, p < .001$) to create a composite index of best friends' PA across middle childhood.

Social skills and nonaggressive antisocial behavior

Mothers' ratings of social skills from ages 6 to 11. Mothers completed the parent version of the Social Skills Rating System (SSRS) (Gresham & Elliott, 1990) at each assessment from ages 6 to 11. This instrument has subscales for cooperation, assertion, responsibility, and self-control,

as well as an overall social skills scale based on the total score. The individual subscales were strongly intercorrelated (i.e., r s at each age all $> .5$, $p < .001$); thus, this study used the overall scale. This scale demonstrates good reliability and validity properties and converges with other measures of social skills (Gresham & Elliott, 1990).

Teachers' ratings of social skills from ages 6 to 11. Teachers completed the teacher version of the SSRS (Gresham & Elliott, 1990), which targets social skills in the school setting. The teacher version of the SSRS contains three subscales: cooperation, assertion, and self-control. As with the parent version, individual scales are highly correlated. Thus, this study used the overall school social skills scale. This measure has good psychometric properties (Gresham & Elliott, 1990).

Mothers' ratings of nonaggressive antisocial behavior from ages 5 to 11. Mothers rated boys' behavior problems at ages 5-11 with the CBCL/4-18 (Achenbach, 1991). A maternal-report nonaggressive antisocial scale was created from items that assess behaviors that occur at a relatively high base rate across this span and are readily observed by adults. On the basis of these criteria, four items were selected: argues a lot, disobedient at home, disobedient at school, and temper tantrums or hot temper. Internal consistency for this scale ranged from .66 to .76 ($M = .70$).

Teachers' ratings of nonaggressive antisocial behavior from ages 6 to 11. Teachers completed the TRF at ages 6-11 (Achenbach, 1991). A teacher-report nonaggressive antisocial scale was created according to the criteria outlined in the preceding paragraph. This scale included four items: argues a lot, defiant, disobedient in school, and temper tantrums or hot temper. Internal consistency for this scale was .86 at ages 6, 7, and 8.

Boys' self-report ratings of nonaggressive antisocial behavior at ages 10 and 11. At ages 10 and 11, examiners administered the Self Report of Delinquency (SRD) (Elliot et al., 1985) to assess boys' antisocial activities. The nonaggressive items from this measure tap covert antisocial behaviors that typically emerge in early- to mid-adolescence, including theft, truancy, and vandalism. The self-report nonaggressive antisocial scale included six items from the SRD: damaged something not belonging to you, taken something at school, taken something out of somebody's house, ran away, skipped school, and set fires. Internal consistency for this scale was .55 at age 10 and .65 at age 11. Scores were averaged ($r = .46, p < .001$) to create a composite measure of self-reported nonaggressive antisocial behavior.

Data Analytic Plan

Analyses proceeded in three stages. In the first stage, LCGCM was applied to mothers' reports of PA from ages 2 to 11 to determine whether groups with distinct longitudinal trajectories (e.g., chronics, desisters, and lows) could be identified. In the second stage, multivariate analyses were performed to identify early child, family, and life transition factors that distinguished membership in the divergent trajectory groups. In the third stage, the trajectory groups were examined in relation to changes in social skills and nonaggressive ASB during middle childhood. This section provides a brief overview of each of these strategies.

Latent class growth curve modeling. To study PA trajectories, this investigation used semi-parametric mixture modeling (SPMM) (Nagin, 1999), a member of the LCGCM family. Like other LCGCM methods, SPMM is designed to identify groups of individuals with distinct trajectories. This approach provides empirical bases for determining (a) the number of groups in the population and (b) the optimal shapes of the trajectories in the different groups. In initial

applications, SPMM was used to identify trajectories for repeated measures of a single outcome variable (Nagin, 1999; Nagin & Tremblay, 1999). Recently, Nagin and Tremblay (2001b) described how the model may be used to identify and relate trajectories for two distinct but theoretically related measurement series (e.g., one series for toddlerhood PA and a second series for school-age PA). As the bivariate or joint model is a straightforward generalization of the univariate model, I will describe the univariate model first.

The univariate trajectory model is defined by two key components: the number of groups and the shape of the trajectory in each of these groups. Each individual i 's score on the variable of interest y (e.g., PA) at a specific time t , given membership in a specific group j , is approximated with:

$$y_{it}^j = \beta_0^j + \beta_1^j \text{Age}_{it} + \beta_2^j \text{Age}_{it}^2 + \gamma_{it} \quad (1)$$

where the parameters, β_0^j (intercept, or level when Age = 0), β_1^j (slope, or growth rate), and β_2^j (slope², or change in growth rate), determine the shape of the trajectory and are superscripted by j to indicate that they are free to vary across groups. The residual error of each individual's score at a given time is denoted by γ_{it} . The estimation procedure yields two additional parameters: the proportion of the population belonging to each group, π_j , and the conditional probability of individual i 's longitudinal sequence of scores Y_i given membership in group j , $P(Y_i*j)$.

SPMM uses a maximum likelihood function to estimate the trajectory model (see Nagin, 1999, for a derivation of the likelihood function). This function is specified to accommodate scale properties of the dependent variable. In the present study, the distribution of PA was

censored. That is, at any given age, a significant number of participants exhibited none of the behaviors measured by the scale, resulting in a cluster of data at the scale minimum. The likelihood function used here incorporates established results on the censored normal distribution to accommodate this problem. The likelihood function is also specified to accommodate missing data under the assumption that it is missing at random. Thus, individuals with incomplete assessment histories do not have to be dropped from the analysis, assuming they do not differ systematically from those without missing data. Results from the attrition analyses presented earlier are consistent with this assumption.

Model evaluation in SPMM is based on three criteria: (a) the statistical significance of the trajectory parameter estimates for each group; (b) the Bayesian Information Criteria (BIC), which is used to choose the best-fitting model (i.e., the model with the optimal number of groups and the optimal shapes of the trajectories within each group); and (c) the conditional (or posterior) probability of membership in each group for each individual in the sample given the individual's observed sequence of scores.

Interpretation of trajectory coefficients is straightforward: Statistical significance indicates that the parameter in question (i.e., intercept, slope, or slope²) is necessary to accurately portray behavior over time; nonsignificance indicates that the parameter is extraneous. Regarding the BIC, Nagin (1999) explained its use for model selection in SPMM. He noted that conventional likelihood-ratio goodness-of-fit tests are appropriate only for model selection problems in which alternative models are nested. In mixture models, a J group model is not nested within a $J + 1$ group model; hence, the likelihood-ratio test cannot be used. In contrast, the BIC is appropriate

for comparison of both nested and unnested models (Kass & Raftery, 1995; Raftery, 1995). For a given model, the BIC is calculated as follows:

$$\text{BIC} = \log(L) - 0.5\log(n)(m), \quad (2)$$

where L is the value of the model's maximized likelihood, n is the sample size, and m is the number of trajectory parameters in the model. The first term of equation (2), the log likelihood, indicates model fit. For a model that provides a perfect fit to the data, the log likelihood equals zero; as fit decreases, so does the value of this term. The second term extracts a penalty proportional to the log of the sample size for the addition of more parameters. Kass and Raftery (1995) recommended selection of the model with the maximum (i.e., least negative) BIC. Thus, for two models with equivalent likelihoods, the model with fewer parameters is preferred.

Finally, regarding posterior probabilities, consider a model with two groups, one with a high, peaked trajectory of PA, and one with low levels and no change over age. In the case of an individual with low PA ratings throughout childhood, the probability of belonging to the peaked group would be near zero while the probability of belonging to the low trajectory group would approach 1.0. As group membership is probabilistic rather than observed, the average posterior assignment probability in a given group for individuals classified into that group indicates the classification precision of the estimated model. Larger values indicate greater precision.

The key features and outputs for the joint trajectory model build upon those of the univariate model. Like its univariate counterpart, the joint model is defined by the number of groups and the shape of the trajectory in each of these groups. A joint model, however, encompasses two

measurement series and, therefore, two sets of trajectory groups. Here, each individual i 's score on the variable y^a at time t , given membership in group j , is approximated with

$$y_{it}^a = \alpha_0^j + \alpha_1^j \text{Age}_{it} + \alpha_2^j \text{Age}_{it}^2 + \gamma_{it}, \quad (3)$$

while each individual i 's score on the variable y^b at time t , given membership in group k , is approximated with:

$$y_{it}^b = \beta_0^k + \beta_1^k \text{Age}_{it} + \beta_2^k \text{Age}_{it}^2 + \gamma_{it}, \quad (4)$$

where the parameters α and β determine the shape of the trajectory in the first and second measurement series, respectively. Notably, the two measurement series may span different periods of time. That is, the Age variable may have different ranges in equations (3) and (4). In this study, for example, y^a (toddlerhood PA) was measured at ages 2-3½, while y^b (school-age PA) was measured at ages 5-11.

For each measurement series, the joint model estimates the trajectory parameters for each group, the proportion of the population belonging to each group, and the conditional probability of individual i 's longitudinal sequence of scores given membership in each group. In addition, the joint model estimates the probability of transitioning to trajectory k (e.g., a trajectory of low school-age PA) given membership in trajectory j (e.g., a trajectory of high toddlerhood PA). The transition probability is denoted by π^{k*j} .

The criteria for evaluating univariate models—trajectory coefficients, the BIC, and posterior probabilities—also apply to joint models. The interpretation of trajectory coefficients is identical in both contexts. Use of the BIC as a basis for model selection is more complicated in joint analyses because the number of alternative models grows exponentially with the number of models considered under the univariate format (Nagin & Tremblay, 2001b). That is, if N^1 and N^2 models are considered for Y^a and Y^b , respectively, a full model search entails estimating $N^1 * N^2$ joint models. Instead, Nagin and Tremblay (2001b) recommended that “model selection be based on searches of the two univariate model spaces, which thereby reduces the number of model searches to $N^1 + N^2$. The final joint model is estimated with the number and shapes of trajectories found to be optimal, based on the two univariate model searches (p. 26).” Finally, as in univariate analyses, posterior probabilities are used in joint analyses to classify individuals into trajectory groups and to assess the precision of classification based on the estimated model.

As a final step in the joint analysis, the investigator can create overall trajectories based on individuals’ memberships in each of the two measurement series. Following Bushway and colleagues (2001), a desisting trajectory was operationalized as an overall trajectory of PA that (a) exceeded modal population levels during early portions of the observation period and (b) was indistinguishable from or below modal levels by the end of the observation period. Applying the same logic, I defined a low trajectory as one that never exceeded modal levels, a high trajectory as one that exceeded the modal trajectory at all assessment points, and an escalating trajectory as one that fell at or below modal levels early in the observation period and exceeded modal levels later in the observation period. Analysis of variance (ANOVA) was used to test for group differences at each age.

A potential limitation of the SPMM analysis is that it depended solely on mothers' observations. To assess the generality of the classifications, trajectory groups were related to teacher-reported PA at ages 6-11 and self-reported PA at ages 10 and 11. Latent growth curve modeling (LGCM) was used to characterize the relationship between trajectory group membership and growth in teacher-reported PA. The LGCM analyses were conducted with the Mplus software package (Muthén & Muthén, 2001) according to the procedures described by Willett and Sayer (1994). ANOVA was used to examine group differences in self-reported PA.

The group membership designations set the stage for two subsequent sets of analyses. In the first set, multinomial logit models (Long, 1997) were estimated to identify child, family, and life transition factors that distinguished desisting boys from those that follow high and low trajectories. Second, the trajectory groups were compared on social skills and nonaggressive ASB. LGCM was used with the repeated-measures maternal- and teacher-report data, and ANOVA was used with the measure of self-reported nonaggressive ASB.

RESULTS

The presentation of results follows the analytic plan described above. After reviewing descriptive statistics for and bivariate correlations among the study variables, I present PA trajectory groups identified by SPMM and their relations with teacher- and youth-reported PA. Next, I examine similarities and differences among the trajectory groups on child, family, and life transition factors. Finally, I compare the trajectory groups on social skills and nonaggressive ASB.

Descriptive Statistics and Bivariate Correlations

Descriptive statistics for all study variables appear in Table 3. Direct comparison of these descriptive statistics with those from other samples is hindered by the fact that many of the

variables are unique to this study (e.g., the physical aggression and nonaggressive ASB variables) or the PMCP (e.g., the variables based on observational measures). However, the mean values of variables that have appeared in other studies highlight the at-risk nature of this sample. For example, average Beck Depression Inventory scores approached 9, which indicates mild depressive states (Beck et al., 1961). Likewise, the mean score for student-teacher closeness was approximately $\frac{3}{4}$ *SD* lower than for young boys from a mixed-income community sample (Hamre & Pianta, 2001). Finally, to illustrate the relative severity of aggressive behavior problems, I cite a previous PMCP report (Shaw, Owens, Giovannelli, & Winslow, 2001) in which average *T* scores on the CBCL Aggression factor (which includes the PA items used here) were approximately $\frac{3}{4}$ *SD* higher than for boys from the standardization sample (Achenbach, 1991). In spite of being more aggressive, on average, than other children, however, the PMCP boys used less PA in middle childhood than in toddlerhood.

Table 3

Means and Standard Deviations of Study Variables

Variable	Child's Age	<i>M</i>	<i>SD</i>	Range
<i>Physical aggression variables</i>				
Maternal report				
Toddlerhood				
CBCL/2-3	2	2.74	1.36	0 – 6
CBCL/2-3	3	2.60	1.33	0 – 6
CBCL/2-3	3.5	2.52	1.32	0 – 6
School-age				
CBCL/4-18	5	.96	1.18	0 – 6
CBCL/4-18	6	.72	1.12	0 – 6
CBCL/4-18	8	.63	1.06	0 – 6
CBCL/4-18	10	.45	.88	0 – 5
CBCL/4-18	11	.53	1.03	0 – 5
Teacher report				
TRF	6	.58	1.24	0 – 6
TRF	7	.65	1.34	0 – 6
TRF	8	.63	1.34	0 – 6
TRF	9	.71	1.40	0 – 6
TRF	10	.73	1.27	0 – 6
TRF	11	.70	1.33	0 – 6
Youth report	10,11	1.80	1.33	0 – 7
<i>Predictor variables</i>				
Fearlessness	2	.03	.82	-3.16 – 4.03
Negative emotionality	1.5, 2	.03	1.59	-3.77 – 4.61
Impulsivity	2	2.88	1.72	0 – 6
Maternal control – toddlerhood	1.5, 2	-.03	1.58	-3.24 – 4.02
Maternal control – preschool	5, 6	-.10	3.33	-6.49 – 5.55
Maternal depression – toddlerhood	1.5, 2	8.14	5.65	0 – 33.50
Maternal depression – preschool	5, 6	7.29	6.21	0 – 39.00
Family adversity – toddlerhood	1.5, 2	.10	1.99	-6.59 – 7.26
Family adversity – preschool	5, 6	.14	1.97	-6.56 – 8.99
Student-teacher closeness	6, 8	35.93	7.05	1 – 49
Best friend's physical aggression	8, 10	-.01	.88	-.84 – 3.24
<i>Social skills variables</i>				
Maternal report				
SSRS	5	45.23	10.42	15 – 73
SSRS	6	46.44	10.24	18 – 76
SSRS	10	49.95	10.86	17 – 79
SSRS	11	50.19	9.49	24 – 70

Table 3 (cont.)

Variable	Child's Age	<i>M</i>	<i>SD</i>	Range
Teacher report				
SSRS	6	37.81	11.18	12 – 57
SSRS	7	38.78	10.16	13 – 58
SSRS	8	37.84	10.43	9 – 56
SSRS	9	37.42	11.36	14 – 59
SSRS	10	36.80	9.97	15 – 60
SSRS	11	38.32	10.43	15 – 38
<i>Nonaggressive antisocial behavior variables</i>				
Maternal report				
CBCL/4-18	5	3.13	1.67	0 – 8
CBCL/4-18	6	2.99	1.94	0 – 8
CBCL/4-18	8	2.48	1.83	0 – 8
CBCL/4-18	10	2.25	1.84	0 – 8
CBCL/4-18	11	2.02	1.94	0 – 8
Teacher report				
TRF	6	1.18	1.77	0 – 8
TRF	7	1.43	2.07	0 – 8
TRF	8	1.68	2.03	0 – 8
TRF	9	2.00	2.28	0 – 8
TRF	10	2.05	2.41	0 – 8
TRF	11	1.96	2.23	0 – 8
Youth report	10, 11	.28	.58	0 – 4

Bivariate correlation coefficients appear in Tables 4 through 10. Table 4 contains correlations among measures of PA. Overall, these measures were positively related, with correlation coefficients ranging from .01 to .61. In most instances, associations diminished over time and across contexts. Interestingly, however, agreement between mothers and teachers improved as boys aged (e.g., cross-sectional $r_s = .14$ at age 6, .26 at ages 8 and 10, and .57 at age 11). Correlations among predictor variables appear in Table 5. Family variables correlated modestly with one another and with child impulsivity, with the strongest associations evident between repeated measures of the same construct. Fearlessness, negative emotionality, student-

teacher closeness, and best friends' aggression were unrelated to most of the other variables. Correlations for social skills and nonaggressive ASB appear in Tables 6 and 7, respectively. In both cases, associations were stronger among measures from the same data source. For nonaggressive ASB, significant (albeit modest) positive correlations emerged between mothers' and boys' ratings. Teachers' ratings of nonaggressive ASB were unrelated to youth reports.

As the basis of the aggression trajectories, maternal-reported PA played a central role in this study. Thus, I present bivariate correlations between maternal-report measures of PA and predictor variables, social skills, and nonaggressive ASB in Tables 8, 9, and 10, respectively. Among the predictor variables (Table 8), child impulsivity, maternal control, and maternal depression were modestly related to maternal-reported PA at most ages and in the expected directions. Associations were less consistent for the other measures. For social skills (Table 9), most correlations were negative, as expected, but nonsignificant. Associations tended to reach significance for measures administered closer in time. For nonaggressive ASB (Table 10), relations approached or met statistical significance for all maternal report measures, with correlations ranging from .13 to .56. Although associations were weaker for teacher and youth reports, some significant correlations emerged, particularly with measures of PA from ages 5 and older.

Table 4

Table 4

Correlations Among Physical Aggression Variables

Variable	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Maternal report</i>														
1. Age 2 PA	.37*	.35**	.31**	.30**	.34**	.17*	.22*	.16*	.08	.04	.09	.15+	.06	.11+
2. Age 3 PA	–	.52**	.45**	.18**	.22**	.11	.06	.01	.13	.02	.13	.04	.08	.02
3. Age 3.5 PA		–	.45**	.30**	.24**	.15*	.19*	.08	.19*	.10	.07	.17*	.12	.10
4. Age 5 PA			–	.57**	.40**	.30**	.31**	.23**	.14	.27**	.05	.05	.14	.19**
5. Age 6 PA				–	.45**	.42**	.27**	.14+	.17*	.26*	.14	.01	.10	.25**
6. Age 8 PA					–	.54**	.37**	.14+	.15	.26*	.22*	.05	.23*	.11+
7. Age 10 PA						–	.53**	.34**	.26**	.33**	.26*	.26**	.56**	.17*
8. Age 11 PA							–	.26**	.21*	.21*	.20+	.29**	.57**	.26**
<i>Teacher report</i>														
9. Age 6 PA								–	.61**	.48**	.40**	.37**	.34**	.05
10. Age 7 PA									–	.52**	.35**	.31**	.29*	.27**
11. Age 8 PA										–	.49**	.29*	.51**	.12
12. Age 9 PA											–	.33**	.31*	.16+
13. Age 10 PA												–	.51**	.13
14. Age 11 PA													–	.22*
<i>Youth report</i>														
15. Age 10-11 PA														–

+ $p < .10$, * $p < .05$, ** $p < .01$.

Table 5

Correlations Among Predictor Variables

Variable	2	3	4	5	6	7	8	9	10	11
1. Fearlessness	-.05	.10	-.11	-.02	-.06	.05	.07	.06	-.01	-.04
2. Negative emotionality	–	.23**	-.01	-.10	.13*	.06	-.03	-.02	-.09	.01
3. Impulsivity		–	-.16*	-.25**	.24**	.18**	.21**	.27**	-.05	-.03
4. Maternal control - toddlerhood			–	.34**	-.22**	-.21**	-.24**	-.27**	.17*	.04
5. Maternal control - preschool				–	-.33**	-.30**	-.26**	-.31**	.07	-.12+
6. Maternal depression - todd.					–	.58**	.16*	.23**	-.11	.02
7. Maternal depression - preschool						–	.19**	.31**	-.05	.03
8. Family adversity - toddlerhood							–	.65**	-.06	.11+
9. Family adversity - preschool								–	-.04	.12+
10. Student-teacher closeness									–	-.05
11. Best friend's physical aggression										–

+ $p < .10$, * $p < .05$, ** $p < .01$.

Table 6
Correlations Among Social Skills Variables

Variable	2	3	4	5	6	7	8	9	10
<i>Maternal report</i>									
1. Age 5 SS	.60*	.48**	.47**	.20*	.11	.23*	.05	.07	.10
2. Age 6 SS	–	.57**	.52**	.13+	.05	.18+	.15	-.01	.07
3. Age 10 SS		–	.76**	.17*	.13	.25*	.26*	.25**	.19+
4. Age 11 SS			–	.22*	.17+	.32**	.26**	.32**	.17+
<i>Teacher report</i>									
5. Age 6 SS				–	.41**	.31**	.32**	.40**	.48**
6. Age 7 SS					–	.47**	.40**	.31**	.44**
7. Age 8 SS						–	.54**	.52**	.44**
8. Age 9 SS							–	.49**	.63**
9. Age 10 SS								–	.49**
10. Age 11 SS									–

+ $p < .10$, * $p < .05$, ** $p < .01$.

Table 7

Correlations Among Nonaggressive Antisocial Behavior Variables

Variable	2	3	4	5	6	7	8	9	10	11	12
<i>Maternal report</i>											
1. Age 5 NAB	.60**	.42**	.33**	.46**	.22**	.23*	.36**	.25*	.08	.18+	.17*
2. Age 6 NAB	–	.54**	.49**	.54**	.32**	.18+	.33**	.30**	.19*	.34**	.28**
3. Age 8 NAB		–	.54**	.57**	.20**	.25*	.36**	.35**	.21*	.20*	.19**
4. Age 10 NAB			–	.67**	.25**	.32**	.34**	.23*	.32**	.29**	.27**
5. Age 11 NAB				–	.29**	.17+	.48**	.39**	.30**	.32**	.18*
<i>Teacher report</i>											
6. Age 6 NAB					–	.41**	.52**	.53**	.52**	.32**	.03
7. Age 7 NAB						–	.70**	.50**	.55**	.45**	.06
8. Age 8 NAB							–	.60**	.45**	.45***	.09
9. Age 9 NAB								–	.60**	.54**	.10
10. Age 10 NAB									–	.57**	.06
11. Age 11 NAB										–	.10
<i>Self report</i>											
12. Age 10-11 NAB											–

+ $p < .10$, * $p < .05$, ** $p < .01$.

Table 8

Correlations Between Predictor Variables and Maternal-Report Physical Aggression Variables

Variable	Age 2 PA	Age 3 PA	Age 3.5 PA	Age 5 PA	Age 6 PA	Age 8 PA	Age 10 PA	Age 11 PA
Fearlessness	.04	.12	.04	.02	.04	.14*	.15*	.06
Negative emotionality	.20*	.07	.23**	.18**	.06	.13+	-.02	.14+
Impulsivity	.34**	.29**	.25**	.22**	.20**	.17*	.09	.05
Maternal control - toddlerhood	-.28**	-.27**	-.28**	-.19**	-.22**	-.20**	-.17*	-.19*
Maternal control - preschool	-.22**	-.21**	-.23**	-.27**	-.22**	-.13+	-.16*	-.26**
Maternal depression - toddlerhood	.17**	.21**	.31**	.22**	.21**	.10	.10	.22**
Maternal depression - preschool	.17**	.09	.19**	.17**	.28**	.08	.10	.15**
Family adversity - toddlerhood	.02	-.02	.05	.05	.12+	.22**	.15+	.12+
Family adversity - preschool	.14*	.05	.08	.10	.11+	.12+	.14+	.11
Student-teacher closeness	-.04	.04	-.03	-.10	-.16*	.06	-.14+	-.06
Best friend's physical aggression	.04	-.06	-.02	-.02	.04	.34**	.13+	.23**

+ $p < .10$, * $p < .05$, ** $p < .01$.

Table 9

Correlations Between Social Skills Variables and Maternal-Report Physical Aggression Variables

Variable	Age 2 PA	Age 3 PA	Age 3.5 PA	Age 5 PA	Age 6 PA	Age 8 PA	Age 10 PA	Age 11 PA
<i>Mother report</i>								
Age 5 SS	-.11+	-.12	-.14*	-.32**	-.11	-.11	-.16*	-.09
Age 6 SS	-.05	-.10	-.07	-.15*	-.21**	-.19**	-.10	-.06
Age 10 SS	-.12	-.08	-.10	-.08	-.17*	-.16*	-.27**	-.26**
Age 11 SS	-.14*	-.10	-.11	-.11	-.12+	-.15*	-.15+	-.33**
<i>Teacher report</i>								
Age 6 SS	-.01	.01	.05	-.09	-.18*	-.09	-.25**	-.27**
Age 7 SS	-.01	-.13	-.05	-.09	-.15+	.01	-.17+	-.11
Age 8 SS	-.02	-.19+	-.04	-.08	-.10	-.20*	-.29**	-.09
Age 9 SS	-.03	-.13	-.14	-.01	-.07	-.14	-.16	-.24**
Age 10 SS	-.14+	-.03	-.04	-.07	-.05	-.20*	-.30**	-.28**
Age 11 SS	.01	-.19+	-.06	-.17+	-.18+	-.21*	-.27**	-.33**

+ $p < .10$, * $p < .05$, ** $p < .01$.

Table 10

Correlations Between Nonaggressive Antisocial Behavior Variables and Maternal-Report Physical Aggression Variables

Variable	Age 2 PA	Age 3 PA	Age 3.5 PA	Age 5 PA	Age 6 PA	Age 8 PA	Age 10 PA	Age 11 PA
<i>Mother report</i>								
Age 5 NAB	.13+	.24**	.29**	.47**	.30**	.28**	.22**	.20**
Age 6 NAB	.14*	.15+	.25**	.30**	.49**	.30**	.32**	.25**
Age 8 NAB	.28**	.22**	.29**	.34**	.36**	.58**	.37**	.36**
Age 10 NAB	.20**	.15+	.25**	.16*	.24**	.35**	.52**	.40**
Age 11 NAB	.29**	.18*	.28**	.29**	.29**	.35**	.36**	.48**
<i>Teacher report</i>								
Age 6 NAB	.12	.01	-.06	.19*	.12	.09	.27**	.28**
Age 7 NAB	.12	.06	.19*	.17*	.22*	.25*	.27**	.38**
Age 8 NAB	-.02	.01	.09	.16	.22*	.22*	.34**	.22**
Age 9 NAB	.05	.14	.10	.12	.18+	.24*	.21*	.19+
Age 10 NAB	.23**	.01	.09	-.02	-.05	-.02	.22**	.25**
Age 11 NAB	.03	-.03	.05	.06	.02	.17+	.30**	.20+
<i>Youth report</i>								
Age 10-11 NAB	.01	.06	.07	.15*	.23**	.20**	.27**	.30**

+ $p < .10$, * $p < .05$, ** $p < .01$.

Estimated Trajectories of Maternal-Reported Physical Aggression

From prior research on stability and instability in childhood PA, I hypothesized that most aggressive young boys desist (i.e., attain age-typical levels of aggression) across early and middle childhood. To test this hypothesis, I applied a joint semi-parametric mixture model for censored data to maternal-report measures of PA from ages 2 to 11. The first stage of the joint trajectory analysis entailed identifying optimal univariate models for toddlerhood and school-age PA (Nagin & Tremblay, 2001b). Table 11 contains BIC scores for univariate models with two, three, four, and five groups. This range coincides with the number of groups posited by trajectory theories of antisocial behavior and with the results of prior applications of SPMM (Moffitt, 1993; Nagin & Tremblay, 1999; Shaw et al., 2003). Initial model specifications included quadratic trajectories for all groups (Table 11, models a-d). Inspection of Table 11 reveals that among these initial models, a four-group solution provided the best fit for toddlerhood PA, whereas a three-group solution was best for school-age PA.

To ensure optimal model fit, the trajectory coefficients from the initial best-fitting solutions were checked for statistical significance. For toddlerhood PA, the trajectory coefficients indicating linear and quadratic trends did not reach statistical significance for two of the four groups. Rather, the trajectories of these two groups could be defined solely by the intercept (i.e., the trajectories were flat). For the other two groups, the intercept and linear terms, but not the quadratic term, reached statistical significance. On the basis of these results, a new four-group growth trend (Table 11, model e for toddlerhood PA). The BIC was maximized for the revised four-group toddlerhood model, indicating an optimal fit to the data.

Table 11

Bayesian Information Criteria by Model Type for Toddlerhood and School-Age Physical Aggression

Model	Order ^a	BIC
<i>Toddlerhood</i>		
a. Two group	2 2	-1159.48
b. Three group	2 2 2	-1151.06
c. Four group	2 2 2 2	-1149.20
d. Five group	2 2 2 2 2	-1154.87
e. Four group	0 1 0 1	-1141.34
<i>School-Age</i>		
a. Two group	2 2	-1129.30
b. Three group	2 2 2	-1113.58
c. Four group	2 2 2 2	-1115.40
d. Five group	2 2 2 2 2	-1120.51
e. Three group	0 2 0	-1110.81

^a Entries in the second column denote the parameters used to approximate each group's trajectory. For example, consider a two group model with order = 0 2. The first group's trajectory is approximated by a zero-order polynomial; that is, it is defined solely by an intercept. In contrast, the second group's trajectory is approximated by a second-order polynomial that includes (by definition) an intercept, a linear growth term, and a quadratic term.

Turning to school-age PA, the linear and quadratic coefficients failed to reach significance for two of the three groups from the initial best-fitting model. For the remaining group, all three trajectory coefficients were significant. From these results, a new three-group school-age model was estimated in which the trajectories for two groups were defined solely by an intercept, while the trajectory for the third group was defined by intercept, linear, and quadratic terms (Table 11, model e for school-age PA). The BIC score for the revised school-age model denoted an optimal fit relative to the previous models.

As recommended by Nagin and Tremblay (2001b), the joint trajectory model was specified using the number and shapes of trajectories from the two optimal univariate models. Table 12 reports trajectories of toddlerhood and school-age PA from the joint analysis; Figures 1 and 2 depict these trajectories graphically. The figures contain both predicted and observed trajectories. The parameter estimates determine the shape of the predicted trajectories; the observed trajectories reflect mean PA scores for boys assigned to each group based on their posterior probabilities.

In toddlerhood, most boys followed a trajectory of moderate, slowly declining PA. Individuals in the moderate-decreasing group were estimated to account for almost two-thirds of the sampled population. This finding supports the view that some aggression is normative in early childhood, and that behavioral controls typically improve with age. A second, relatively large contingent (23.8%) followed an elevated, flat trajectory. Boys in this high-stable group averaged about 4 on the 6-point aggression scale, which is roughly 1 *SD* above the sample mean at each of the three toddlerhood assessments. The joint model also identified two small trajectory groups at the opposing extremes of the aggression continuum. Boys in the low group (9.3%)

Table 12

Estimated Trajectory Parameters, Percentages, and Posterior Assignment Probabilities for Toddlerhood and School-Age Trajectory Groups

Trajectory group	Intercept ^a		Slope		Quadratic		Est. % of Population	Post. Assignment Prob.	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>		<i>M</i>	<i>SD</i>
<i>Toddlerhood</i>									
Low	.85*	.36	–	–	–	–	9.3%	.86	.15
Mod. Decreasing	3.22***	.36	-.36**	.11	–	–	62.6%	.82	.11
High stable	4.03***	.11	–	–	–	–	23.8%	.87	.14
High increasing	2.73**	1.17	.75*	.34	–	–	4.3%	.92	.11
<i>School-Age</i>									
Low	.11+	.06	–	–	–	–	58.1%	.90	.13
Decreasing	5.20*	2.02	-.90*	.45	.04**	.01	31.9%	.87	.15
High	3.18***	.28	–	–	–	–	10.0%	.84	.17

^a The intercept term represents the estimated score when age = 0.

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

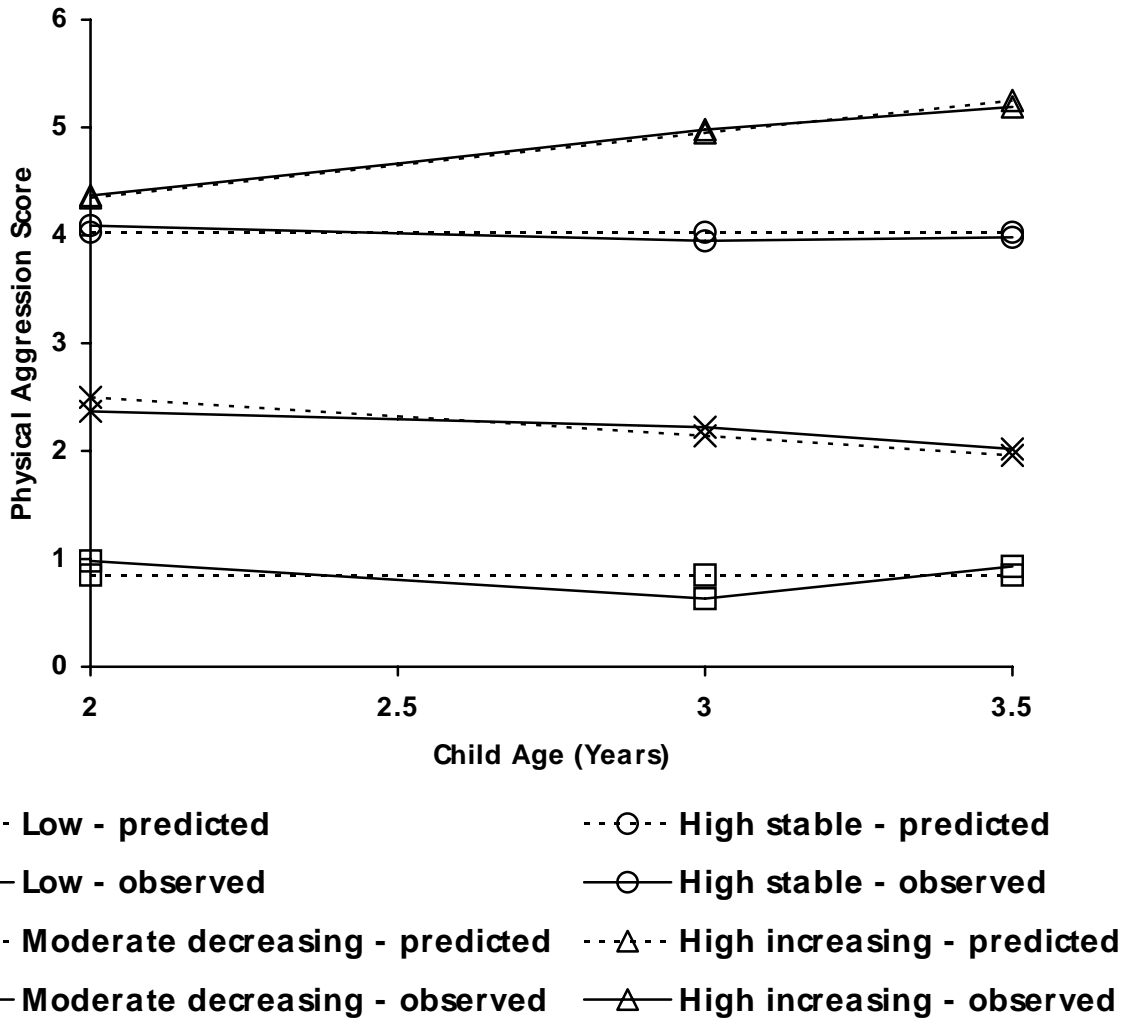


Figure 1. Trajectories of physical aggression in toddlerhood.

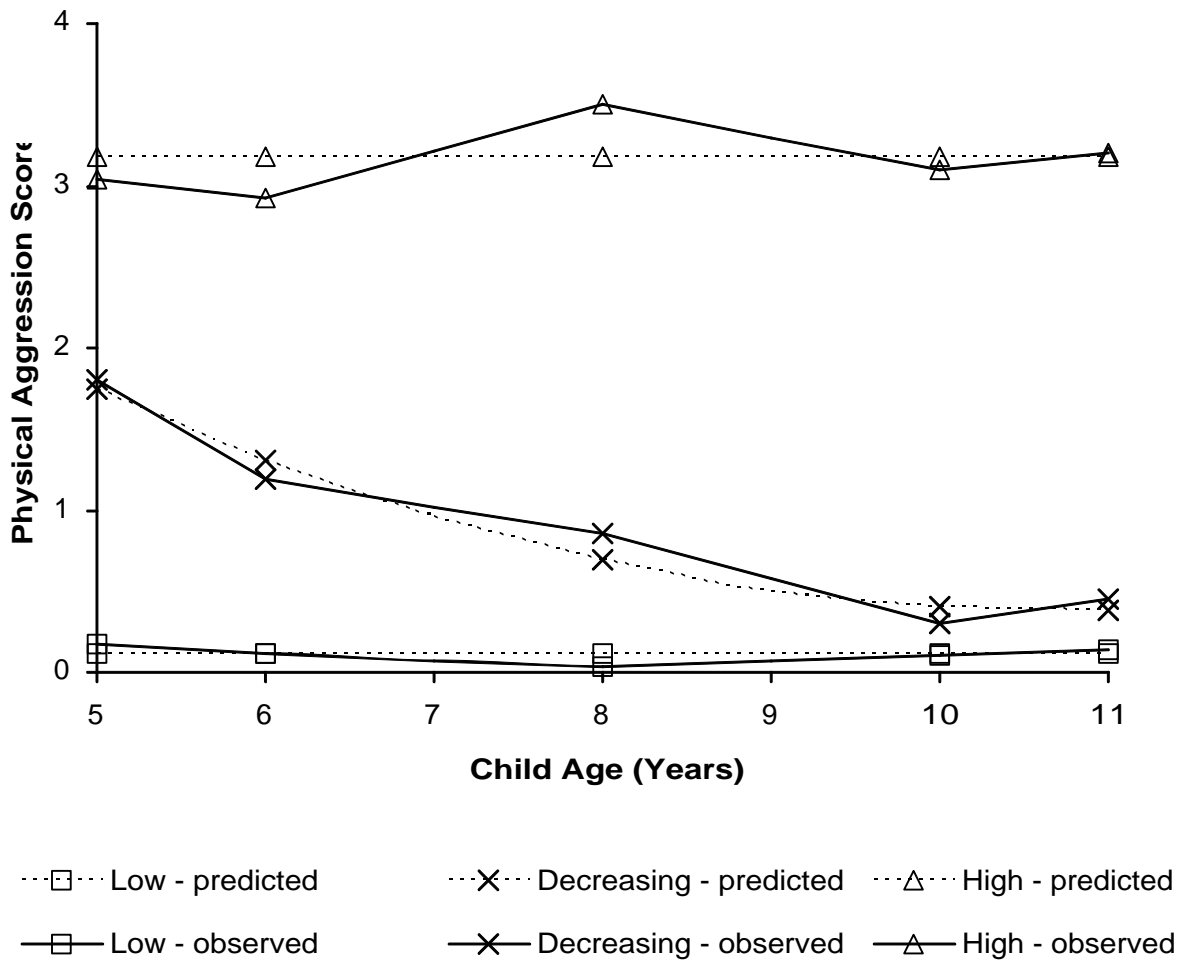


Figure 2. Trajectories of physical aggression in the elementary-school years.

averaged just under 1 on the aggression scale. In contrast, those in the high-increasing group (4.3%) exhibited relatively severe levels of PA at age 2 and grew even more aggressive through age 3½. Overall, the joint model demonstrated good classification precision in toddlerhood, with mean posterior assignment probabilities ranging from .82 for moderate decreaseers to .92 for high increaseers.

In the school-age period, the model again identified low, decreasing, and high trajectories of PA, but no increasing trajectory. In this period, the low group was largest, comprising an estimated 58.1% of the population. The high group (10%) followed a trajectory that fell approximately 2 *SDs* above the sample mean at each of the five school-age time points. The decreasing group (31.9%) began roughly midway between the high and low groups and then dropped steadily before leveling off just above the low group. Mean posterior assignment probabilities for the three school-age groups ranged from .84 for highs to .90 for the lows, indicating relatively precise classification for this period.

How do the toddlerhood trajectories relate to the school-age trajectories? Table 13 contains transition probabilities, which indicate the likelihood of belonging to the various school-age trajectory groups given membership in each of the toddler trajectory groups. The transition probabilities reveal several overall trends. First, consistent with prior research, boys who followed low or high trajectories early in life often maintained similar trajectories through middle childhood. Consider the two groups with relatively mild PA in toddlerhood—the lows and moderate decreaseers. The estimated probabilities of boys in these two groups joining the school-age low group were .78 and .70, respectively. Continuity was weaker for boys in the two

relatively aggressive toddler groups. Still, roughly 1 in 4 high stables and high increasers—a sizable minority—proceeded to the small high-trajectory group in the school-age period.

Table 13

Estimated Conditional Probabilities of School-Age Trajectory Group by Toddlerhood Trajectory Group

Toddlerhood trajectory	School-age trajectory		
	Low	Decreasing	High
Low	.78	.22	.00
Moderate decreasing	.70	.27	.03
High stable	.31	.44	.25
High increasing	.09	.64	.27

Second, some boys underwent change in their level of aggressiveness. Unexpectedly, among boys initially low on PA, a nontrivial portion temporarily escalated during the school years. Specifically, an estimated 22% of the lows and 27% of the moderate decreaseers joined the school-age decreasing group. The likelihood of remaining high throughout the school-age years after a history of low toddlerhood PA was very small—.00 and .03, respectively, for the lows and moderate decreaseers. However, the reverse pattern—attaining low levels of PA after a history of high PA in toddlerhood—was relatively common. In fact, transiting to the school-age decreasing trajectory was the most likely outcome for both high stables (.44) and high increasers (.64). Additionally, a subset of aggressive toddlers—roughly 1 in 3 high stables and 1 in 10 high increasers—joined the school-age low trajectory. In all, about 3 in 4 aggressive toddlers exhibited low levels of PA by the end of middle childhood.

Results from the joint model indicate five overall trajectories of PA from ages 2 to 11: (1) persistently low PA, (2) persistently high PA, (3) temporarily escalating PA, (4) escalating PA, and (5) desisting PA. The persistently low group includes boys in the toddlerhood low and moderate-decreasing groups who transition to the school-age low group. This group comprises an estimated 51% of the sampled population and thus represents the modal trajectory. The persistently high group is defined to include boys in the toddlerhood high-stable and high-increasing groups who join the school-age high trajectory. This group, designated the “chronic” group, includes an estimated 7% of the population. The temporarily escalating group includes those boys in the toddlerhood low and moderate-decreasing groups who transit to the school-age decreasing group. Individuals in this group comprise an estimated 19% of the population. Included in the escalating trajectory group are those in the two lowest toddlerhood groups who shift to the school-age high trajectory group. Individuals in this group make up an estimated 2% of the population. Finally, the desisting group consists of boys in the two high toddlerhood groups who join the school-age decreasing and low groups. The desisters comprise an estimated 21% of the population.

Are these designations warranted? I sought to validate the classification in two ways. First, I compared the five overall trajectory groups on levels of maternal-reported PA at each age. Recall that Bushway and colleagues (2001) defined chronic, escalating, and desisting trajectories in relation to modal population levels. Table 14 presents mean PA at each age for each group and the results of univariate ANOVAs. I used univariate comparisons in place of a multivariate repeated measures ANOVA to protect against list-wise deletion. The results conformed to Bushway and colleagues’ (2001) criteria. Chronics exceeded the low trajectory at each age.

Table 14

Physical Aggression (PA) Scores by Overall Trajectory Group

	Lows (<i>n</i> = 132)		Chronics (<i>n</i> = 19)		Temporary Escalators (<i>n</i> = 48)		Escalators (<i>n</i> = 6)		Desisters (<i>n</i> = 53)		<i>F</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
<i>Toddlerhood</i>											
Age 2 PA	2.18 _a	1.08	4.21 _b	1.14	2.22 _a	.81	2.32 _a	1.60	4.14 _b	1.13	39.38**
Age 3 PA	1.80 _a	.89	4.78 _b	.83	1.89 _a	.83	2.08 _a	.84	4.52 _b	1.15	46.56**
Age 3.5 PA	1.72 _a	.86	4.83 _b	1.15	1.75 _b	.87	1.87 _a	.69	4.44 _c	1.14	67.94**
<i>School-age</i>											
Age 5 PA	.07 _a	.23	3.15 _b	1.11	1.75 _c	.98	2.68 _d	1.52	1.47 _c	1.34	35.63**
Age 6 PA	.07 _a	.22	2.98 _b	1.41	1.12 _c	1.14	2.72 _b	1.13	.95 _c	.96	31.06**
Age 8 PA	.10 _a	.20	3.52 _b	1.71	.65 _a	1.05	3.43 _b	.75	.57 _a	.84	58.65**
Age 10 PA	.09 _a	.18	3.10 _b	1.54	.26 _a	.78	3.11 _b	.82	.26 _a	.59	69.59**
Age 11 PA	.14 _a	.33	3.21 _b	1.42	.33 _a	.35	3.16 _b	1.17	.33 _a	.59	83.16**

Note. Means with different subscripts are significantly different based on Tukey HSD post-hoc comparisons.

** $p < .01$.

Temporary escalators surpassed lows only for a brief period (ages 5 and 6); escalators remained elevated throughout the school-age period. Finally, desisters received high scores throughout toddlerhood but were indistinguishable from lows at the last three measurement occasions. Notably, desisters and chronics received equally high PA scores at the beginning of toddlerhood.

Second, I compared the trajectory groups on teacher- and youth-reported PA using LGCM and ANOVA, respectively. As an initial step in the latent growth curve analysis, I plotted boys' teacher-rated PA scores against time. Through visual inspection of the plots, I inferred that individual change was linear. On the basis of this conclusion, I then specified a baseline growth model in which the six teacher-reported measures of PA were used as indicators of two latent trajectory parameters: the intercept, which indicates the estimated level of behavior when Age = 0, and the slope, which describes the yearly rate of change in the behavior. Given the present focus on behavioral outcomes (i.e., persistence versus desistance), Age was centered around the value of 11, which corresponds to the participants' age at the final assessment. Thus, the first measurement occasion (age 6) was coded as -5, the second (age 7) as -4, and so on, with the final measurement occasion assigned a value of 0. Based on this method of coding, the intercept could be interpreted as the estimated score when boys were age 11. As recommended by Willett and Sayer (1994), no assumptions regarding independence and homoscedasticity of the measurement errors were imposed.

The baseline model fit the data well ($\chi^2 = 16.08$, $df = 16$, $p = .45$; $\chi^2/df = 1.01$; Comparative Fit Index, CFI = .99; Root Mean Square Error of Approximation, RMSEA = .005, 90% CI = .001, .011; Standardized Root Mean Square Residual, SRMSR = .003). The mean and the variance of both trajectory coefficients were statistically significant, providing further evidence

for the adequacy of the baseline model. To test for a curvilinear trend, I added a quadratic term to the model. The quadratic coefficient was not significantly different from zero, nor did its inclusion improve model fit. On the basis of these results, I concluded that growth in teacher-reported PA was linear.

In the final stage of the growth analysis, trajectory groups were represented in the growth model by four dichotomous dummy-coded variables: chronics versus lows, temporary escalators versus lows, escalators versus lows, and desisters versus lows. The dummy variables were included in the model as independent variables. The two latent trajectory parameters served as dependent variables. I examined the overall impact of group status on the trajectory parameters by fitting a reduced model in which the group-status variables' effects were constrained to be zero. The full model provided a better fit than the reduced model, $\Delta\chi^2 = 18.32$, $\Delta df = 8$, $p < .05$, indicating a significant relation between group status and trajectories of teacher-rated PA.

Coefficients from the full model appear in Table 15. Fitted trajectories appear in Figure 3. As anticipated, chronics and escalators exceeded the lows on teacher-rated PA at age 11, although this difference was significant only for the chronics. Lows, temporary escalators, and desisters were roughly equivalent. Overall, the pattern of slope coefficients also conformed to expectation. For lows, rate of change was effectively zero. Chronics followed a rising trajectory. temporary escalators and desisters gradually declined on teacher-rated PA (although contrasts with the low group did not reach significance), while escalators followed a flat-line trajectory.

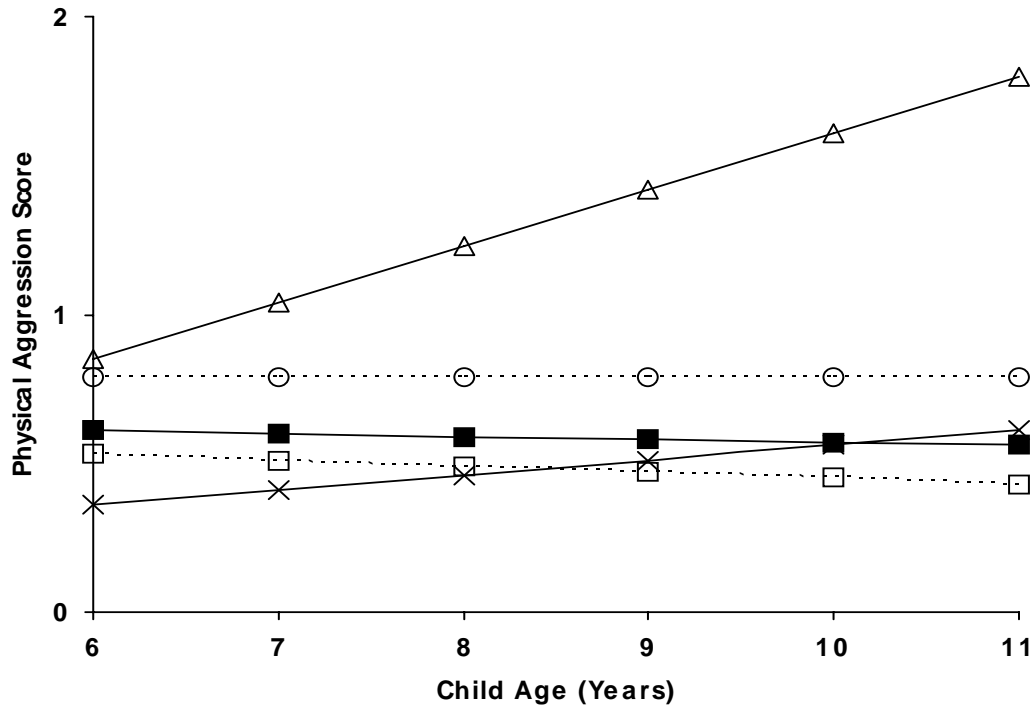
Table 15

Growth in Teacher-Reported Physical Aggression by Overall Trajectory Group

	<i>B</i>	<i>SE</i>
Low group level at age 11 (intercept)	.61**	.14
Increments to low group level at age 11		
Chronic group status	1.19**	.38
Temporary escalator group status	-.18	.60
Escalator group status	.18	.35
Desister group status	-.05	.22
Low group rate of yearly change (slope)	.05	.04
Increments to low group rate of yearly change		
Chronic group status	.19*	.08
Temporary escalator group status	-.02	.09
Escalator group status	.00	.15
Desister group status	-.01	.06

* $p < .05$, ** $p < .01$ *** $p < .001$.

Table 16 reports the ANOVA results for self-reported PA. As expected, desisters, lows, and temporary escalators rated themselves as significantly less aggressive than chronics. The small escalator group reported high levels of PA but did not differ from any of the other groups, presumably because of low statistical power.



—■— Desister —×— Low —△— Chronic ···□··· Temporary escalator ···○··· Escalator

Figure 3. Teacher-rated physical aggression by overall trajectory group.

Table 16

Self-Reported Physical Aggression by Overall Trajectory Group

Lows (n = 123)		Chronics (n = 19)		Temporary escalators (n = 46)		Escalators (n = 6)		Desisters (n = 45)		F
M	SD	M	SD	M	SD	M	SD	M	SD	
1.66 _a	1.07	2.34 _b	.99	1.90 _a	1.35	2.42 _{ab}	1.62	1.65 _a	.99	2.74*

Note. Means with different subscripts are significantly different based on Tukey HSD post-hoc comparisons.

* $p < .05$.

Thus, the trajectory groups differed in predictable ways on measures of teacher- and youth-rated PA. These results lend validity to the maternal-report-based classifications. I turn next to factors that distinguish desisters from the other groups.

Predictors of Desistance

From person-environment interaction and life course models and from research with older children, I predicted that desisters experience high child risk, low caregiving risk, and positive life transitions. Prior studies have provided scant evidence for late-onset PA; thus, my hypotheses regarding predictor variables focused on differences and similarities between desisters and lows and chronics. Although I made no predictions about boys that escalate in their use of PA, I included temporary escalators and escalators in the analyses on an exploratory basis.

A multinomial logit model was used to examine the effects of predictor variables on group membership. Multinomial logit models are widely employed to predict nominal outcomes with multiple independent variables (Long, 1997). Like other multivariate methods, logit models exclude cases with missing values on the independent variables. Values were missing for all of the predictor variables, with the proportion of cases with missing data ranging from .008 for toddlerhood adversity and maternal depression to .10 for preschool maternal control. To reduce problems associated with case-wise deletion (e.g., loss of power, precision, and generalizability), the expectation-maximization (EM) method was used to impute missing values (McLachlan & Krishnan, 1997). Intuitively, what EM does is to “guess” values of missing data, then iteratively search for better values. More formally, it begins by randomly assigning values to all the parameters to be estimated. It then alternates between two steps: the expectation step (i.e., the

“E-step”) and the maximization step (i.e., the “M-step”). In the E-step, the algorithm computes the expected likelihood for the complete data (the so-called Q-function) where the expectation is taken with respect to the current settings of parameters and the observed (incomplete) data. In the M-step, it re-estimates all the parameters by maximizing the Q-function. Once it has obtained a new generation of parameter values, the algorithm repeats the E- and M-steps until the likelihood converges. EM operates under the assumption that data are missing at random (MAR). Little’s Missing Completely At Random test, which is computed by the SPSS EM procedure, was used to evaluate this assumption. The results were consistent with MAR, $\chi^2 = 20.47$, $df = 257$, $p = 1.00$.

The logit analysis comprised four steps. The first step concerned factors in toddlerhood. I predicted that desisters would be distinguished from lows (but not chronics) by higher PA, fearlessness, negative emotionality, and impulsivity, and from chronics (but not lows) by more positive maternal control and by lower maternal depression and family adversity. To test this hypothesis, I entered child, maternal, and family variables from toddlerhood into the logit model. In this and subsequent steps, desisters served as the reference group; lows, chronics, temporary escalators, and escalators served as target groups.

Results from the first step of the logit analysis appear in the upper portion of Table 17. Each logit coefficient represents the effect of an independent variable on the probability of membership in the target group versus the reference group, controlling for other independent variables in the model. The coefficient’s exponentiated value measures the odds ratio—the relative change in odds of belonging to the target group attendant to a one unit change in the independent variable.

Among early child characteristics, higher levels of PA and impulsivity increased the likelihood of belonging to the desister group relative to belonging to the low group. After accounting for the other variables in the model, a one unit increment in PA raised the odds of being in the desister group by 37% (.37=1-.63); a one unit increase in impulsivity raised the odds by 35% (.35=1-.65). These variables did not differentiate desisters and chronics. Unexpectedly, desisters and chronics differed on fearlessness, with lower levels associated with membership in the former group. A one unit decrease in fearlessness (i.e., -1 SD) raised the odds of belonging to the desister group by 65%. Fearlessness did not reliably discriminate desisters and lows, although there was a nonsignificant trend for lower levels of fearlessness to increase the likelihood of being a desister. Physical aggression was the only early child variable to distinguish desisters from boys in the two escalator groups.

Contrary to expectation, maternal control, maternal depression, and family adversity in toddlerhood discriminated desisters from lows. Boys whose mothers used more negative control and reported more depressive symptoms and family adversity were more likely to be desisters than lows. A one unit decrease in maternal control (i.e., more negative maternal control) increased the odds of belonging to the desister group by 22%; a one unit increase in maternal depression raised the odds by 10%; and a one unit increase in adversity raised the odds by 12%. As expected, these three toddlerhood predictor variables—maternal control, maternal depression, and family adversity—also discriminated desisters from chronics. The likelihood of membership in the desister group increased with higher levels of positive control and lower levels of maternal depression and family adversity. Finally, maternal depression and family adversity predicted desistance versus escalation. Lower levels of family adversity and maternal depression

Table 17

Logit Analysis: Predicting Membership in Overall Trajectory Groups

Variable	Lows vs Desisters			Chronics vs Desisters			T. Escalators vs Desisters			Escalators vs Desisters		
	<i>B</i>	<i>SE</i>	Exp(<i>B</i>)	<i>B</i>	<i>SE</i>	Exp(<i>B</i>)	<i>B</i>	<i>SE</i>	Exp(<i>B</i>)	<i>B</i>	<i>SE</i>	Exp(<i>B</i>)
<i>Step 1</i>												
Age 2 PA	-.46**	.12	.63	.10	.17	1.10	-.58**	.19	.56	-.65*	.29	.52
Fearlessness	.27+	.14	1.24	.80*	.31	1.65	.26	.35	1.23	-.10	.51	.91
Negative emotionality	-.12	.10	.89	-.14	.16	.85	.04	.15	1.04	.10	.22	1.10
Impulsivity	-.30**	.11	.65	.01	.03	1.02	-.22	.17	.88	-.25	.27	.78
Maternal control (T)	.20*	.06	1.22	-.18*	.08	1.17	.05	.09	1.05	-.03	.13	.97
Maternal depression (T)	-.10**	.04	.90	.13*	.06	1.14	-.09+	.05	.91	.10*	.05	1.10
Family adversity (T)	-.11**	.05	1.12	.21*	.10	1.23	.11*	.05	1.12	.11	.12	1.25
<i>Step 2</i>												
Maternal depression (P)	-.01	.03	.99	.05	.06	.95	.07	.05	1.07	.16+	.08	1.16
Family adversity (P)	.03	.07	1.03	.05	.11	1.05	.06	.11	1.06	.11	.16	1.12
<i>Step 3</i>												
Maternal control (P)	.12	.13	1.13	-.16	.16	.97	-.14	.19	.87	-.05	.29	.96
<i>Step 4</i>												
Teacher-child rel.	.02	.03	1.02	-.02	.02	.98	-.11**	.02	.89	-.02	.03	.98
Best friends' PA	.08	.22	1.09	.16	.33	1.17	.05	.34	1.05	.54*	.36	2.56

+ $p < .10$, * $p < .05$, ** $p < .01$. Note. Change in McFadden Pseudo R-Square: Step 1: .29, Step 2: .03, Step 3: .05, Step 4: .04.

distinguished desisters from temporary escalators and escalators, respectively.

The second and third steps of the logit analysis concerned family factors in the preschool period. From life course models, I predicted that desisters would be distinguished from chronics (but not lows) by decreases in maternal depression and family adversity. I also predicted that the effects of family context transitions, should such effects emerge, would be mediated by improvements in parenting. To test these hypotheses, I entered preschool maternal depression and family adversity into the logit model (step two), followed by preschool maternal control (step three). Mediation would be indicated if preschool depression and adversity discriminated desisters and chronics after step two but not after step three.

The results from steps two and three were not consistent with my predictions. After controlling for other variables in the model, preschool maternal depression, family adversity, and maternal control were unrelated to membership in the desister versus chronic groups. Maternal depression was marginally predictive of membership in the desister versus escalator groups, with lower scores increasing the odds of belonging to the former group.

The final step of the logit analysis involved variables pertaining to social relationships outside the home. From life course models, I predicted that desisters would be distinguished from chronics (but not lows) by positive social role transitions in the form of close student-teacher relationships and friendships with nonaggressive peers. This hypothesis was tested by entering student-teacher closeness and best friends' PA into the logit model.

Here, too, the results did not support the hypothesis. After accounting for the other variables in the model, desisters were indistinguishable from chronics (and lows) with respect to teacher-child closeness and best friends' PA. These variables did discriminate desisters from the

escalator groups, however. Boys who were close to their teachers were more likely to be desisters than temporary escalators. Boys who rated their best friends as nonaggressive were more likely to be desisters than escalators.

Failure of the life course variables to distinguish desisters from chronics after accounting for early risk factors is compatible with two different scenarios: Either the life course variables predicted desistance versus persistence but added no variance beyond that accounted for by the early risk factors, or they were not predictive to begin with. Only the former scenario would constitute evidence against the life course model. Findings from a follow-up logit analysis were, in fact, consistent with the former scenario. Specifically, when life course variables were the sole predictors of group membership, chronics exhibited significantly more risk than desisters on preschool maternal depression and family adversity, and on teacher-child closeness and best friends' PA (see Table 18).

Desistance from Physical Aggression in Relation to Social Skills and Nonaggressive ASB

From research with older children, I hypothesized that desistance from early PA would be accompanied by sustained improvements in social skills and nonaggressive antisocial behavior. Specifically, I predicted that desisters would (a) exhibit more rapid increases in social skills and more rapid decreases in nonaggressive ASB than lows and chronics, and (b) not differ from lows in either domain by the end of middle childhood. To analyze the relationship between desistance and social skills, I compared desisters with lows and chronics in latent growth curve models of the maternal- and teacher-report data. For nonaggressive ASB, I used LGCM with maternal and teacher reports and ANOVA with self reports. Once again, the two escalator groups were included on an exploratory basis.

Table 18

Logit Analysis: Predicting Membership in Overall Trajectory Groups Using Life Course Variables

Variable	Lows vs Desisters			Chronics vs Desisters			T. Escalators vs Desisters			Escalators vs Desisters		
	<i>B</i>	<i>SE</i>	Exp(<i>B</i>)	<i>B</i>	<i>SE</i>	Exp(<i>B</i>)	<i>B</i>	<i>SE</i>	Exp(<i>B</i>)	<i>B</i>	<i>SE</i>	Exp(<i>B</i>)
<i>Step 1</i>												
Maternal depression (P)	.00	.02	.00	.15**	.03	1.14	.14	.09	1.14	.30**	.06	1.25
Family adversity (P)	-.03	.05	.97	.18*	.08	.08	.17*	.08	1.19	.21*	.11	1.23
<i>Step 2</i>												
Maternal control (P)	.10	.11	1.10	-.18	.15	.84	-.18	.14	.84	-.18	.19	.84
<i>Step 3</i>												
Teacher-child rel.	.02	.02	1.02	-.05**	.01	.95	-.15**	.05	.85	-.10**	.02	.91
Best friends' PA	.21	.29	1.23	.01*	.00	1.02	.11	.28	1.11	.79**	.12	2.19

* $p < .05$, ** $p < .01$. *Note.* Change in McFadden Pseudo R-Square: Step 1: .15, Step 2: .00, Step 3: .10.

For the growth curve analyses of social skills and nonaggressive ASB, I followed the same procedure used in the analysis of teacher-rated PA. After inspecting plots of each measure against time, I fit a baseline model based on my assessment of the nature of growth. Results from the initial model were examined to determine whether a linear or curvilinear trend was required to adequately fit the data, as indicated by goodness-of-fit indices and the statistical significance of the slope and slope² coefficients. If necessary, a new baseline model was specified based on these findings. Finally, trajectory groups were represented in the model by four dummy variables: lows versus desisters, chronics versus desisters, temporary escalators versus desisters, and escalators versus desisters. The dummy variables served as independent variables in the model and the growth parameters served as dependent variables. A $\Delta\chi^2$ test was used to test the overall relationship between group status and the growth parameters.

Table 19 summarizes results from the model specifications. A linear-growth baseline model was optimal for mother-rated social skills and mother- and teacher-rated nonaggressive ASB. For teacher-rated social skills, neither the mean nor the variance of the slope coefficient differed significantly from zero in the initial baseline model. A second model with no linear trend afforded a better fit and was retained. In all four growth models, the $\Delta\chi^2$ test indicated a significant overall relationship between group status and the growth parameters.

Table 19

Summary of Model Specifications for Mother- and Teacher-Rated Social Skills and Nonaggressive ASB

Model	Order ^a	χ^2	<i>df</i>	χ^2/df	CFI	RMSEA	RMSEA 90% CI	SRMSR	$\Delta\chi^2$	Δdf
<i>Social skills</i>										
<i>Maternal report</i>										
Optimal baseline model	1	23.12*	12	1.93	.94	.04	.02, .06	.01		
Group status in model									21.08**	8
<i>Teacher report</i>										
Optimal baseline model	0	16.70	18	.93	1.00	.00	.00, .01	.00		
Group status in model									13.87**	4
<i>Nonaggressive ASB</i>										
<i>Maternal report</i>										
Optimal baseline model	1	21.89	14	1.56	.97	.04	.03, .06	.02		
Group status in model									22.74**	8
<i>Teacher report</i>										
Optimal baseline model	1	26.60	18	1.48	.96	.05	.03, .07	.01		
Group status in model									16.84*	8

Note. CFI = Comparative Fit Index, RMSEA = Root Mean Square Error of Approximation, SRMSR = Standardized Root Mean Square Residual. ^a Entries in this column indicate the order of the best-fitting baseline model. A zero-order model is defined solely by an intercept; a first-order model contains an intercept and a slope. * $p < .05$. ** $p < .01$.

Estimated parameters from the growth model for mother-rated social skills appear in Table 20. Fitted growth curves appear in Figure 4. As expected, desisters exceeded chronics at age 11 but did not differ from lows. Desisters increased more rapidly than lows and chronics; however, this difference was significant only in comparison to chronics, who decreased across the observation period. Finally, desisters were indistinguishable from the escalator groups in both level and rate of change.

Table 20

Growth in Mother-Reported Social Skills by Overall Trajectory Group

	<i>B</i>	<i>SE</i>
Desister group level at age 11 (intercept)	50.50***	1.05
Increments to desister group level at age 11		
Low group status	.95	1.40
Chronic group status	-7.35*	2.54
Temporary escalator group status	-.08	2.39
Escalator group status	-1.13	3.96
Desister rate of yearly change (slope)	.83**	.18
Increments to desister group rate of yearly change		
Low group status	-.19	.24
Chronic group status	-1.24*	.43
Temporary escalator group status	-.02	.41
Escalator group status	-.13	.67

* $p < .05$, ** $p < .01$ *** $p < .001$.

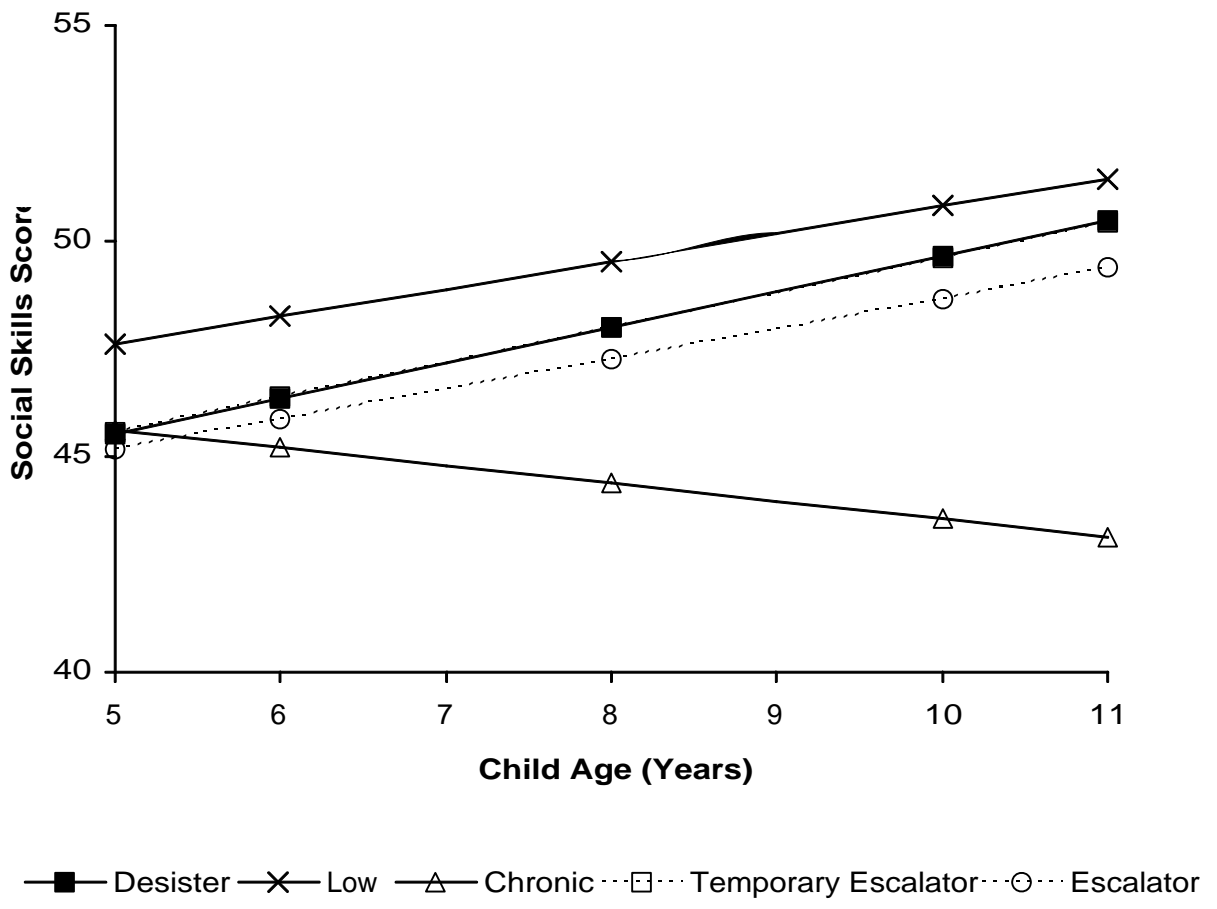


Figure 4. Mother-rated social skills by overall trajectory group.

Table 21 presents results for teacher-rated social skills. Once again, desisters received higher ratings at age 11 than chronics but did not differ from lows. Desisters also exceeded escalators but not temporary escalators. Recall that a slope parameter was not needed to model teacher-reported social skills. Thus, the group differences in social skills at age 11 were present across the span of the study (see Figure 5).

Table 21

Growth in Teacher-Reported Social Skills by Overall Trajectory Group

	<i>B</i>	SE(<i>B</i>)
Desister group level at age 11 (intercept)	39.91***	5.72
Increments to desister group level at age 11		
Low group status	0.05	1.15
Chronic group status	-7.27**	2.09
Temporary escalator group status	-.26	3.25
Escalator group status	-5.86**	1.97

** $p < .01$, *** $p < .001$.

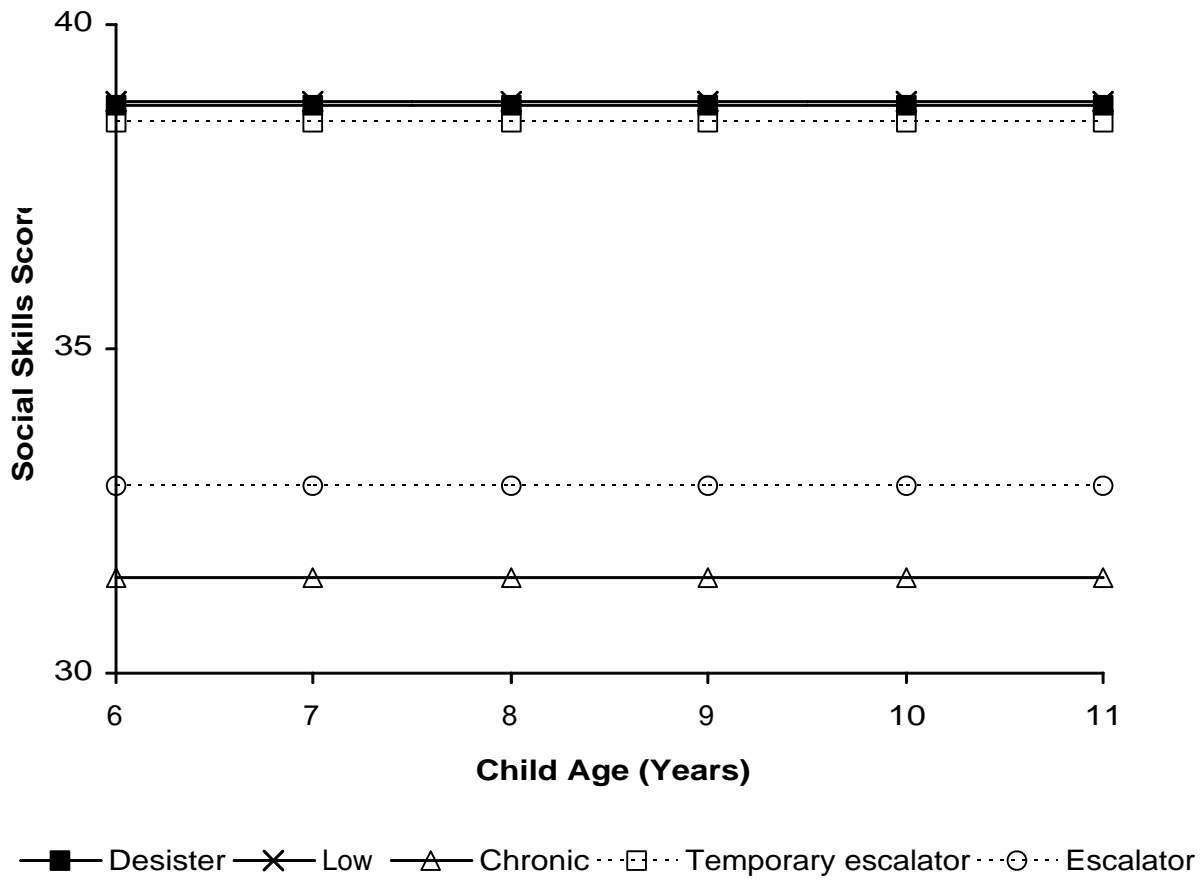


Figure 5. Teacher-rated social skills by overall trajectory group.

The results for mother-rated nonaggressive ASB appear in Table 22 and are illustrated in Figure 6. Desisters, lows, and the two escalator groups declined over time, whereas chronics increased. As a result, chronics exceeded desisters in both level and rate of change, as anticipated. Contrary to expectation, however, desisters were perceived by their mothers as more antisocial at age 11 than the low group. These two groups did not differ in rate of change; thus, this pattern held across the observation period. Desisters and escalators had indistinguishable mother-rated nonaggressive ASB trajectories.

Table 22

Growth in Mother-Reported Nonaggressive ASB by Overall Trajectory Group

	<i>B</i>	<i>SE</i>
Desister group level at age 11 (intercept)	2.48***	.19
Increments to desister group level at age 11		
Low group status	-1.03**	.25
Chronic group status	2.37**	.45
Temporary escalator group status	-.08	.42
Escalator group status	.12	.70
Desister rate of yearly change (slope)	-.14**	.04
Increments to desister group rate of yearly change		
Low group status	-.01	.05
Chronic group status	.26**	.09
Temporary escalator group status	-.13	.08
Escalator group status	.00	.13

* $p < .05$, ** $p < .01$ *** $p < .001$.

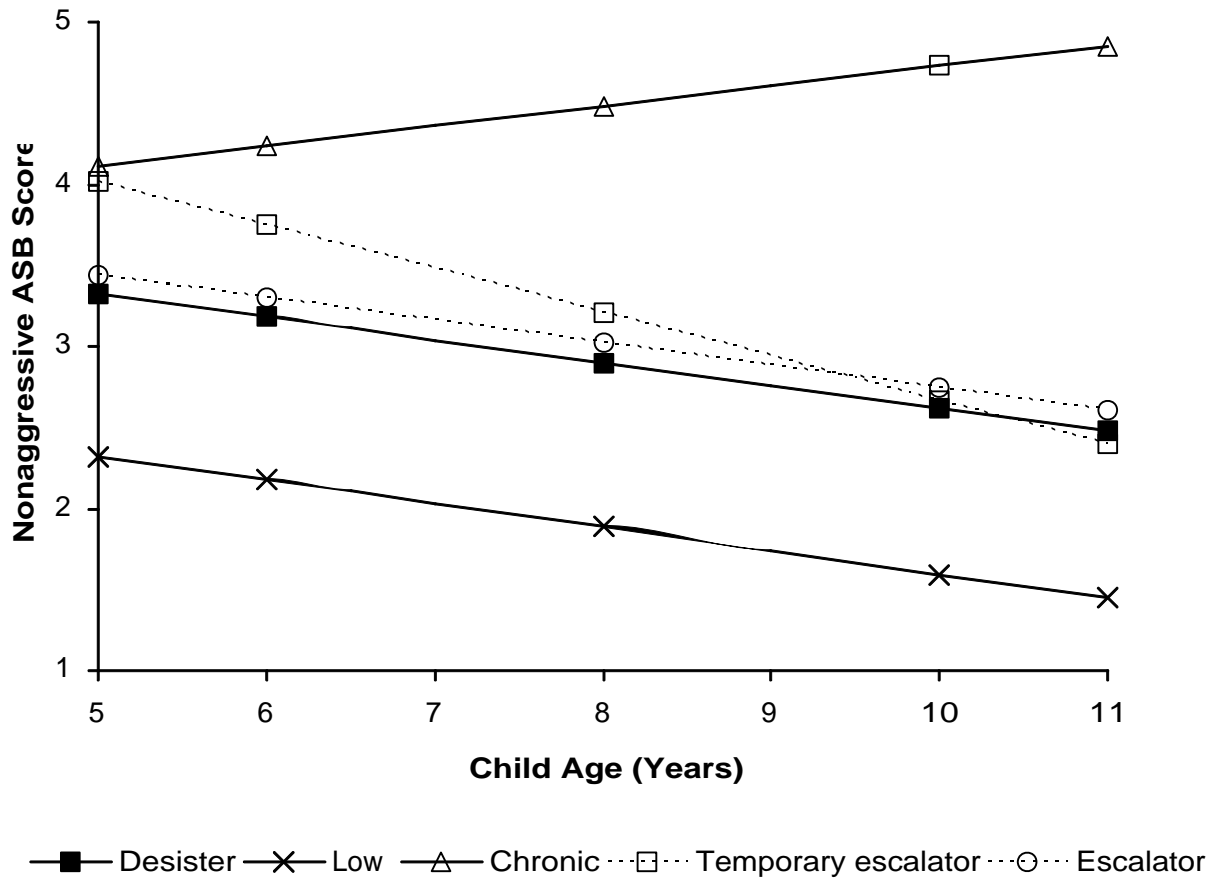


Figure 6. Mother-rated nonaggressive antisocial behavior by overall trajectory group.

Table 23 contains results for teacher-rated nonaggressive ASB. Desisters followed a relatively high, flat-line trajectory (see Figure 7). In contrast, all other groups increased, although only the low group increased significantly more rapidly than the desisters. The desister group did not differ from any of the other groups in terms of level of teacher-rated nonaggressive ASB at age 11.

Table 23

Growth in Teacher-Reported Nonaggressive ASB by Overall Trajectory Group

	<i>B</i>	<i>SE</i>
Desister group level at age 11 (intercept)	2.21***	.27
Increments to desister group level at age 11		
Low group status	-.29	.36
Chronic group status	.55	.66
Temporary escalator group status	-.02	.13
Escalator group status	.01	.62
Desister rate of yearly change (slope)	.02	.06
Increments to desister group rate of yearly change		
Low group status	.17*	.08
Chronic group status	.14	.09
Temporary escalator group status	.11	.13
Escalator group status	.12	.21

* $p < .05$, *** $p < .001$.

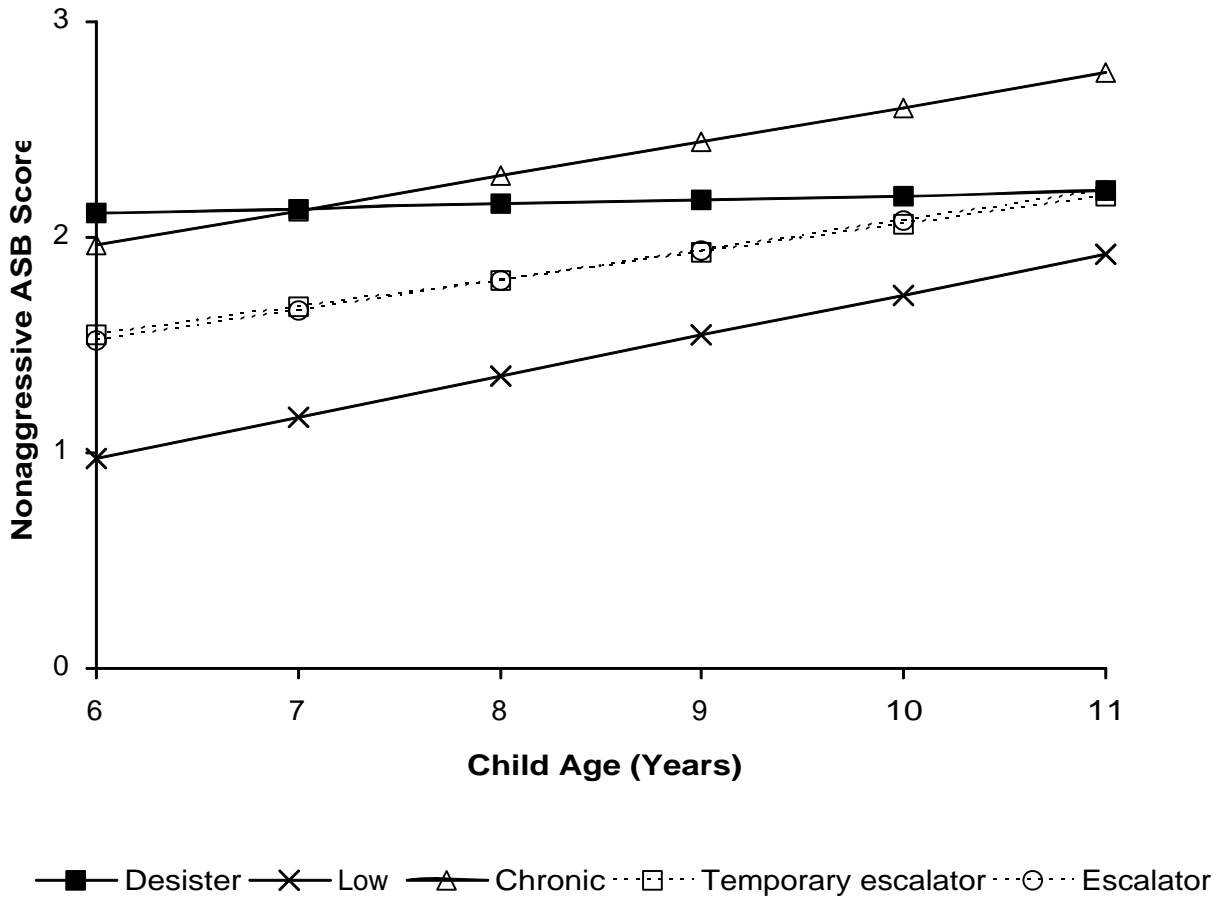


Figure 7. Teacher-rated nonaggressive antisocial behavior by overall trajectory group.

The results for self-reported nonaggressive ASB appear in Table 24. As expected, desisters and lows rated themselves as less antisocial than chronics. Temporary escalators also rated themselves as less antisocial than chronics. Escalators did not differ from the other groups.

Table 24

Self-Reported Nonaggressive Antisocial Behavior by Overall Trajectory Group

Lows (<i>n</i> = 123)		Chronics (<i>n</i> = 19)		Temporary escalators (<i>n</i> = 46)		Escalators (<i>n</i> = 6)		Desisters (<i>n</i> = 45)		<i>F</i>
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
.20 _a	.24	.66 _b	.42	.25 _a	.35	.27 _{ab}	.36	.22 _a	.33	3.51**

Note. Means with different subscripts are significantly different based on Tukey HSD post-hoc comparisons.

** *p* < .01.

DISCUSSION

This study of disadvantaged boys had three major aims. The first aim was to identify participants who followed a desisting trajectory of PA from ages 2-11. As expected, most boys who were highly aggressive in early childhood exhibited low levels of aggression by the end of middle childhood. Second, the study sought to identify factors associated with desistance. In particular, analyses tested the proposition that desisters experience high child risk, low caregiving risk, and positive life transitions. The results provide partial support for this view. As anticipated, desisters were indistinguishable from chronically aggressive boys in PA and impulsivity at age 2. Contrary to expectation, however, desisters resembled boys with persistently low aggression on a measure of fearfulness and exhibited intermediate risk (i.e., between chronics and lows) on toddlerhood measures of maternal depression, harsh parenting,

and family adversity. Furthermore, life transition variables failed to discriminate desisters from chronics or lows after accounting for early child and family factors. A third goal was to determine whether boys who desisted from early aggression experienced continuing difficulties in the form of social skills deficits or nonaggressive ASB. As expected, compared with chronically aggressive boys, desisters improved in both domains according to maternal, teacher, and youth reports. In fact, by the end of middle childhood, desisters were indistinguishable from lows on these measures, with one exception: Mothers of desisters rated their sons higher on nonaggressive ASB. In the following pages, I discuss these findings in detail and conclude with implications for research and clinical work with aggressive children.

Trajectories of Physical Aggression

To capture developmental changes in the manifestation of aggressive behavior, this study modeled trajectories of PA in toddlerhood and the elementary-school years using two separate measures. The measure of toddlerhood PA, administered at ages 2, 3, and 3½, focused on hitting, biting, and kicking. The measure of school-age aggression, used at ages 5, 6, 8, 10, and 11, targeted physical fighting.

Consistent with prior research on the absolute stability of PA (e.g., Brownlee & Bakeman, 1981; Cairns & Cairns, 1994; Cummings et al., 1989; Loeber et al., 1989), mean aggression levels decreased with age. Thus, disadvantaged boys, like other children, appear to rely less often on force as a means to solve problems as they grow older. Consistent with prior research on the relative stability of PA (Olweus, 1979), toddlerhood PA correlated significantly, albeit modestly, with school-age PA. This finding suggests that while some boys maintain their rank order in aggressiveness, many do not.

These sample-level, “variable-centered” results provide a backdrop for the SPMM trajectory analysis (Nagin & Tremblay, 2001b). Specifically, the analysis sought to disaggregate groups of boys with distinctive patterns of stability and change. Five such groups emerged. The largest group, comprising an estimated 51% of the population, maintained a low trajectory across childhood. These boys used aggression occasionally in toddlerhood and then only very rarely in the school years. This finding indicates that for most children, even among those identified as high-risk based on demographic characteristics, intermittent aggression is common in toddlerhood but not thereafter (Maccoby, 1980; Tremblay, 2000).

A second, small contingent (7%) followed a high, non-declining trajectory. This virulent group appears to fit the early-starter/chronic pathway described by Moffitt (1993) and Patterson (1993). It is also consistent with SPMM results with older children. Notably, in each of six samples, Broidy and colleagues (2003) found a small group of boys (4-11%) who engaged in consistently high levels of PA over time. The present study lacks data after age 11; thus, it is impossible to know what portion of the chronic group will exhibit “life-course persistent” antisocial behavior and problems of living (Moffitt, 1993). However, the well-established links between persistent childhood aggression and poor adult outcomes, particularly among males (Caspi & Moffitt, 1995; Robins, 1966), suggest that many of these boys will experience lasting difficulties.

Two groups showed low levels of PA in toddlerhood followed by high levels of PA in the school years. For the larger of the two groups (19%), this increase was temporary; the smaller group (2%), however, remained aggressive at the study’s end. The presence of escalating groups was unexpected based on prior SPMM results. For example, Broidy and colleagues (2003) did not find a “late-onset” group in any of the samples in their study. However, the apparent absence

of escalators in past research may have reflected the fact that the same measure of PA was used from early school-age through adolescence. As Rutter (2003) notes, “If, in order to have measures that can be applied across a wide age range, the items focus mainly on behaviors characteristic of earlier childhood . . . a misleading picture of age trends may emerge (p. 373).” An analytic strategy that can accommodate different, age-appropriate measures of PA, such as the joint SPMM model used here, may be necessary to capture all of the major trajectories.

The fifth and final group followed a desisting trajectory. These boys were as aggressive as the chronics in toddlerhood but no more aggressive than the low group by the end of middle childhood. Comprising an estimated 21% of the population, the desisting group was three times larger than the chronic group. In other words, 3 of 4 highly aggressive young boys from disadvantaged families learned to control aggressive impulses over time. This finding suggests that the early-starter model (Moffitt, 1993; Patterson, 1993) is an oversimplification of aggressive development, at least with respect to early childhood. Far from representing the beginnings of a “life-course persistent” pathway, early aggression, in most cases, is relatively short-lived. Thus, the same developmental complexity that the early-starter model sought to explain across adolescence (i.e., persisting versus desisting trajectories) also applies to early childhood.

Follow-up analyses revealed that the maternal-report based trajectory groups differed in predictable ways on teacher- and self-report ratings from ages 6-11 and 10-11, respectively. By the end of the study, chronics and escalators were the most aggressive group in the eyes of teachers and the boys themselves. In contrast, both raters viewed lows, desisters, and temporary escalators as nonaggressive by the study’s end. Thus, to the extent that external ratings of PA were available, they increased the validity of the trajectory groupings. While the study cannot

address the generality of mothers' ratings from ages 2-5, the high level of agreement with teacher and youth reports during the school years provides some assurance in this regard.

Predictors of Desistance

What distinguishes desisters from their peers? This study tested three different explanatory models of desistance from early PA. According to the dimensional model, desisters fall between chronics and lows on measures of early PA and early child, parent, and family risk factors for PA (Gottfredson & Hirschi, 1990). The person-environment interaction model holds that the desisting trajectory reflects high levels of early child risk paired with low levels of parent and family risk (Moffitt, 1993). Finally, the life course model predicts that desisters experience discontinuities in risk or the onset of protective processes (Elder, 1995). The results do not provide clear-cut support for any one model. Instead, they suggest a more complex process with interactional and dimensional elements.

Turning first to child characteristics, age-2 PA, impulsivity, and fearlessness discriminated desisters from one or more of the other groups. As predicted by the person-environment interactional model, desisters and chronics were more aggressive and impulsive than lows at age 2 but did not differ from each other on these attributes. On the measure of age-2 fearlessness, however, desisters resembled lows rather than chronics. Whereas chronics were likely to approach novel, threatening stimuli, lows and, in particular, desisters, who were marginally more fearful than even the lows, tended to become distressed and to withdraw.

These findings hold at least two implications for explanations of desistance. First, the fact that desisters were as aggressive as chronics at age 2 discredits the notion that desisters have a lower initial propensity for aggression. Thus, the so-called propensity hypothesis (Gottfredson &

Hirschi, 1990), a central tenet of the dimensional framework, cannot explain desistance versus persistence of early aggression.

Second, the findings on impulsivity and fearlessness imply an interactional risk pattern, but not of the person-environment variety. Rather, *within-person* interactions among temperament attributes are indicated. Specifically, all aggressive toddlers were impulsive; however, those who remained aggressive also were fearless, while those who desisted were fearful. These results suggest that impulsivity is involved in the onset of aggressive behavior problems, while temperamental fear helps determine whether these problems persist or decline. This formulation is consistent with studies of antisocial behavior in older children. For example, Loeber and colleagues (Loeber, Green, Keenan, & Lahey, 1995) found that ADHD best predicted early onset of CD in multivariate analyses, whereas Raine and colleagues (Raine, Venables, & Williams, 1990, 1995) found that fearfulness and high autonomic arousal protect delinquent adolescents against adult criminality. Research with young children suggests that impulsive, hyperactive boys are more likely than their peers to become involved in conflicts with others and to use force to resolve these conflicts (Billman & McDevitt, 1980; Hay & Ross, 1982). How might high temperamental fear reverse this pattern?

Kochanska's (1993, 1997) theorizing on temperament, parenting, and internalization of prosocial standards provides a useful perspective here. Her work is particularly relevant because of its focus on early childhood. Kochanska argues that internalization involves two mechanisms: anxious arousal (1993) and mutually responsive orientation (MRO) with caregivers (1997). According to theory, anxious arousal facilitates semantic processing of prosocial messages during discipline encounters. MRO motivates children to maintain positive relations by acting according to caregivers' wishes. Although Kochanska believes both mechanisms of

internalization operate in most children, her work suggests that anxious arousal is paramount for fearful children (1993, 1997). This group is most likely to become distressed when confronted with wrongdoing and, accordingly, most attuned to caregivers' remonstrations.

Thus, fearful temperament may play a role in desistance by facilitating the internalization of social standards. However, Kochanska's model is interactional, emphasizing the quality of parenting as well as the disposition of the child. In the case of fearful children, emotionally charged, power assertive discipline could lead to overarousal and a sense of resentment that interferes with internalization (Kochanska, 1993). In contrast, gentle discipline seems to be particularly effective for such children (Kochanska, 1997).

Consistent with person-environment interaction models in general and Kochanska's work in particular, desisters experienced less negative maternal parenting than chronically aggressive boys. However, consistent with dimensional models, boys who were never aggressive experienced still less negative maternal parenting than desisters. This latter finding invites several different interpretations. First, if desisters, owing to high fearfulness, are indeed more sensitive to parents' directives than other children, an intermediate level of sensitivity, consistency, and warmth may be sufficient to reduce aggression. No studies have addressed this issue to date.

Alternatively, the parenting data may indicate a threshold effect. That is, increases or decreases in early negative maternal control may have a significant effect on long-term aggression outcomes only at the higher end of the negative control distribution. At the lower end of the distribution, the association between early maternal control and PA in middle childhood may be trivial. This scenario is consistent with Scarr's (1992) proposal that the human species has evolved to become resistant to minor environmental irritants in socialization. As a result,

within the “normal expected environmental range,” the environment’s impact on enduring individual differences in behavior should be small relative to genetic influences. In contrast, outside of the normal expected range, the influence of the environment might be more powerful. Developmentalists seldom test for nonlinear effects of this kind. Moreover, standard variable-centered analytic methods such as regression and analysis of variance include an assumption of linearity. Nonetheless, Scarr’s hypothesis is consistent with evidence from several sources. First, retrospective reports suggest that criminally violent adults are much more likely to have experienced physical abuse as children than nonviolent adults (Widom, 1989). Second, the prospective analyses of Dodge and colleagues show that physical abuse in early childhood is a robust predictor of clinically-elevated externalizing problems through middle childhood, whereas variations in discipline among nonabused children are only modestly associated with later externalizing problems (Deater-Deckard & Dodge, 1997; Dodge, Pettit, Bates, & Valente, 1995). Thus, differences between no negative control and a medium amount may not matter as much as differences between a medium amount and a large amount.

Scarr’s proposal has generated considerable controversy, partly because of its failure to define the boundary between normal expected environments and abnormal environments (Baumrind, 1993). This omission is relevant here: The measure of parenting used in this study does not distinguish between abusive and nonabusive discipline, much less between “normal” and “abnormal” parenting. Nonetheless, given the present findings and the evidence cited above, the possibility of a nonlinear relationship between parental control and childhood PA remains plausible.

Which interpretation of the parenting results is best? Do desisters learn to control aggressive impulses in spite of suboptimal parenting because they are temperamentally attuned

to parents' wishes? Or is it because their parents are not excessively harsh? The fact that temperament and parenting independently discriminated desisters from other groups in the multivariate analysis suggests both explanations may apply. Desistance from early PA may require an internal source of motivation and, at the least, a moderately supportive rearing environment.

The findings for maternal depression and family adversity mirror those for maternal control. That is, desisters experienced significantly less risk than the chronic group and significantly more risk than the low group. This pattern lends itself to the same general interpretations as for maternal control. First, desisters' fearfulness may offset any long-term risks associated with a suboptimal home environment. Maternal depression and family adversity are thought to affect early development partly through parenting. These factors may increase the likelihood of aggressive behavior problems by precipitating coercive, negative discipline and decreasing positive involvement (Patterson, DeBaryshe, & Ramsey, 1989). Fearful children may be less likely to engage in protracted struggles with their parents and, given a heightened sensitivity to prosocial messages (Kochanska, 1993), may be more likely to benefit from positive interactions. Few researchers have examined the intersection of temperament and less proximal social context factors such as parental psychopathology or family adversity. Thus, this hypothesis is admittedly speculative and awaits future studies for confirmation or disconfirmation.

Alternatively, or additionally, Scarr's hypothesis might pertain to families' psychological and socioeconomic resources as well as to parenting. Studies of maternal depression and family adversity initiated in early childhood provide some support for this idea. Zahn-Waxler, Iannotti, Cummings, and Denham (1990) found that disruptive behaviors were more stable among young

children of clinically depressed mothers than among children of mothers who were not clinically depressed. Similarly, chronically aggressive children are much more likely to come from inner-city neighborhoods than working- or middle-class neighborhoods (Offord, Lipman, & Duku, in press). Working- and middle-class neighborhoods, in contrast, differ less dramatically in the prevalence of aggressive children. Thus variations at the higher end of the maternal depression and family adversity distributions may have stronger associations with aggression than variations at the lower end.

Unexpectedly, the results provide no support for the life course model. None of the life transition variables discriminated desisters from chronics or lows after accounting for early child and family factors. This pattern contradicts prior research on predictors of change in antisocial behavior (Caspi & Moffitt, 1995; Hughes et al., 1999; Ingoldsby, 2002). In these studies, improvements in family functioning and positive relationships outside of the home coincided with or preceded improvements in behavior. To be sure, the studies in question did not control for as many early child and family variables as this study. Thus, the null effects of life transition variables found here may reflect a lack of residual variance. This explanation is not entirely satisfactory, however: Early child and family variables accounted for less than a third of the variance among trajectory groups, leaving a substantial portion unexplained.

A more intriguing interpretation is that trajectories of childhood PA are determined, in most cases, by factors in toddlerhood, and, conversely, are unaffected by experiences in preschool and elementary school. In other words, all of the raw materials upon which the control of childhood aggression is based are evident early in development. Of course, this explanation would pertain only to childhood PA. It does not discount the importance of later experiences for other forms of aggression (including those that appear in middle childhood or adolescence) or for

nonaggressive antisocial behavior. However, chronic childhood PA is one of the best predictors of violent and nonviolent criminal behavior later in life (Robins, 1966), thus, early child and family factors may play a critical, albeit indirect, role in these outcomes as well.

Although the life course findings were unanticipated, they are consistent with the views of certain temperament and attachment theorists who emphasize the primacy of early development in establishing behavioral trajectories (e.g., Kagan, 1997; Sroufe, Carlson, Levy, & Egeland, 1999). Additional long-term longitudinal studies initiated in infancy will help determine whether this is the case with childhood PA.

In all, the findings suggest that desistance hinges on a developmental process involving early child, parent, and family factors. Impulsivity seems to increase PA initially; high fear and low (but nonnegligible) negative parenting, maternal depression, and family adversity seem to play a role in restoring it to age-appropriate levels. Some of these results run contrary to prior findings. However, as most previous research used aggression measures that included nonaggressive behaviors, or focused more broadly on externalizing problems, it is not clear whether the discrepant results reflect idiosyncracies of this sample or differences in outcome measures across studies. Thus, while this research hints at why desistance occurs for some aggressive children but not others, much more work remains before a conclusive answer is at hand.

What of the few boys who were not aggressive as toddlers but became aggressive in middle childhood? This study is one of very few to identify “late-onset” aggression trajectories. Moreover, all of the group comparisons were in reference to desisters. Thus, results associated with the two increasing groups should be interpreted cautiously. Nonetheless, an interesting pattern emerged. Despite low risk on most predictor variables, both groups experienced

vulnerability in one aspect of the early home environment and, subsequently, in one domain outside the home. For the temporary escalator group, the vulnerabilities in question were relatively severe early family adversity followed by lack of closeness in the student-teacher relationship. In contrast, boys in the escalator group experienced relatively severe maternal depression in toddlerhood and had aggressive best friends in middle childhood.

Taken together, these findings are consistent with a diathesis-stress model (Walker, Downey, & Bergman, 1989). Specifically, adverse experiences in an otherwise supportive early environment might create an underlying deficit in the regulation of aggression that is triggered by challenges that arise later in life. For temporary escalators, this challenge could be the transition to school. The eventual downturn in aggression that defines the latter portion of this group's trajectory may occur as the boys grow accustomed to the school setting. For escalators, contact with aggressive peers may be the "stress" that precipitates late-starting PA. This formulation fits with Moffitt's (1993) explanation of adolescent-onset antisocial behavior, which she believes arises when heretofore well-adjusted boys begin to mimic individuals on the life-course persistent pathway. The present results suggest that pre-existing vulnerabilities may determine which boys are drawn to and influenced by antisocial peers. These issues merit attention in future research.

Desistance in Relation to Other Aspects of Adjustment

Prior research suggests aggressive young children are at risk for a variety of poor behavioral outcomes (Coie & Dodge, 1998). On the basis of such findings, this study compared desisters to their peers on social skills and nonaggressive antisocial behavior. Overall, the results suggest that boys who desist from early PA also improve in these two domains.

Turning first to social skills, mothers reported that desisters grew increasingly skillful over

time. By age 11, mothers and teachers discerned no difference in the social skills of desisters versus lows. Thus, boys who desisted from early PA clearly attained age-appropriate levels of social skills. These findings are consistent with the idea that aggressive conflict can promote social competence in some circumstances (Dunn, 1988; Kochanska, 1997; Shantz, 1987; Vaughn, Vollenweider, Bost, Azria-Evans, & Snider, 2003). Kochanska (1997) suggests this occurs when parents respond to their children's aggression with clear messages about acceptable problem-solving strategies. In contrast, Dunn (1988) and Shantz (1987) suggest that children learn such lessons themselves by experimenting with different approaches to conflict. Adults may help with this process by encouraging discussion of social rules, but conflict itself is the primary medium through which young children acquire social problem-solving skills. This study cannot determine whether desisters learn social skills from their parents, on their own, or both. It does suggest, however, that these children are well prepared to handle the social challenges of adolescence.

The findings were less consistent for nonaggressive ASB. According to the boys' mothers, desisters decreased in nonaggressive ASB over time but remained more antisocial than lows (but less antisocial than chronics) at age 11. According to teachers, desisters did not change in their use of nonaggressive ASB, nor did they differ from any of the other groups by age 11. According to the boys themselves, desisters were no more likely than lows and significantly less likely than chronics to engage in nonaggressive ASB at ages 10 and 11.

The discrepancy between the maternal report data and the teacher- and self-report data may have arisen from differences among the measures. The maternal- and teacher-report measures focused on angry, noncompliant behavior at home and at school, respectively, while the self-report measure focused on covert delinquency, including theft, truancy, and vandalism. Thus, we

may conclude that by early adolescence, desisters remained somewhat more argumentative and oppositional at home than boys who were never aggressive (owing, perhaps to minor difficulties in the parent-child relationship held over from early childhood in the desister group). However, these problems did not transfer to the school setting, nor did they translate into more serious antisocial acts.

In short, aggressive behavior problems appear not to precede significant dysfunction if they remit by middle childhood. Rather, the findings provide further evidence that desistance from childhood PA reflects the internalization of prosocial standards of behavior (Kochanska, 1997).

Limitations

Several methodological limitations warrant caution in the interpretation of these results. First, the study was intended to illuminate desistance from PA in disadvantaged males. Further work with boys *and* girls from diverse backgrounds is needed to replicate or qualify these findings. Second, SPMM is a new method. Although it holds several important advantages over traditional trajectory analysis procedures, the field has had inadequate opportunity for a thorough evaluation. As SPMM grows more established, so too should the results associated with its use. Third, the study relied on mothers' reports of PA in estimating trajectories; therefore, the trajectories reflect both maternal perceptions and objective behavior. The fact that these trajectories predicted teacher-reported PA trajectories supports their external validity. It is possible, however, that the reports of other caregivers, had they been available, would have produced different developmental patterns from those found here.

Fourth, measurement of social skills and nonaggressive ASB began several years after measurement of PA. As a result, this study cannot elucidate early associations among these variables. In the future, researchers may wish to consider how basic social skills of toddlerhood,

such as sharing and empathic displays, influence the course of PA. A final limitation concerns the composite indices of temperament, parenting, and adversity. In creating these indices, I sought to maximize generality by combining measures derived from different methods, raters, and/or occasions. I note, however, that correlations among the measures, although statistically significant, were modest in most cases. This may have been a result of the pluralistic approach to creating the composite indices (i.e., minimal shared error and method variance). From a psychometric perspective, stronger associations would have been preferable.

Future Directions

This study of desistance from childhood PA raised at least as many questions as it set out to address. Given the lack of research on the topic, this outcome is not surprising. In the preceding sections, I cited several specific findings that might be clarified with additional study. Here, I highlight some general issues for future research.

First, a thorough understanding of aggression trajectories ultimately will require a close look at aggressive acts. This study used measures of PA that are ahistorical. That is, they yield general impressions of aggressiveness across extended periods rather than details about particular instances of PA. A general approach may be necessary to chart developmental trajectories; however, it neglects information about the immediate causes and consequences of aggression. Researchers may gain important insights into the course of PA by considering how these details differ for desisters and persisters. Consider, for example, the findings that (a) desisters and persisters were equally aggressive at age 2, and (b) desisters were relatively fearful. Together, these results suggests that boys in the two groups may have become aggressive for different reasons. Thus, desisters might use aggression defensively to ward off perceived threats, while the relatively fearless persisters might become aggressive to get what they want. This

distinction fits with recent work on reactive (i.e., defensive or retaliatory) versus proactive (i.e., bullying or instrumental) aggression in older children and adolescents (Crick & Dodge, 1996; Dodge & Coie, 1987). Importantly, proactive aggression in middle childhood is a better predictor of violence later in life than reactive aggression (Vitaro, Gendreau, Tremblay, Oligny, 1998). It is not clear whether these different forms of aggression could be distinguished reliably in toddlerhood. Careful examination of the events leading up to and following the aggressive acts of young children should help to resolve this issue. More broadly, studies that apply molecular *and* global measures of PA over time may be most useful for understanding divergent trajectories.

A second issue for future research concerns the mediating processes that underlie desistance. In the preceding pages, I suggested that internalization of prosocial standards may be the critical change that reduces PA among some aggressive young children. The fact that desistance from aggression was accompanied by increased social skills and decreases in nonaggressive ASB indirectly supports this claim. Direct tests of this hypothesis, however, will require research designs that pose internalization variables as mediators between predictor variables (e.g., parenting, temperament) and changes in PA. Kochanska and colleagues have developed a variety of internalization measures for use with young children (Kochanska, 2002; Kochanska & Thompson, 1997).

Third, future studies could use prevention designs to test the causal status of inter-variable relations examined here (Cicchetti & Hinshaw, 2002; Kellam & Rebok, 1992). Randomization of individuals to experimental versus control conditions ensures that group differences in the course of behavior problems are due to the intervention itself, and not to extraneous confounding factors (Cicchetti & Hinshaw, 2002; Cook & Campbell, 1979). Assuming prevention trials are initiated

early in development, they also can help to clarify directions of effect (i.e., by ruling out the alternate hypothesis that the presence of or changes in psychopathology influences risk factors, rather than the converse) (Howe, Reiss, & Yuh, 2002). Importantly, such studies must track the variables targeted for intervention (e.g., parenting, maternal depression, family adversity) to ensure that any changes in behavior are linked to changes in the risk factors of interest.

Implications for Clinical Practice: Who, What, When, and How Much

The current findings have several implications for assessments and interventions with aggressive young children and their families. First, not all aggressive young boys are in need of intervention. As this and other studies (Bennett et al. 1999; McMahon, 1994) suggest, many children who appear to be on an early-starter pathway are not at long-term risk. Careful evaluation of child and family variables will help distinguish between children who are likely to exhibit chronic aggression and those whose behavior is likely to improve without intervention.

Relatedly, the study lends support to multi-pronged assessment and intervention strategies. Child temperament, maternal parenting, maternal depression, and family adversity all accounted for unique variance in predicting desistance versus persistence. Multi-systemic interventions that address all these factors might yield the biggest dividends. This point raises a question seldom considered in the treatment literature: How do clinicians effectively target temperament, an ingrained characteristic of the child? This and other research (Coie & Dodge, 1998; Rutter, 2003) suggest that temperament influences adjustment via transactions with the environment. To change behavior, then, clinicians must focus on the interactive processes in which temperament is involved (rather than temperament itself). With Kochanska's work, this study suggests that fearful/fearless temperament influences PA trajectories through its role in internalization of parental standards. Thus, clinicians would not attempt to make the fearless child fearful, but

rather introduce dyadic changes that help him or her internalize prosocial standards. Kochanska (1997) found secure attachment is particularly important for conscience development in fearless children. Interventions that improve the quality of the parent-child bond (e.g., Lieberman, Weston, & Pawl, 1991) may serve to reduce PA in such cases.

Third, the findings underscore the importance of early intervention. All of the variables that distinguished desisters and persisters were from toddlerhood. If early-appearing child and family factors are primary influences on childhood PA, the content and timing of interventions should reflect this fact. Indeed, past research has shown that interventions implemented before school-age have a higher success rate than those initiated later in childhood (Dishion & Patterson, 1992). Fourth, the study provides clues regarding the extent of therapeutic change needed to deflect high PA trajectories. Desisters experienced intermediate risk in the domains of parenting, maternal depression, and family adversity. This finding suggests that interventions need not make families with aggressive children equivalent to families with nonaggressive children to be effective. Reduction of risk across domains, rather than the elimination of risk, may be the objective interventions should strive to achieve.

Conclusions

In all, the results make three general contributions. First, they refute the notion that all or most aggressive young boys are on a “life-course persistent” pathway. Using a group-based procedure that accommodates different, developmentally-appropriate measures of PA, the study found that most aggressive male toddlers desist by the end of middle childhood. Second, the results help define the conditions under which early aggression subsides. In toddlerhood, desisters were distinguished by high impulsivity, high fearfulness, and intermediate risk in the domains of parenting, maternal depression, and family adversity. Variables from middle

childhood were unrelated to desistance after controlling for toddlerhood variables. Third, they paint an optimistic picture of the long-term outcomes of desisters. By age 11, this group was nearly indistinguishable from boys who were never aggressive. Beyond these contributions, this study highlights the need for rigorous, in-depth longitudinal research to understand trajectories of aggression and related behaviors.

BIBLIOGRAPHY

Achenbach, T. M. (1991). *Manual for the Child Behavior Checklist/4-18 and 1991 Profile*.

Burlington, VT: University of Vermont Department of Psychiatry.

Achenbach, T. M. (1991). *Manual for Teacher's Report Form and 1991 Profile*. Burlington:

University of Vermont, Department of Psychiatry.

Achenbach, T. M. (1992). *Manual for the Child Behavior Checklist/2-3 and 1992 Profile*.

Burlington, VT: University of Vermont Department of Psychiatry.

Aguilar, B., Sroufe, L. A., Egeland, B., & Carlson, E. (2000). Distinguishing the early-onset/persistent and adolescence-onset antisocial behavior types: From birth to 16 years.

Development and Psychopathology, 12, 109-132.

Ainsworth, M. D., Blehar, M., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the Strange Situation*. Hillsdale, NJ: Erlbaum.

Asher, S. R., & Coie, J. D. (Eds.). (1990). *Peer rejection in childhood*. New York: Cambridge University Press.

August, G. J., Realmuto, G. M., Hektner, J. M., & Bloomquist, M. L. (2001). An integrated components preventive intervention for aggressive elementary school children: The Early Risers program. *Journal of Consulting and Clinical Psychology*, 69, 614-626.

Bandura, A. (1973). *Aggression: a social learning analysis*. Englewood Cliffs, NJ: Prentice-Hall.

Bates, J. E., Freeland, C. A., & Lounsbury, M. L., (1979). Measurement of infant difficultness.

Child Development, 50, 794-803.

- Bates, J. E., Maslin, C., & Frankel, K. (1985). Attachment security, mother-child interaction, and temperament as predictors of behavior-problem ratings at age 3 years. In I. Bretherington & E. Waters (Eds.), *Growing points in attachment theory and research. Monographs of the Society for Research in Child Development*, 50(1-2, pp. 167-193).
- Baumrind, D. (1993). The average expectable environment is not good enough: A response to Scarr. *Child Development*, 64, 1299-1317.
- Beck, A. T., Ward, C. H., Mendelson, M., Mock, J. E., & Erbaugh, J. K. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, 4, 561-571.
- Bennett, K. J., Lipman, E. L., Brown, S., Racine, Y., Boyle, M. H., & Offord, D. R. (1999). Predicting conduct problems: Can high-risk children be identified in kindergarten and Grade 1? *Journal of Consulting and Clinical Psychology*, 67, 470-480.
- Berkowitz, L. (1962). *Aggression: A social psychological analysis*. New York: McGraw Hill.
- Billman, J., & McDevitt, S. C. (1980). Convergence of parent and observer ratings of temperament with observations of peer interaction in nursery school. *Child Development*, 51, 395-400.
- Black, M. C. (2001, August). *Person offenses in juvenile court, 1989-1998*. Fact Sheet. Washington DC: Department of Justice Programs, Office of Juvenile Justice and Delinquency Prevention.
- Block, J. (1965). *The Child-Rearing Practices Report: A set of Q items for the description of parental socialization attitudes and values*. Berkeley, CA: Institute of Human Development, University of California.
- Block, J.H., Block, J., & Gjerde, P.F. (1986). The personality of children prior to divorce: A prospective study. *Child Development*, 57, 827-840.

- Brame, B., Nagin, D. S., & Tremblay, R. E. (2001). Developmental trajectories of physical aggression from school entry to late adolescence. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *42*, 503-512.
- Broidy, L. M., Nagin, D. S., Tremblay, R. E., Brame, B., Dodge, K. A., Fergusson, D. M., Horwood, J. L., Loeber, R., Laird, R. D., Lynam, D., Moffitt, T., Bates, J. E., Pettit, G. S., & Vitaro, F. (2003). Developmental trajectories of childhood disruptive behaviors and adolescent delinquency: A six site, cross-national study. *Developmental Psychology*, *39*, 222-245.
- Brownlee, J. R., & Bakeman, R. (1981). Hitting in toddler-peer interaction. *Child Development*, *52*, 1076-1079.
- Burchinal, M., & Appelbaum, M. I. (1991). Estimating individual developmental functions: Methods and their assumptions. *Child Development*, *62*, 23-43.
- Bushway, S., Piquero, A., Briody, L., Cauffman, E., & Mazerolle, P. (2001). An empirical framework for studying desistance as a process. *Criminology*, *39*, 491-515.
- Cairns, R. B., & Cairns, B. D. (1994). *Lifelines and risks: pathways of youth in our time*. New York: Cambridge University Press.
- Cairns, R. B., & Cairns, B. D. (2000). The natural history and developmental functions of aggression. In A. J. Sameroff & M. Lewis (Eds.), *Handbook of developmental psychopathology* (pp. 403-429). New York: Kluwer Academic/Plenum Publishers.
- Cairns, R. B., Cairns, B. D., Neckerman, H. J., Ferguson, L. L., & et al. (1989). Growth and aggression: I. Childhood to early adolescence. *Developmental Psychology*, *25*, 320-330.
- Caldwell, B. M., & Bradley, R. H. (1984). *Home observation for measurement of the environment*. Little Rock: University of Arkansas at Little Rock.

- Calkins, S. (1994). Origins and outcomes of individual differences in emotion regulation. In N. A. Fox (Ed.), *The development of emotion regulation: Biological and behavioral considerations. Monographs of the Society for Research in Child Development, 59*,(2-3, Serial No. 240, pp. 53-72). Chicago: University of Chicago Press.
- Campbell, S. B. (1987). Parent-referred problem three-year-olds: Developmental changes in symptoms. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 28*, 835-845.
- Campbell, S. B., Breaux, A. M., Ewing, L. J., & Szumowski, E. K. (1986). Correlates and predictors of hyperactivity and aggression: A longitudinal study of parent-referred problem preschoolers. *Journal of Abnormal Child Psychology, 14*, 217-234.
- Campbell, S. B., March, C. L., Pierce, E. W., Ewing, L. J., & Szumowski, E. K. (1991). Hard-to-manage preschool boys: family context and the stability of externalizing behavior. *Journal of Abnormal Child Psychology, 19*, 301-310.
- Campbell, S. B., Pierce, E. W., Moore, G., & Marakovitz, S. (1996). Boys' externalizing problems at elementary school age: Pathways from early behavior problems, maternal control, and family stress. *Development and Psychopathology, 8*, 701-719.
- Campbell, S. B., Shaw, D. S., & Gilliom, M. (2000). Early externalizing behavior problems: Toddlers and preschoolers at risk for later maladjustment. *Development and Psychopathology, 12*, 467-488.
- Caplan, M., Vespo, J., Pedersen, J., & Hay, D. F. (1991). Conflict and its resolution in small groups of one- and two-year-olds. *Child Development, 62*, 1513-1524.
- Caspi, A., & Moffitt, T. E. (1995). The continuity of maladaptive behavior: From description to understanding in the study of antisocial behavior. In D. Cicchetti & D. J. Cohen (Eds.),

- Developmental psychopathology. Vol. 2: Risk, disorder, and adaptation.* (pp. 472-511).
New York: Wiley.
- Cicchetti, D., & Hinshaw, S. P. (2002). Prevention and intervention science: Contributions to developmental theory. *Development and Psychopathology, 14*, 667-671.
- Cicchetti, D., & Richters, J. (1993). Developmental considerations in the investigation of conduct disorder. *Development and Psychopathology, 5*, 331-344.
- Cohen, J., & Canela-Cacho, J. A. (1994). Incarceration and violent crime: 1965-1988. In A. J. Reiss & J. A. Roth (Eds.), *Understanding and preventing violence. Vol. 4: Consequences and control.* Washington, D.C.: National Academy Press.
- Coie, J. D., & Cillessen, A. H. (1993). Peer rejection: Origins and effects on children's development. *Current Directions in Psychological Science, 2*, 89-92.
- Coie, J.D., & Dodge, K.A. (1998). In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology. Vol. 3: Social, emotional, and personality development* (5th ed., pp.779-862). New York: Wiley.
- Conduct Problems Prevention Research Group (2002). Using the Fast Track randomized prevention trial to test the early-starter model of the development of serious conduct problems. *Development and Psychopathology, 14*, 925-944.
- Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentation : Design and analysis issues for field settings.* Boston: Houghton Mifflin.
- Crick, N. R. (1996). The role of overt aggression, relational aggression, and prosocial behavior in the prediction of children's future social adjustment. *Child Development, 67*, 2317-2327.
- Crick, N. R., & Dodge, K. A. (1996). Social information processing in reactive and proactive aggression. *Child Development, 67*, 993-1002.

- Cummings, E. M., Iannotti, R. J., & Zahn-Waxler, C. (1989). Aggression between peers in early childhood: Individual continuity and developmental change. *Child Development, 60*, 887-895.
- Deater-Deckard, K., & Dodge, K. A. (1997). Externalizing behavior problems and discipline revisited: Nonlinear effects and variation by culture, context, and gender. *Psychological Inquiry, 8*, 161-175.
- Dishion, T. J., & Patterson, G. R. (1992). Age effects in parent training outcome. *Behavior Therapy, 23*, 719-729.
- Dodge, K. A., Pettit, G. S., Bates, J. E., & Valente, E. (1995). Social information-processing patterns partially mediate the effect of early physical abuse on later conduct problems. *Journal of Abnormal Psychology, 104*, 632-643.
- Dodge, K. A., & Coie, J. (1987). Social information processing factors in reactive and proactive aggression in children's peer groups. *Journal of Personality and Social Psychology, 53*, 1146-1158.
- Dunn, J. (1988). *The beginnings of social understanding*. Cambridge: Harvard University Press.
- Dunn, J., & Munn, P. (1986). Sibling quarrels and maternal intervention: Individual differences in understanding and aggression. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 27*, 583-595.
- Egeland, B., Kalkoske, M., Gottesman, N., & Erickson, M. F. (1990). Preschool behavior problems: Stability and factors accounting for change. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 31*, 891-909.

- Elder, G. H., Jr. (1995). The life course paradigm: Social change and individual development. In P. Moen & G. H. Elder (Eds.), *Examining lives in context: Perspectives on the ecology of human development* (pp. 101-139). Washington, DC: American Psychological Association.
- Elder, G. H. (1998). The life course and human development. In W. Damon (Series Ed.) & R. M. Lerner (Vol. Ed.), *Handbook of child psychology. Vol. 1: Theoretical models of human development* (5th ed., pp. 939-992). New York: Wiley.
- Elliott, D. S., Huizinga, D., & Ageton, S. (1985). *Explaining delinquency and drug use*. Beverly Hills: Sage.
- Elliott, D. S., Huizinga, D., & Morse, B. (1987). Self-reported violent offending: A descriptive analysis of juvenile violent offenders and their offending careers. *Journal of Interpersonal Violence, 1*, 472-514.
- Fagot, B. I. (1984). The consequences of problem behavior in toddler children. *Journal of Abnormal Child Psychology, 1*, 248-256.
- Fergusson, D. M., Lynskey, M. T., & Horwood, J. L. (1996). Factors associated with continuity and changes in disruptive behavior patterns between childhood and adolescence. *Journal of Abnormal Child Psychology, 24*, 533-553.
- Feschbach, S. (1964). The function of aggression and the regulation of aggressive drive. *Psychological Review, 71*, 257-272.
- Feschbach, S. (1970). Aggression. In P. H. Mussen (Ed.), *Carmichael's manual of child psychology* (3rd ed., Vol. 2). New York: Wiley.
- Gilliom, M., Shaw, D.S., Beck, J.E., Schonberg, M.A., & Lukon, J.L. (2002). Anger regulation in disadvantaged preschool boys: Strategies, antecedents, and the development of self-control. *Developmental Psychology, 38*, 222-235.

- Gottfredson, M. R., & Hirschi, T. (1990). *A general theory of crime*. Palo Alto, CA: Stanford University Press.
- Gresham, F. M., & Elliot, S. N. (1990). *Social Skills Rating System Manual*. Circle Pines, MN: American Guidance Service.
- Haapasalo, J., & Tremblay, R. E. (1994). Physically aggressive boys from ages 6 to 12: Family background, parenting behavior, and prediction of delinquency. *Journal of Consulting and Clinical Psychology, 62*, 1044-1052.
- Hamre, B. K., & Pianta, R. C. (2001). Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development, 72*, 625-638.
- Hartup, W. W. (1974). Aggression in childhood: Developmental perspectives. *American Psychologist, 29*, 337-341.
- Hartup, W. W. (1983). Peer relations. In P. H. Mussen (Series Ed.) & E. M. Hetherington (Vol. Ed.), *Handbook of Child Psychology. Vol. 4: Socialization, personality, and social development* (4th ed., pp. 103-196). New York: Wiley.
- Hay, D. F. (1984). Social conflict in early childhood. In G. Whitehurst (Ed.), *Annals of Child Development* (Vol. 1, pp. 1-44). London: JAI.
- Hay, D., Nash, A., & Pedersen, J. (1983). Interaction between six-month-old peers. *Child Development, 54*, 557-562.
- Hay, D. F., & Ross, H. S. (1982). Social nature of early conflict. *Child Development, 54*, 557-562.
- Higgins, E. T., & Parsons, J. E. (1993). Social cognition and the social life of the child: Stages as subcultures. In E. T. Higgins, D. N. Ruble, & W. W. Hartup (Eds.), *Social cognition and social development* (pp. 15-62). Cambridge: Cambridge University Press.

- Howe, G. W., Reiss, D., & Yuh, J. (2002). Can prevention trials test theories of etiology? *Development and Psychopathology, 14*, 673-694.
- Hughes, J. N., Cavell, T. A., & Jackson, T. (1999). Influence of the teacher-student relationship on childhood conduct problems: A prospective study. *Journal of Clinical Child Psychology, 28*, 173-184.
- Ingoldsby, E. M. (2002). Neighborhood contextual factors and early-starting antisocial behavior. Unpublished doctoral dissertation, University of Pittsburgh.
- Kagan, J. (1969). The three faces of continuity in human development. In D. A. Goslin (Ed.), *Handbook of socialization theory and research* (pp. 983-1002). Chicago: Rand McNally.
- Kagan, J. (1981). *The second year: The emergence of self-awareness*. Cambridge, MA: Harvard University Press.
- Kagan, J. (1997). Temperament and the reactions to unfamiliarity. *Child Development, 68*, 139-143.
- Kass, R. E., & Raftery, A. E. (1995). Bayes factor. *Journal of the American Statistical Association, 90*, 773-795.
- Keenan, K., & Shaw, D. S. (1994). The development of aggression in toddlers: A study of low-income families. *Journal of Abnormal Child Psychology, 22*, 53-77.
- Kellam, S. G., & Rebok, G. W. (1992). Building developmental and etiological theory through epidemiologically based preventive intervention trials. In J. McCord & R. E. Tremblay (Eds.), *Preventing antisocial behavior: Interventions from birth through adolescence* (pp. 162-195). NY: Guilford.

- Kingston, L., & Prior, M. (1995). The development of patterns of stable, transient, and school-age onset aggressive behavior in young children. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*, 348-358.
- Kochanska, G. (1993). Toward a synthesis of parental socialization and child temperament in early development of conscience. *Child Development, 64*, 325-347.
- Kochanska, G. (1997). Mutually responsive orientation between mothers and their young children: Implications for early socialization. *Child Development, 68*, 94-112.
- Kochanska, G. (2002). Committed compliance, moral self, and internalization: A mediational model. *Developmental Psychology, 38*, 339-351.
- Kochanska, G., Coy, K. C., & Murray, K. T. (2001). The development of self-regulation in the first four years of life. *Child Development, 72*, 1091-1111.
- Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology, 36*, 220-232.
- Kochanska, G., & Thompson, R. A. (1997). The emergence and development of conscience in toddlerhood and early childhood. In J. E. Grusec & L. Kuczynski (Eds.), *Parenting and children's internalization of values. A handbook of contemporary theory* (pp. 53-77). NY: Wiley
- Kopp, C. B. (1989). Regulation of distress and negative emotions: A developmental view. *Developmental Psychology, 25*, 343-354.
- Kopp, C. B. (1991). Young children's progression to self-regulation. In M. Bullock (Ed.), *The development of intentional action: Cognitive, motivational, and interactive processes* (pp. 38-54). Basel, Switzerland: Karger.

- Laub, J. H., & Sampson, R. J. (2001). Understanding desistance from crime. In M. H. Tonry (Ed.), *Crime and justice: A review of the research* (Vol. 28, pp. 1-69). Chicago: University of Chicago Press.
- Lavigne, J. V., Gibbons, R. D., Christoffel, K. K., & Arend, R. (1996). Prevalence rates and correlates of psychiatric disorders among preschool children. *Journal of the American Academy of Child and Adolescent Psychiatry, 35*, 204-214.
- Larzelere, R. E., Martin, J. A., & Amberson, T. G. (1989). The toddler behavior checklist: A parent-completed assessment of social-emotional characteristics of young preschoolers. *Family Relations, 38*, 418-425.
- Lipsey, M. W., & Derzon, J. H. (1998). Predictors of violent or serious delinquency in adolescence and early adulthood. In R. Loeber & D. P. Farrington (Eds.), *Serious and violent juvenile offenders: Risk factors and successful interventions* (pp. 86-105). Thousand Oaks: Sage Publications.
- Loeber, R. (1982). The stability of antisocial and delinquent child behavior: A review. *Child Development, 53*, 1431-1446.
- Loeber, R. (1988). Natural histories of conduct problems, delinquency, and associated substance abuse: Evidence for developmental progressions. In B. B. Lahey & A. E. Kazdin (Eds.), *Advances in clinical child psychology* (Vol. 11, pp. 72-124). New York: Plenum.
- Loeber, R., Farrington, D. P., Stouthamer-Loeber, M., Moffitt, T. E., & Caspi, A. (1998). The development of male offending: Key findings from the first decade of the Pittsburgh Youth Study. *Studies on Crime and Crime Prevention, 7*, 141-171.

- Loeber, R., Green, S. M., Keenan, K., & Lahey, B. B. (1995). Which boys will fare worse? Early predictors of the onset of conduct disorder in a six-year longitudinal study. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*, 499-509.
- Loeber, R., Green, S. M., Lahey, B. B., & Kalb, L. (2000). Physical fighting in childhood as a risk factor for later mental health problems. *Journal of the American Academy of Child and Adolescent Psychiatry, 39*, 421-428.
- Loeber, R., & Hay, D. (1997). Key issues in the development of aggression and violence from childhood to early adulthood. *Annual Review of Psychology, 48*, 371-410.
- Loeber, R., & Le Blanc, M. (1990). Toward a developmental criminology. In M. Tonry & N. Morris (Eds.), *Crime and justice: A review of research* (Vol. 12). Chicago: University of Chicago Press.
- Loeber, R., & Stouthamer-Loeber, M. (1998). Development of juvenile aggression and violence: Some common misperceptions and controversies. *American Psychologist, 53*, 242-259.
- Loeber, R., Tremblay, R. E., Gagnon, C., & Charlebois, P. (1989). Continuity and desistance in disruptive boys' early fighting at school. *Development and Psychopathology, 1*, 39-50.
- Long, J. S. (1997). *Regression models for categorical and limited dependent variables*. Thousand Oaks: Sage.
- Luby, J., & Morgan, K. (1997). Characteristics of an infant/preschool psychiatric clinic sample: Implications for clinical assessment and nosology. *Infant Mental Health Journal, 18*, 209-220.
- Maccoby, E. (1980). *Social development: Psychological growth and the parent-child relationship*. New York: Harcourt Brace.

- Martin, J. A. (1981). A longitudinal study of the consequences of early mother-infant interaction: A microanalytic approach. *Monographs of the Society for Research in Child Development*, 46.
- Maruna, S. (1997). Going straight: Desistance from crime and life narratives of reform. In R. J. Amia Lieblich (Ed.), *The narrative study of lives* (pp. 59-93). Thousand Oaks: Sage Publications.
- Matas, L., Arend, R. A., & Sroufe, L. A., (1978). Continuity of adaptation in the second year: The relationship between quality of attachment and later competence. *Child Development*, 49, 547-556.
- Maudry, M., & Nekula, M. (1939). Social relations between children of the same age during the first two years of life. *Journal of Genetic Psychology*, 54, 193-215.
- Maughan, B., Pickles, A., Rowe, R., Costello, E. J., & Angold, A. (2000). Developmental trajectories of aggressive and non-aggressive conduct problems. *Journal of Quantitative Criminology*, 16, 199-221.
- McFadyen-Ketchum, S. A., Bates, J. E., Dodge, K. A., & Pettit, G. S. (1996). Patterns of change in early childhood aggressive-disruptive behavior: Gender differences in predictions from early coercive and affectionate mother-child interactions. *Child Development*, 67, 2417-2433.
- McLachlan, G. J., & Krishnan, T. (1997). *The EM algorithm and extensions*. New York: Wiley.
- McLeod, J. D., & Shanahan, M. J. (1996). Trajectories of poverty and children's mental health. *Journal of Health and Social Behavior*, 37, 207-220.

- McMahon, R. J. (1994). Diagnosis, assessment, and treatment of externalizing problems in children: The role of longitudinal data. *Journal of Consulting and Clinical Psychology, 62*, 901-917.
- McCord, J. (1983). A longitudinal study of aggression and antisocial behavior. In K. T. V. Dusen & S. A. Mednick (Eds.), *Prospective studies of crime and delinquency* (pp. 269-275). Boston: Kluwer.
- Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100*, 674-701.
- Munson, J. A., McMahon, R. J., & Spieker, S. J. (2001). Structure and variability in the developmental trajectory of children's externalizing problems: Impact of infant attachment, maternal depressive symptomatology, and child sex. *Development and Psychopathology, 13*, 277-296.
- Muthén, L. K., & Muthén, B. O. (2001). *Mplus user's guide* (2nd ed.). Los Angeles, CA: Muthén & Muthén.
- Nagin, D. S. (1999). Analyzing developmental trajectories: A semiparametric, group-based approach. *Psychological Methods, 4*, 139-157.
- Nagin, D. S., & Tremblay, R. E. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and nonviolent juvenile delinquency. *Child Development, 70*, 1181-1196.
- Nagin, D. S., & Tremblay, R. E. (2001a). Parental and early childhood predictors of persistent physical aggression in boys from kindergarten to high school. *Archives of General Psychiatry, 58*, 389-394.

- Nagin, D. S., & Tremblay, R. E. (2001b). Analyzing developmental trajectories of distinct but related behaviors: A group-based method. *Psychological Methods, 6*, 18-34.
- Nagin, D. S., & Tremblay, R. E. (2002). Most fall but not all: Changes in physical aggression from childhood through adolescence. Manuscript submitted for publication.
- Nesselroade, J. R., & Baltes, P. B. (1979). *Longitudinal research in the study of behavior and development*. New York: Academic Press.
- Offord, D. R., Lipman, E. L., & Duku, E. K. (in press). Epidemiology of problem behavior up to age 12. In R. Loeber & D. P. Farrington (Eds.), *Child delinquents: Development, intervention, and service needs*. Thousand Oaks, CA: Sage.
- Olweus, D. (1979). Stability of aggressive reaction patterns in males: A review. *Psychological Bulletin, 86*, 852-875.
- Owens, E. B. (1998). Resilience to chronic psychosocial stressors: A longitudinal study of preschool-aged boys at risk for developing externalizing problems. Unpublished doctoral dissertation, University of Pittsburgh.
- Parke, R. D., & Slaby, R. G. (1983). The development of aggression. In E. M. Hetherington & P. H. Mussen (Eds.), *Handbook of child psychology. Vol. 4: Socialization, personality, and social development* (pp. 547-642). New York: Wiley.
- Patterson, G. R. (1993). Orderly change in a stable world: The antisocial trait as a chimera. *Journal of Consulting and Clinical Psychology, 61*, 911-919.
- Patterson, G. R., DeBaryshe, B. D., & Ramsey, E. (1989). A developmental perspective on antisocial behavior. *American Psychologist, 44*, 329-335.

- Patterson, G. R., Littman, R. A., Bricker, W., & Walker, R. N. (1967). Assertive behavior in children: A step toward a theory of aggression. *Monographs for the Society for Research in Child Development*, 32, Serial No. 113.
- Pianta, R. (1992). *The Student Teacher Relationship Scale*. University of Virginia, Charlottesville.
- Raftery, A. E. (1995). Bayesian model selection in social research. *Sociological Methodology*, 25, 111-164.
- Raine, A., Reynolds, C., Venables, P. H., Mednick, S. A., & Farrington, D. P. (1998). Fearlessness, stimulation-seeking, and large body size at age 3 years as early predispositions to childhood aggression at age 11 years. *Archives of General Psychiatry*, 55, 745-751.
- Raine, A., Venables, P. H., & Williams, M. (1990). Relationships between central and autonomic measures of arousal at age 15 years and criminality at age 24 years. *Archives of General Psychiatry*, 47, 1003-1007.
- Raine, A., Venables, P. H., & Williams, M. (1995). High autonomic arousal and electrodermal orienting at age 15 years as protective factors against criminal behavior at age 29 years. *American Journal of Psychiatry*, 152, 1595-1600.
- Raudenbush, S. W. (2001). Comparing personal trajectories and drawing causal inferences from longitudinal data. *Annual Review of Psychology*, 52, 501-525.
- Reid, J. B., Eddy, J. M., Fetrow, R. A., & Stoolmiller, M. (1999). Description and immediate impacts of a preventive intervention for conduct problems. *American Journal of Community Psychology. Special Issue: Prevention science*, 27, 483-517.

- Richman, N., Stevenson, J. E., & Graham, P. J. (1982). *Pre-school to school: A behavioural study*. London: Academic Press.
- Robins, L. N. (1966). *Deviant children grown up: A sociological and psychiatric study of sociopathic personality*. Baltimore: Williams & Williams.
- Rothbart, M. K., Ahadi, S. A., & Hershey, K. L. (1994). Temperament and social behavior in childhood. *Merrill-Palmer Quarterly*, 40, 21-39.
- Ross, H. S., Filyer, R. E., Lollis, S. P., & Perlman, M. (1994). Administering justice in the family. *Journal of Family Psychology*, 8, 254-273.
- Rubin, K. H., Bukowski, W., & Parker, J. G. (1998). Peer interactions, relationships, and groups. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.). *Handbook of child psychology. Vol. 3: Social, emotional, and personality development* (5th ed., pp. 619-701). New York: Wiley.
- Rutter, M. (1988). Longitudinal data in the study of causal processes: Some uses and some pitfalls. In M. Rutter (Ed.), *Studies of psychosocial risk: The power of longitudinal data* (pp. 1-28). Cambridge: Cambridge University Press.
- Rutter, M. (1994). Continuities, transitions and turning points in development. In M. Rutter & D. F. Hay (Eds.), *Development through life: A handbook for clinicians* (pp. 1-25). Oxford: Blackwell.
- Rutter, M. (2003). Commentary: Causal processes leading to antisocial behavior. *Developmental Psychology*, 39, 372-378.
- Rutter, M., Giller, H., & Hagell, A. (1998). *Antisocial behavior by young people*. New York: Cambridge University Press.

- Rutter, M., Yule, B., Quinton, D., Rowlands, O., Yule, W., & Berger, W. (1975). Attainment and adjustment in two geographical areas: 3. Some factors accounting for area differences. *British Journal of Psychiatry, 126*, 520-533.
- Sampson, R. J., & Laub, J. H. (1993). *Crime in the making: Pathways and turning points through life*. Cambridge, MA: Harvard University Press.
- Savin-Williams, R. C. (1979). Dominance hierarchies in groups of early adolescents. *Child Development, 50*, 142-151.
- Scarr, S. (1992). Developmental theories for the 1990s: Development and individual differences. *Child Development, 63*, 1-19.
- Shantz, C. U. (1987). Conflicts between children. *Child Development, 58*, 283-305.
- Shaw, D. S., & Bell, R. Q. (1993). Developmental theories of parental contributors to antisocial behavior. *Journal of Abnormal Child Psychology, 21*, 493-518.
- Shaw, D. S., Gilliom, M., & Giovannelli, J. (2000). Aggressive behavior disorders. In C. H. Zeanah (Ed.), *Handbook of infant mental health* (2nd ed., pp. 397-411). New York: Guilford.
- Shaw, D. S., Gilliom, M., Ingoldsby, E. M., & Nagin, D. S. (2003). Trajectories leading to school-age conduct problems. *Developmental Psychology. Special Issue: Violent children, 39*, 189-200.
- Shaw, D. S., Owens, E. B., Giovannelli, J., & Winslow, E. B. (2001). Infant and toddler pathways leading to early externalizing disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*, 36-43.

- Shaw, D. S., Winslow, E. B., Owens, E. B., Vondra, J. I., Cohn, J. F., & Bell, R. Q. (1998). The development of early externalizing problems among children from low-income families: A transformational perspective. *Journal of Abnormal Child Psychology, 26*, 95-107.
- Spieker, S. J., Larson, N., C., Lewis, S. M., Keller, T. E., & Gilchrist, L. (1999). Developmental trajectories of disruptive behavior problems in preschool children. *Child Development, 70*, 443-458.
- Sroufe, L. A., Carlson, E., A., Levy, A. K., & Egeland, B. (1999). Implications of attachment theory for developmental psychopathology. *Development and Psychopathology, 11*, 1-13.
- Sroufe, L. A., & Rutter, M. (1984). The domain of developmental psychopathology. *Child Development, 55*, 17-29.
- Stattin, H., & Trost, K. (2000). When do preschool conduct problems link to future social adjustment problems and when do they not? In L. R. Bergman, R. R. Cairns, L. G. Nilsson, & L. Nystedt (Eds.), *Developmental science and the holistic approach* (pp. 55-77). New York: Erlbaum.
- Straus, M.A. (1979). Measuring intrafamily conflict and violence: The conflict tactics scales. *Journal of Marriage and the Family, 75*-88.
- Stouthamer-Loeber, M., Loeber, R., Farrington, D. P., Zhang, Q., Van Kammen, W. B., & Maguin, E. (1993). The double edge of protective and risk factors for delinquency: Interrelations and developmental patterns. *Development and Psychopathology, 5*, 683-702.
- Tremblay, R. E. (2000). The development of aggressive behaviour during childhood: What have we learned in the past century? *International Journal of Behavioral Development, 24*, 129-141.
- Tremblay, R. E., LeMarquand, D., & Vitaro, F. (1999). The prevention of oppositional defiant

- disorder and conduct disorder. In H. C. Quay & A. E. Hogan (Eds.), *Handbook of disruptive behavior disorders* (pp. 525-555). Dordrecht, Netherlands: Kluwer.
- Tremblay, R. E., Masse, L. C., Vitaro, F., & Dobkin, P. L. (1995). The impact of friends' deviant behavior on early onset of delinquency: Longitudinal data from 6 to 13 years of age. *Development and Psychopathology*, *7*, 649-667.
- Vaillancourt, T., Brengden, M., Boivin, M., & Tremblay, R. E. (2003). A longitudinal confirmatory factor analysis of indirect and physical aggression: Evidence of two factors over time? *Child Development*, *74*, 1628-1638.
- Vaughn, B. E., Vollenweider, M., Bost, K. K., Azria-Evans, M. R., & Snider, J. B. (2003). Negative interactions and social competence for preschool children in two samples: Reconsidering the interpretation of aggressive behavior for young children. *Merrill-Palmer Quarterly*, *49*, 245-278.
- Vitaro, F., Gendreau, P. L., Tremblay, R. E., & Oligny, P. (1998). Reactive and proactive aggression differentially predict later conduct problems. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *39*, 377-385.
- Walker, E., Downey, G., & Bergman, A. (1989). The effects of parental psychopathology and maltreatment on child behavior: A test of the diathesis-stress model. *Child Development*, *60*, 15-24.
- Weitekamp, E. G. M., & Kerner, H. J. (1994). *Cross-national longitudinal research on human development and criminal behavior*. Dordrecht: Kluwer Academic Publishers
- Widom, C. S. (1989). Does violence beget violence? A critical examination of the literature. *Psychological Bulletin*, *106*, 3-28.

- Willett, J. B., & Sayer, A. G. (1994). Using covariance structure analysis to detect correlates and predictors of individual change over time. *Psychological Bulletin*, *116*, 363-381.
- Winslow, E. B., & Shaw, D. S. (1995). *Early parenting coding system*. Unpublished manuscript, University of Pittsburgh.
- Winslow, E. B., Shaw, D. S., Yaggi, K. & Dougherty, R. (1999, April). Roles of neighborhood context, ethnicity, and maternal parenting in the development of early male conduct problems. Poster presented at the biennial meeting of the Society for Research in Child Development, Albuquerque, NM.
- Zahn-Waxler, C., Iannotti, R. J., Cummings, E. M., & Denham, S. (1990). Antecedents of problem behaviors in children of depressed mothers. *Development and Psychopathology*, *2*, 271-291.