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**Maternal Risk Factors, Early Life Events, and Deviant Outcomes: Assessing  
Antisocial Pathways from Birth Through Adolescence**

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of the University of Cincinnati

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by

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**ABSTRACT**

The life-course perspective has been instrumental in exploring relationships between early life circumstances, childhood problem behaviors, and adolescent and adult offending. This dissertation focuses on three areas that are central to the life-course perspective, (a) the development of childhood antisocial behavior, (b) factors that foster the stability of antisocial behavior, and (c) debate over the existence of multiple routes to delinquency. Particular research questions focus on (a) whether biosocial interactions predict childhood antisocial behavior, (b) whether processes of cumulative continuity account for stability in antisocial behavior, and (c) whether discrete offender groups differ on risk markers for delinquency. This research uses a sample of 1030 individuals from the National Longitudinal Survey of Youth Mother-Child data set to examine the onset and persistence of antisocial behavior. Negative Binomial regression models reveal no support for the hypothesis that childhood antisocial behavior is the result of an interaction between neuropsychological deficits and structural adversity. Rather, the findings suggest that while both individual differences and structural adversity predict childhood antisocial behavior, these factors operate in an additive, rather than interactive fashion. The analyses focusing on the development of antisocial behavior from childhood to adolescence suggest that both stability and change are evident, and that early antisocial behavior is an insufficient cause of delinquency. Analysis of sub-groups constructed based on their level of antisocial behavior over time revealed some differences (including verbal intelligence and poverty status) between individuals with a history of childhood antisocial behavior (life-course persistent) and those who began offending in adolescent (adolescent limited), but these differences are overshadowed by similarities between the groups. The theoretical and policy implications of this research are discussed.

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## CHAPTER I

### INTRODUCTION

In the early 1980s, Frank Williams (1984) commented that criminological theory had become stale and stagnant. In contrast to this dire assessment of the state of criminology, the past two decades witnessed a revitalization of criminological theorizing. Two themes are central to this rebirth. First, contemporary theorists have reconceptualized several “classic” criminological statements, including strain theory (Agnew, 1992), control theory (Gottfredson and Hirschi, 1990; Sampson and Laub, 1993), ecological theory (Sampson and Groves, 1989), and labeling theory (Matsueda, 1992).

The second theme emerging in criminology is an interest in explaining offending behavior (or childhood antisocial behavior) over the life span of individuals. Developmental, or “life-course” criminology focuses attention on risk (and protective) factors for antisocial behavior across the life-course<sup>1</sup>. This framework has been instrumental in exploring relationships between early life circumstances, childhood problem behaviors, and adolescent and adult offending. The developmental perspective has also been open to integrating work from psychology and biology that were previously

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<sup>1</sup> In the criminology literature, there are subtle differences between “developmental” and “life-course” perspectives. Life-course theorists tend to place offending in the broad context of human development (Sampson and Laub, 1993). Developmental theorists tend to be more mechanical and focused on the specifics of offending (Loeber and Le Blanc, 1990). The choice of terminology within each perspective illustrates these differences. The developmental perspective emphasizes the onset, duration, frequency, escalation, and de-escalation of offending, while the life-course approach stresses the importance of trajectories and transitions through life. Despite differences in terminology, the two perspectives have a high degree of conceptual overlap. For example, both perspectives emphasize stability and change in offending over the life course, and both are open to non-sociological constructs. For this reason, “life-course” and “developmental” criminology are often used interchangeably in the literature. In this dissertation, they are used synonymously to represent a conceptual focus on stability and change in offending.

outside the realm of mainstream criminology. This dissertation examines the effects of early biological, sociological, and psychological risks on childhood antisocial behavior and delinquency using data from a national sample of American youths.

The next section of this chapter provides a brief overview of the life-course perspective. The overview includes discussions of the age-crime relationship and the stability of antisocial behavior. The second section of this chapter outlines the conceptual and empirical issues addressed by this dissertation. The final segment of the chapter discusses how this dissertation may help direct policymakers.

### **THE LIFE COURSE PERSPECTIVE**

The life-course, or developmental perspective refers to a broad framework that focuses attention on how changes in social behavior are related to age in an orderly way (Patterson, 1993). Thus, the "life-course" is conceived of as "a sequence of culturally defined age graded roles and social transitions that are enacted over time" (Caspi, Elder, and Herbener, 1990: 15). Two core concepts in the life-course analytical framework are trajectories and transitions (Sampson and Laub, 1993). Trajectories are lines of development, or pathways that represent long-term patterns of behavior. In the early life-course, examples of pathways include cognitive development and education, while in the later life-course; common trajectories include work life and marriage. Transitions, are typically, short or abrupt life events that are embedded within particular trajectories. For example, the education pathway is marked by several possible transitions, including the change from elementary to high school education, dropping out of school, or the move from secondary to college education.

Thus, at its core, developmental criminology focuses attention on stability (trajectories) and change (transitions) in behaviors across the life-course. The pathway of most interest to criminologists, of course, is criminal behavior. Therefore, developmental criminologists are concerned with the onset, escalation, persistence, and desistence of criminal behavior. In this paradigm, the age-crime relationship occupies a central position.

### *The Age-Crime Relationship*

The relationship between age and crime is one of the most stable empirical associations identified by criminologists over decades of research. Cross-sectional age versus crime plots consistently reveal that the prevalence of criminal involvement is uncommon during early childhood, increases rapidly during early adolescence (roughly ages 10-14), reaches a peak during mid to late adolescence (around age 17), and declines rapidly thereafter (Moffitt, 1993a; Thornberry, 1996). With minor variations, this aggregate age- crime curve holds for both males and females, for most types of crimes, across historical periods, and in numerous Western nations (Hirschi and Gottfredson, 1983).

Until recently, however, the complexity of this relationship has been masked by two important methodological limitations (Moffitt, 1993a). First, the bulk of age-crime research is cross-sectional rather than longitudinal, indicating only prevalence rates at one point in time for any range of age groups. The aggregate, cross-sectional nature of early research left open at least two explanations of the age-crime curve: (a) a change in prevalence or (b) a change in incidence. That is, the peak in adolescence could be due

either to an increase in the number of offenders (prevalence), or an increase in the rate of offending by a stable group of offenders.

Subsequent longitudinal research has indicated that the former explanation is correct (Farrington, 1986a; Wolfgang, Thornberry, and Figlio, 1987). Indeed, a major focus of the "career criminal" research emerging in the late 1980s was disaggregating the age-crime curve to empirically document specific offending trajectories, such as early starters, later starters, persisters, desisters, occasionals, and chronics (Blumstein, Cohen, and Farrington, 1986; Blumstein, Farrington, and Moitra, 1985).

While the aggregate nature of early age-crime studies masked individual offending trajectories, a focus on official criminal behavior obscured the importance of early childhood in the age-crime relationship (Moffitt, 1993a). Age was by definition left-censored because much of the delinquency that occurs early in the life-course is not detected by criminal justice agencies. Indeed, researchers using self-report delinquency measures provided evidence that illegal behavior begins long before it is detected by social control agents (Loeber, Stouthamer-Loeber, Van Kammen, & Farrington, 1989). Further, if one relaxes "crime" to include antisocial behavior, it is clear that the onset age for behaviors such as aggression, lying, or stealing extend well back into early childhood (Loeber, 1982).

Of course, one could make the argument that the "antisocial" behavior of youth is qualitatively different from early criminal behavior—that they differ to such a degree that they do not represent the same underlying phenomena. The empirical evidence indicates, however, that childhood antisocial behavior is a strong and consistent correlate of adolescent and adult crime (Lipsey and Derzon, 1998; Loeber, 1982; Loeber and

Leblanc, 1990). Developmental theorists refer to this as heterotypic continuity, where forms of deviance (e.g., hitting and biting at age four, shoplifting at age eight, robbery at age 15) are viewed as different behavioral manifestations of the same underlying trait (Loeber et. al, 1990; Moffitt, 1993a; Silverthorn and Frick, 1999). In short, these forms of deviance share conceptual, empirical, and theoretical overlap.

### ***Stability and Change in Antisocial Behavior***

Sociological, or “mainstream” criminology has long recognized that prior offending or criminality is a strong predictor of future criminal behavior (Gottfredson and Hirschi, 1990). A focus on *criminal* behavior, however, largely precluded the study of precursors (e.g., “antisocial behavior”) to delinquency. Therefore, much of the evidence for the continuity of antisocial behavior comes from the psychology literature. For example, Robbins’ (1966, 1978) longitudinal studies of a cohort of black males indicated that an adult diagnosis of antisocial personality disorder virtually required antisocial childhood behavior. In a review of the literature on the continuity of aggression, Olweus (1979) found that correlations between early and later aggression averaged .63 (.79 when corrected for attenuation). Loeber (1982), reviewing the literature on childhood antisocial behavior, found that early lying, aggression, and theft were strong predictors of later delinquency and criminal offending. Further, those children with (a) the highest levels of problem behaviors; (b) problem behaviors in multiple settings; and (c) with an early onset to delinquency; tended to be antisocial in later life, and were more likely to exhibit chronic offense patterns.

While the stability of antisocial behavior and offending is well documented (Loeber, 1982; Loeber and Dishion, 1983; Huesmann, Eron, Lefkowitz, and Walder 1984), there exists an empirical paradox—despite high stability coefficients associated with aggression and antisocial behavior, many youth who are antisocial during childhood desist from this behavior as adolescents or adults (Loeber and Stouthamer-Loeber, 1998; Moffitt, Caspi, Dickson, Silva, and Stanton, 1996). Put another way, antisocial adult behavior almost requires antisocial childhood behavior, but the reverse is not true (Sampson and Laub, 1993).

Developmental research, therefore, focuses on the explanation of both stability and change over the life-course. Despite recent advances in developmental criminology, many empirical and conceptual issues remain unresolved. The next section briefly documents conceptual and empirical gaps in the life-course literature that this dissertation is designed to address.

## **CONCEPTUAL AND EMPIRICAL ISSUES IN DEVELOPMENTAL CRIMINOLOGY**

The present section of the paper outlines three conceptual areas of developmental criminology that are critical to the study: (a) the importance of early life circumstances for criminology, (b) the explanation of stability, and (c) the necessity of developmental subtypes. Within each of the sections, the discussion addresses how this dissertation seeks to advance the current knowledge base.

## *The Importance of Early Life Circumstances for Criminology*

The mere recognition that the stability of antisocial behavior can be traced to pre-adolescence has important implications for the study of crime. The fact that antisocial behavior is stable from early childhood suggests that criminological theories that focus exclusively on adolescence (or adulthood) cannot explain the emergence of early problem behaviors. A classic example is Merton's (1938) theoretical statement. Merton argued that there is a gap between universally held aspirations of financial success and upward social mobility (e.g., "the American dream") and the reality of American social structure. Further, this disjuncture places a strain on individuals that is often alleviated through criminal activity. It is difficult for this theory to explain the emergence (and stability thereafter) of antisocial behavior in pre-adolescence, when the causal mechanisms operate during late adolescence and adulthood.

Accordingly, researchers have "pushed back" the causes of delinquency and crime, and examined the early life circumstances of adolescent and adult offenders. For example, Travis Hirschi (1969, Gottfredson and Hirschi, 1990) altered his theoretical position, moving from social bond theory, where the main causal mechanisms producing delinquency operate during adolescence, to a theory of "low self-control," where causal processes are largely complete by age eight.<sup>2</sup> Gottfredson and Hirsch (1990) hypothesize that parents' failure to adequately monitor childhood misbehavior, and recognize and

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<sup>2</sup> Gottfredson and Hirschi (1990) propose that offending arises from an interaction between low self-control and the opportunity to commit crimes. In their theoretical statement and in previous works, however, the authors are careful to note that opportunity for crime is ubiquitous. Thus, most empirical examinations of the General Theory have focused on the self-control construct.

punish deviance, inhibits the development of self-control in their children (see also Patterson, 1993).

Indeed, past research indicates that many social risk markers that operate in childhood (e.g., harsh or inadequate discipline, parental rejection, family structure, poverty) represent important predictors of early misconduct and later delinquency and crime (Loeber and Dishion, 1983; Loeber and Stouthamer-Loeber, 1986). More recently, theorists have recognized that “child effects” may also be implicated (Lytton, 1990). That is, individual differences in toddlers and children may influence or interact with family structure and process variables (Moffitt, 1993a). The recognition of psychosocial or biological individual differences in mainstream criminology represents a significant departure from past practices.

Due to a number of circumstances, criminology has been the province of sociology since the early 1900s (Andrews and Bonta, 1998). With few exceptions, sociologists have minimized or neglected the importance of individual differences, focusing instead upon “traditional” sociological variables such as socioeconomic status, economic and educational opportunity, or delinquent associations. Exemplified by Sutherlands’ ideological attacks on the Gluecks’, researchers interested in individual differences (especially biological differences) were either ignored or ridiculed (Laub and Sampson, 1991; Rowe and Osgood, 1984).

In recent years, however, research has demonstrated the importance of biosocial interactions in the explanation of both offending patterns in general, and violence in particular (Brennan, et al., 1997; Brennan, Grekin, and Mednick, 1999; Kandel and Mednick, 1991; Raine, Brennan, and Mednick, 1994). Biosocial interactive processes

include the co-occurrence of birth complications and poverty or maternal rejection (Raine, Brennan, and Mednick, 1994) and the combination of low birth weight and low SES or weak family structure (Tibbetts and Piquero, 1999). Less is known, however, about *how* biosocial interactions relate to childhood antisocial behavior and delinquency. Biosocial interactions may directly (e.g., by producing a stable antisocial trait) or indirectly (e.g., poor cognitive functioning and school failure) effect childhood antisocial behavior and delinquency. By contrast, most prior research links early interactions with adult offending, and treats childhood as a “black box.”

Moffitt (1993a) suggests a developmental framework for explaining such interactions. Briefly, she hypothesizes that that these interactions are salient only for life-course-persistent (LCP) offenders—those who exhibit stable antisocial behavior throughout the life-course. Moffitt argues that neuropsychological deficiencies produce a child with a “difficult temperament.” When reared in a disadvantaged parenting environment, a series of failed child-parent encounters leads to inadequate socialization. Specific tests of hypotheses derived from this aspect of Moffitt’s theory have been supportive of the link between early life circumstances and LCP offending. For example, Tibbetts and Piquero (1999) found that the interaction between low birth weight and disadvantaged environments was related to early onset to delinquency, but not late onset in a sample of inner city black males.

This dissertation seeks to advance knowledge of the relationship between early life circumstances, childhood antisocial behavior, and juvenile delinquency. Specifically, the dissertation includes tests of several interactions between biological (e.g., low birth weight, maternal smoking during pregnancy) and an index of social adversity. The

research design, because it includes multiple childhood data points, permits a more in depth analysis of *how* such interactions influence childhood antisocial behavior and juvenile delinquency.

This dissertation also moves beyond the specifics of biosocial interactions to more fully examine the linkages between early life circumstances, and stability and change in childhood antisocial behavior and delinquency.

### *Explaining Stability*

While the stability of antisocial behavior is well documented, two related issues remain unresolved. First, there is substantial disagreement over the explanation of the processes that foster stability. Second, there is the paradox that as many as half of antisocial children and adolescents desist from offending as adults. Nagin and Paternoster (1991) outline two conceptual frameworks for explaining the continuity of offending: population heterogeneity and state dependence. The former explanation suggests that the stability of offending is caused by individual differences in some factor (often labeled "propensity") that is stable over the life-course. Most population heterogeneity explanations of propensity focus on properties of individuals such as low self-control or difficult temperament. It is possible, however, that differences in propensity stem from time-stable social factors such as neighborhood characteristics. A pure population heterogeneity explanation suggests that once the causal mechanism that produces antisocial behavior is complete, little change is likely (Paternoster, Dean, Piquero, Mazerolle, and Brame, 1997).

In contrast, state dependence explanations of stability posit that early antisocial behavior or delinquency affects factors (e.g., schooling, job prospects, peer relations),

that in turn effect the probability of future offending (Farrington, 1986b; Patterson, 1993). Thus, much of the continuity in offending may be due to consequences of initial antisocial behavior (e.g., school failure, peer rejection). Early antisocial behavior could seriously limit future opportunities to advance through developmental stages (school, job, or marriage prospects), incur labeling from agencies of social control, or directly affect the likelihood of future antisocial behavior.

The empirical evidence to date suggests that a pure population heterogeneity theory is inadequate (Nagin and Farrington, 1992; Nagin and Paternoster, 1991; Paternoster et al., 1997; Paternoster and Brame, 1997; Sampson and Laub, 1993). For example, Sampson and Laub's (1993) re-analysis of the Gluecks' data revealed that, independent of stable individual differences, prior offending still predicted future offending. Similarly, studies controlling for "unobserved population heterogeneity" through statistical modeling do not fully "explain away" prior offending or other state dependent (e.g., delinquent peers) effects (Nagin and Farrington, 1992; Nagin and Paternoster, 1991).

Thus, it appears as though both population heterogeneity and state dependence are implicated in the stability of offending. Patterson (1993) uses the "chimera," an unusual hybrid creature created by grafting tissue from different organisms onto a single body, to describe this process. Developmentally, an antisocial child not only carries the initial antisocial trait, but also accumulates the baggage (peer rejection, academic failure) that is grafted on to the initial trait.

In sum, research points to a process of stability more complex than a simple trait-based explanation. Less is known, however, about which consequences of antisocial

behavior are likely to increase future offending. Moreover, much of the extant research focuses on stability from juvenile delinquency to adult offending (cf., Sampson and Laub, 1993) and relies on proxies (e.g., official or self-reported delinquency prior to an arbitrary age) of early stability, rather than on actual measures of stable, childhood antisocial behavior. This dissertation examines stability in antisocial behavior in the early life course, and focuses on possible consequences (e.g., scholastic performance, peer relations) during this developmental stage that may foster stability through the transition into adolescence.

### *Developmental Subtypes of Offenders*

The discussion of stability and change thus far has operated under the assumption that both processes operate in a single causal model for all offenders. Recent developmental theorists relax this assumption, and account for stability and change by hypothesizing distinct causal mechanisms for different subgroups of offenders (Moffitt, 1993a; Patterson and Yoerger, 1993; Loeber and Hay, 1994). Much of this work stems from "criminal career" researchers, who disaggregated age-crime relationships into discrete (e.g., chronics, limiteds) offending trajectories (see, Nagin, Farrington, and Moffitt, 1995).

Life-course theorists capitalized on these findings by providing specific causal models for different offending trajectories. Current developmental theory focuses largely on a two-group model that differentiates stable, chronic offenders from offenders that experiment in offending during adolescence (Moffitt, 1993a; Patterson and Yoerger, 1993; Simons, Wu, Conger, and Lorenz, 1994). One group of offenders (early starters, or life-course-persisters) has an early onset of offending, and shows extraordinary stability

and variety in offending over the life course. Offenders with a later onset tend to desist from offending as they move into young adulthood.

Patterson (1993) argues that the main causal mechanism for the early starters is failed parenting, which leads to inadequate socialization. Moffitt (1993a) contends that the causal mechanism for life-course-persistent offenders is an interaction between an ill-tempered child and a disadvantaged parenting environment. Both theories suggest that late-onset offenders are due primarily to interactions with delinquent peers.<sup>3</sup> In essence, these theories view some offenders as qualitatively different from others. Early onset offenders are not simply *more* antisocial, they represent a distinct group of individuals on a specific causal pathway.

The empirical evidence regarding whether multiple trajectories fit the data better than a single model is mixed (Nagin and Land, 1993; Nagin, et al., 1995; Moffitt et al., 1996; Paternoster et al., 1997; Simons et al., 1994; Tibbetts and Piquero, 1999). For example, Moffitt and her colleagues' (1996) recent assessment of their New Zealand sample revealed that early and late starters differed from each other in several respects, including their likelihood of dropping out of school, and adult personality profiles. Conversely, Paternoster and Brame (1997) found few differences between early and late starters in the National Youth Survey.

Most of the studies testing multiple trajectories classify youth into discrete groups based on either offending histories (Nagin et al., 1995) or the onset age of self-reported,

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<sup>3</sup> Patterson (1993) and Moffitt (1993) both suggest that delinquent peers play a causal role in late-onset offending, but through different causal sequences. Moffitt argues that the gap between social and biological maturity causes a strain that pushes youth to "mimic" the early onset offenders. Patterson suggests that family disruption causes increased "wandering," which in turn leads to exposure to delinquent peers.

or official crime (Paternoster and Brame, 1997). Fewer studies have classified youth based on childhood antisocial behavior, and focused on differences between the groups in pre-adolescence. This dissertation identifies delinquent youths who were extremely antisocial as children (persisters), and compares these individuals to adolescents who discontinued antisocial behavior (desisters), and adolescents who never engaged in antisocial behavior. These groups are compared on early life circumstances, and across several psychosocial measures.

### *Summary of Theoretical Implications*

Life-course criminology enhances the possibility that criminology can become a truly interdisciplinary field, incorporating findings from biology, sociology, and psychology. Moreover, developmental theory focuses attention on early life circumstances that effect childhood problem behavior, juvenile delinquency, and the stability of antisocial behavior. This dissertation capitalizes on advances in life-course theory by focusing on the effect of early biological, psychological, and sociological risk markers on childhood antisocial behavior and juvenile delinquency. This dissertation addresses several conceptual areas of the life-course literature, including (a) the explanation of stability and change during late childhood, (b) the empirical validity of Moffitt's developmental theory, and (c) explanations of childhood antisocial behavior and delinquency for theoretically relevant subgroups of offenders. Moreover, it is anticipated that this study will contribute to future public policy regarding delinquency prevention.

## POLICY IMPLICATIONS

Research on prenatal and early life events has the potential to provide valuable information to early intervention practitioners and to policymakers interested in delinquency prevention. Early intervention as a correctional policy has recently gained momentum for at least three reasons. First, public opinion research indicates that the public is willing to support early intervention programs, even if it involves increases in taxes (Cullen, Wright, Brown, Moon, Blankenship, and Applegate, 1998). Second, evaluation research indicates that early intervention programs can successfully reduce crime and other problem behaviors (Currie, 1998; Palmer, 1992; Tremblay and Craig, 1995; Yoshikawa, 1994).

In a review of 49 early intervention programs that targeted either antisocial behavior or risk markers for deviance, Tremblay and Craig (1995) found that most of the programs were successful and that the ratio of success increased as the stage of intervention moved from adolescence to early childhood. Examples of early intervention programs successful at reducing or preventing delinquency include the Perry Preschool Project and the Syracuse University Family Development programs (Currie, 1998).

A third reason for increased levels of support for early intervention is potential cost savings. Specifically, delinquency prevention programs may be more cost effective than alternative correctional policies. In a comparative analysis of corrections policies, Greenwood, Model, Rydell, and Chiesa (1996) concluded that early prevention programs, (e.g., three strikes legislation) prevent similar amounts of crime as selective incapacitation strategies, but at substantially reduced costs.

Effective intervention, however, depends upon a reliable knowledge base of those early risk markers that precede delinquency and childhood antisocial behavior, as well as factors that may insulate at-risk individuals. Tremblay and Craig (1995) identify parenting skills and the child's cognitive development as critical risk markers and targets for intervention. Less is known about biological risk markers, or the interaction of biological and social risk markers. For example, a low birth weight child may be "at-risk" for antisocial behavior, but the risk may not be realized if certain environmental characteristics (e.g., poor home environment, parental rejection) are present. This dissertation seeks to enhance the knowledge base for future intervention efforts by examining whether and how early risk markers affect the life course of youths, as they move from birth to adolescence.

## **DISSERTATION OVERVIEW**

This dissertation employs prospective, longitudinal data to examine the early life-course of a national sample of American youth. The next two chapters of this dissertation present a more detailed discussion of the study parameters. Chapter two reviews, in greater detail, the literature on early risk markers for childhood antisocial behavior and delinquency, and the literature surrounding the development of offending. Additionally, research questions and corresponding hypotheses are contained in this chapter. Chapter three outlines the sample and measures, and analytical procedures used in the analyses. Analyses are reported in Chapter four, and Chapter five is a review and analysis of the findings. Chapter five concludes with policy implications and directions for future research.

## CHAPTER 2

### LITERATURE REIVEW

Developmental criminology emphasizes the importance of tracing antisocial behavior through the life course of individuals. This dissertation focuses on developmental pathways of antisocial behavior over the early life course (birth through adolescence). Accordingly, the purpose of this chapter is to shed light on the extant empirical literature regarding the emergence and development of antisocial behavior from the early childhood through adolescence.

The chapter is structured into four sections. The departure point for the literature review is a discussion of the conceptualization and measurement of childhood antisocial behavior. Because criminologists have only recently begun to focus on the early childhood period, the section seeks to reconcile psychological and criminological understandings of antisocial behavior during this part of the life-course.<sup>4</sup> Each of the remaining three sections examine one of three substantive area of the dissertation.

The second section of this chapter reviews the current theoretical and empirical understanding of childhood antisocial behavior. Specific foci include the role of direct parental controls, parent child-attachment, structural adversity, and individual risk factors. Although most theories of childhood antisocial behavior and delinquency employ these concepts, they do so in different manners. Theoretical constructs are

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<sup>4</sup> To be sure, the work of Glueck and Glueck (1959) and others did focus on the importance of childhood behavior problems (as well as direct parental controls). However, their efforts were viciously attacked (Sutherland, 1937), and generally ignored as criminology progressed into the 1980's as a "sociological" field. Further, the Gluecks' were more interested in the identification of empirical relationships as opposed to constructing theoretical explanations of these relationships.

organized here around two competing models of delinquency; the “mediation model” (Gottfredson and Hirschi, 1990; Patterson, 1993; Sampson and Laub, 1993) and Moffitt’s (1993a) dual taxonomy of offending.

The third section of the chapter focuses attention on evidence regarding the stability of childhood antisocial behavior generally, and specifically, stability from early childhood to adolescence. Two key topics covered in this section include explanations of stability, and factors that may moderate or mediate the effect of early antisocial behavior on later antisocial behavior and delinquency.

The final portion of the chapter addresses the debate over whether continuity and change in antisocial behavior and crime is better captured by a general, or typological theory. Specifically, the developmental subtype theories of Moffitt (1993a) and Patterson (1993) are contrasted with general developmental (Sampson and Laub, 1993) and non-developmental (Gottfredson and Hirschi, 1990) theories of crime. Following each of the last three sections, research questions (pertaining to that particular area) are presented.

### **CHILDHOOD ANTISOCIAL BEHAVIOR DEFINED**

A discussion of the predictors of “childhood antisocial behavior” first requires that this concept be defined. Because mainstream criminology has, until recently, neglected to focus on early childhood behaviors, the bulk of the research (and therefore conceptualization) of antisocial childhood behaviors comes from the fields of psychology and psychiatry. Accordingly, the departure point for this chapter is a comparison of psychological and criminological definitions of childhood antisocial behavior.

### *Conduct Disorder, Oppositional Defiant Disorder, and Attention Deficit/Hyperactivity Disorder*

Whereas criminologists and developmental psychologists tend to view antisocial and criminal behavior on a continuum, psychiatrists focus on whether or not individuals exhibit enough antisocial behavior to meet the criteria for a disorder (Rutter, Harington, Quinton, and Pickles, 1997). Because they belong to a “service oriented” discipline, psychiatrists focus on the extreme cases, antisocial personality disorder for adults, and either oppositional disorder or conduct disorder for children and adolescents (Achenbach, 1993).

The most recent version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) requires that children manifest at least three of the following behaviors to be diagnosed with Conduct Disorder (American Psychiatric Association, 1994). The behaviors (or “symptoms”) are divided into four categories:

(1) Aggression: bullies, threatens, intimidates; starts physical fights; uses a weapon that can harm others; has been physically cruel to people or animals; has stolen while confronting a victim; has forced sex on someone.

(2) Destruction of Property: sets fires deliberately to cause serious damage; deliberately destroys property.

(3) Lying or Theft: breaks into other’s property; often cons others, lies to get things or avoid responsibility; often steals valuables without confrontation.

(4) Serious Violation of Rules: Often stays out late at night without permission, starting before age 13; has run away from home overnight at least twice; often plays hooky from school, starting before age 13.

Each of the three behaviors must have occurred in the past year, and at least one must have occurred in the past six months. Additionally, there are two sub-types of conduct disorder. Individuals diagnosed with *childhood onset* conduct disorder display

the behaviors prior to age 11, while those with *adolescent onset* conduct disorder develop symptoms after age 11.

Inspection of the list of behaviors qualifying a child for conduct disorder reveals a great deal of overlap with delinquent behavior. With the exception of rule violations, most of the symptoms describe delinquent acts. Moreover, the categorization of these problem behaviors parallels the classic criminological classification of property (lying, theft, property destruction) and violent (aggression) offenses. Indeed, some psychiatrists have argued that the broad classification of conduct disorder hides different subtypes of childhood antisocial behavior (Loeber and Hay, 1994; Achenbach, 1993). For example, Rolf Loeber hypothesizes that there are three related pathways to delinquency; authority conflict (truancy, refusal to do things), covert (lying, shoplifting) behavior, and overt (aggression, fighting, violence) behavior.

In addition to conduct disorder, oppositional defiant disorder (ODD) also overlaps with childhood antisocial behavior. ODD refers to developmentally inappropriate levels of irritable, argumentative, and defiant interactions with others (Lahey and Loeber, 1997). While these behaviors are less similar to delinquent offenses than the criteria for CD, the two diagnoses overlap to such a degree that they may be measuring the same dimension (Achenbach, 1993). In essence, such oppositional behavior may simply be the developmental precursor to more serious conduct problems. Hinshaw, Lahey, and Hart (1993), for example, cite two studies in which 96% of the boys who met DSM criteria for CD also met the criteria for ODD.

A final disorder related to childhood antisocial behavior is Attention Deficit/Hyperactivity Disorder (ADHD). ADHD refers to developmentally inappropriate

levels of attention problems, motor hyperactivity, and impulsive behavior. While some youths classified as ADHD experience only one type of problem behavior (either inattention or hyperactivity/impulsivity), most experience both types of problems (Lahey and Loeber, 1997). ADHD and CD (or antisocial behavior generally) have been empirically linked in two manners. First, children with ADHD are more likely than children without ADHD to evidence conduct problems (Lahey and Loeber, 1997). Second, children diagnosed as both ADHD and CD (e.g., comorbidity) are more likely to exhibit persistent antisocial behavior over time. Research documenting the relationships between ADHD, CD and ODD has been largely atheoretical in nature (Lahey and Loeber, 1997). For example, questions remain as to whether ADHD and CD are related because youth with ADHD are impulsive and therefore cannot inhibit antisocial acts or whether ADHD and CD simply manifestations of the same underlying disorder (Farrington, Loeber, and VanKammen, 1990).

Typically, psychiatrists diagnose ODD, CD, or ADHD through a structured interview that taps into the behaviors outlined in DSM. This taxonomic, or categorical approach suggests that individuals either have or do not have a particular disorder. While such categorical approaches are valuable for identifying and treating disordered youth, many researchers prefer to measure childhood antisocial behavior with dimensional models.

***Dimensional Models: Anti-social, Oppositional, and Externalizing Behaviors***

Dimensional models score individuals according to the degree to which they manifest a given variable or syndrome (Achenbach, 1993). This method of measurement is similar to sociological measures of crime and delinquency. Indeed, most dimensional

models of childhood antisocial behavior are “variety indexes” based on maternal or teacher reports of whether or not the child committed antisocial behaviors over a specific period of time (e.g., the Child Behavior Checklist, Achenbach, 1991). Such measures typically focus specifically on antisocial behavior (typically similar to DSM criteria for CD), hyperactivity (ADHD), or more generally on “externalizing” behavior problems. The construct of externalizing behaviors includes antisocial behaviors, as well as oppositional/defiant behaviors and impulsive or disruptive acts. The assumption underlying the concept of “externalizing behaviors” is that the three types of behaviors are tapping the same core dimension of behavior.

### *Early Delinquency Onset*

Apart from psychological constructs of childhood antisocial behavior, criminologists have started to focus on predictors of “early onset” delinquency (Loeber, 1983, LeBlanc and Loeber, 1998; Loeber and LeBlanc, 1990). There is currently little consensus on what age constitutes an “early” age for delinquency (Paternoster et al., 1997; Mazerolle, 1997). Early onset is typically defined, however, as delinquency occurring prior to at least age 14 (Paternoster et al., 1997; Simons et al., 1994; Patterson and Yoerger, 1993). Researchers have also used varying definitions of “delinquency,” including self-reported delinquent items (both trivial and serious) and police contact or arrest.

Because early onset is typically defined as delinquent behavior occurring during childhood (i.e., before age 14), predictors of such behavior are germane to a discussion of childhood antisocial behavior. It should be noted, however, that while predictors of early onset have received recent attention (e.g., Patterson, Crosby, Vuchinich, 1992), most

criminologists focus on the connection between early onset and later delinquency or adult crime (Farrington et al., 1990; Lahey, Goodman, Waldman, Bird, Canino, Jenson, Regia, Leaf, Grodan and Applegate, 1999; Paternoster et al., 1997; Mazerolle, 1997).

In short, conduct disorder, antisocial problem behaviors tapped by psychological scales (e.g., the Child Behavior Checklist), and early onset delinquency share considerable definitional overlap. Many of the “antisocial behaviors” in dimensional scales are contained in the diagnostic criteria for conduct disorder, and are also forms of delinquency. Throughout the remainder of this dissertation, the term “childhood antisocial behavior” is used in preference to either early delinquency or conduct disorder. Antisocial behavior refers to behaviors that violate important norms or laws. In this sense, symptoms of conduct disorder are considered antisocial behaviors, whereas oppositional behavior (excessive whining, temper tantrums) are not (Lahey, Waldman, and McBurnett, 1999). The next section of this chapter outlines theoretical explanations of childhood antisocial behavior, and summarizes the empirical literature supporting the major theoretical constructs.

## **EXPLANATIONS OF CHILDHOOD ANTISOCIAL BEHAVIOR**

Developmental criminologists, by “pushing back” the etiology of antisocial behavior into childhood, have opened many promising theoretical avenues. The most obvious issue is whether early childhood antisocial behavior has precursors that can be reliably identified and placed in a theoretical context. The extant developmental literature suggests some consensus on a general theoretical model that highlights the importance both parenting skills and the social structural context of parenting

(Gottfredson and Hirschi, 1990; McLeod and Shanahan, 1993; Sampson and Laub, 1993; Patterson, 1993). While the exact causal mechanisms vary by individual authors, the essence of this “mediation model” is that structural characteristics (e.g., SES, parental criminality) indirectly affect childhood antisocial behavior through their effect on parenting efficacy (Capaldi, Chamberlain, and Patterson, 1997).

In contrast to the “mediation model,” Moffitt (1993a) argues that childhood antisocial behavior is the result of an interaction between child effects (e.g., difficult temperament) and an adverse parenting context. While others recognize the importance of child effects, they neither place it in a theoretical context nor specify an interaction with social factors. The remainder of this section outlines, in greater detail, the causal mechanisms implicated by these competing models of childhood antisocial behavior.

### *The Mediation Model*

As noted earlier, theoretical statements congruent with the mediation model highlight the importance of two primary influences—parental efficacy and structural adversity. The following section reviews these two dimensions, focusing on: (a) the specific causal mechanisms, and (b) the empirical evidence implicating the causal mechanisms. While the mediation model is salient in the psychological literature, it is often invoked to explain a wide range of outcomes including childhood mental health and academic achievement. Because this dissertation focuses on childhood antisocial behavior and delinquency, the review here focuses primarily on criminological versions of the mediation model.

identify “low self control” as the sole cause of crime (and presumably childhood antisocial behavior)<sup>5</sup>. From their control theory perspective, all children are naturally impulsive and antisocial—they lack self-control. Self-control, the product of adequate “socialization,” crystallizes as a trait in early childhood (around eight years of age). Parents socialize their child by monitoring a child’s behavior, recognizing deviant behavior when it occurs, and punishing such behavior (Gottfredson and Hirschi, 1990: 97). The authors note that parents must care about their children enough to monitor and punish them. Therefore, a minimum amount of emotional attachment is also necessary.

In outlining their parental predictors (supervision, monitoring, punishment) of low self-control, Gottfredson and Hirschi draw heavily from the work of Gerald Patterson. Both Patterson’s (1982) coercion theory and his more recent work (Patterson, 1993; Patterson and Yoerger, 1993) give a central causal role to parenting practices. In addition to the constructs adopted by Gottfredson and Hirschi, Patterson (1993) also suggests that inconsistent or erratic punishment and inadvertent rewards for problem behaviors promote childhood antisocial behavior and early delinquency. In contrast, and in keeping

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<sup>5</sup> Gottfredson and Hirsch (1990) claim that low self-control crystallizes by the age of eight years. Therefore, although their theory is intended to predict delinquency, crime, and analogous behaviors, it must also explain the emergence of childhood antisocial behavior occurring after eight years of age. Similarly, Patterson’s (1993) early starter model is intended to explain early onset delinquency. As noted earlier, this construct is conceptual similar to childhood antisocial behavior. Sampson and Laub (1993) do not specifically address the age at which their theoretical constructs operate. Their analysis of the Gleuck data begins with predicting delinquency (at age 14); however, their theoretical constructs are logically consistent with the prediction of childhood antisocial behavior, and are paralleled in the psychological literature on childhood behavior problems.

with Hirschi's (1969) past theoretical position, Gottfredson and Hirschi (1990: 94-95) insist that "low self-control is not produced by training, tutelage, or socialization."<sup>6</sup>

Sampson and Laub's (1993) age graded theory of informal social control also draws heavily from Patterson's work. The central causal mechanisms in their theory (during childhood) are direct parental controls. They hypothesize that erratic or harsh discipline and low supervision increase delinquency. Additionally, Sampson and Laub move beyond "effective punishment" by extending Braithwaite's (1989) concept of reintegrative shaming to include the emotional attachment between a parent and child. According to the authors, "when the bonds of respect are broken by parents in the process of punishment, successful child rearing is difficult to achieve (Sampson and Laub, 1993: 68). While Sampson and Laub equate parent-child bonding to reintegrative shaming, emotional attachment also has deep roots in psychological theory (Dodge, 1991; McLeod and Shanahan, 1993; Speltz, KeKlyen, and Greenberg, 1999).

Psychological explanations of the relationship between emotional attachment and childhood problem behaviors are perhaps more complex, and certainly more varied (Goldberg, 1997). Speltz et al. (1999) highlight four explanations for the relationship between child-parent relations and antisocial child behavior, (a) insecurely attached children may develop internal representations of relationships that bias subsequent social perceptions and cognitions, (b) attachment quality may promote motivation to identify and comply with parents and other caregivers, (c) acting out may serve to establish order

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<sup>6</sup> Gottfredson and Hirschi use Patterson's constructs (supervision, monitoring, punishment) to represent "direct parental controls" in accordance with their control theory perspective. In contrast, Patterson (1982) operates from a social learning paradigm. Thus, in keeping with Hirschi's (1969) position against social learning theories, Gottfredson and Hirschi (1990) refuse to recognize that parents may inadvertently train children to be deviant. However, this type of parental behavior may fit within Gottfredson and Hirschi's construct of "failure to recognize deviant behavior."

and predictability in disorganized parent-child relationships, and (d) poor attachment may impact neural organization and conditioning processes, which can result in impaired ability to tolerate and manage strong affect.

In short, most advocates of the mediation model largely agree on the relationship between parenting and childhood antisocial behavior. To differing extents, they emphasize direct parental controls (monitoring, supervision, consistent discipline), and the emotional attachment between parents and their children. These factors also occupy a central role in psychological models predicting childhood problem behaviors (Cicchetti and Richters, 1993; Speltz et al., 1999; Klein, Forehand, Armistead, and Long, 1997).

To a large extent, the mediation model was constructed from existing empirical evidence (Hirschi and Gottfredson, 1996). Consequently, it is of little surprise that the empirical literature on direct parental controls and parent-child attachment generally supports their relationship to both childhood antisocial behavior and adolescent delinquency (Loeber and Stouthamer-Loeber, 1986; Sampson and Laub, 1993; Larzelere and Patterson, 1993; Patterson, 1993; Wells and Rankin, 1988).

Loeber and Stouthamer-Loeber's (1986) meta-analysis of studies examining the relationship between family factors and antisocial behavior remains perhaps the most extensive review of parental predictors to date. They found that socialization variables (parental supervision, parental rejection, parent-child involvement) were among the most powerful predictors of juvenile conduct problems and delinquency. Specifically, lack of supervision was significantly related to delinquency (or conduct problems) in 91% of the studies examined, with a median relative improvement over chance (RIOCI) of 36% for prediction studies, and 66% for comparison studies. Parent-child attachment (or

conversely, rejection) was also strongly related to delinquency and childhood aggression. Of the 30 analysis examined, 29 yielded a significant relation between attachment and delinquency, the median RIOC was 63% for comparison studies, and 24% for normal samples.

Harsh (e.g., physical) and inconsistent discipline (a combined measure) was also related to delinquency and aggression (median RIOC = 82% for comparison, and 12.4% for normal samples). Physical punishment alone was not a strong predictor of delinquency, as only 9 of 16 analyses found significant relations, and the median RIOC was only 2%. However, Loeber and Stouthamer Loeber (1986) argue that this weak relationship is due, in part, to the fact that most of these studies used delinquency outcomes rather than childhood conduct problems. As children age, physical punishment is administered less frequently, and therefore variables measuring this feature of parenting become less salient. This position is bolstered by both reviews of the punishment literature (e.g., Steinmetz, 1979) and specific studies (Strauss, Sugarman, and Giles-Sims, 1997; McLeod and Shanahan, 1993) that focus on childhood conduct problems.

Despite the strength of the relationship between socialization variables and childhood antisocial behavior or delinquency, critics suggest that this relationship may be spurious (Harris, 1998; Lytton, 1990). Specifically, some have argued that antisocial children are more likely to be punished, reduce parents' supervision efforts, and breach emotional bonds. The parent training programs of Patterson (1980, 1982) and his colleagues (Capaldi, Chamberlain, and Patterson, 1997) at the Oregon Social Learning Center, however, suggest that parenting does have a causal effect. In numerous

instances, they have demonstrated that changing parenting behaviors has direct effects on subsequent child behaviors.

In short, the empirical evidence strongly supports the direct effect of parenting and parent-child interactions on delinquency and childhood problem behaviors. As noted earlier, this is only one dimension of the Mediation model. The second dimension concerns the social structural context in which parenting takes place.

The context of parenting—structural adversity. Advocates of the mediation model argue that structural adversity reduces the likelihood of effective parenting, and therefore indirectly increases the probability of childhood problem behaviors and early delinquency. The phrase “structural adversity” is used here to capture either characteristics of parents (parental deviance, SES), the family (family size, single parent household), or family processes (marital conflict) that may be disadvantageous to child rearing. Again, this aspect of the mediation model has been proposed by developmental theories predicting problem behaviors (Conger, Conger, Elder, Simons, and Whitbeck, 1992; McLoyd, 1990; Velez, Johnson, and Cohen, 1989), and theories of delinquency and crime (Gottfredson and Hirschi, 1990; Patterson, 1993; Sampson and Laub, 1993).

Similar to hypotheses regarding the direct effects of parenting skills (and attachment), theorists differ on the variety of adverse factors hypothesized to affect parenting, and the extent of their effect. Gottfredson and Hirschi (1990) argue that parents’ socialization efforts are hampered when they have a large family or are a single parent. They hypothesize that large family size limits a parent’s ability to adequately monitor and discipline children. Similarly, the authors suggest that single parents (typically women) are disadvantaged because they have less time and resources available

to supervise children. Gottfredson and Hirschi (1990) do not articulate any further structural or family factors that impede socialization. While their theory is not inconsistent with, for example, indirect effects of poverty or SES on delinquency, the authors might argue that these relationships are spurious.<sup>7</sup>

Consistent with the General Theory of Crime, Sampson and Laub (1993) include family size (and household crowding), and family disruption (single parent status) as structural predictors of parent-child relationships in their age graded theory of social control. Additionally, they outline several other aspects of adversity, including parental deviance, socioeconomic status, and residential mobility, that may indirectly effect (operating through parenting) delinquency.

Although some authors suggest that the link between parent and child deviance is due, in part, to a genetic or biological link (Moffitt, 1993a), Sampson and Laub take the position that the importance of parental deviance lies in its effect on parenting.

Accordingly, they note that, "A central characteristic of deviant and criminal life styles is the rejection of restrictions and duties—especially those that involve planning, patience, and investment in the future" (Sampson and Laub, 1993: 69). Specifically, Sampson and Laub (1993) hypothesize that deviant parents (e.g., commit crimes or drink excessively) are more likely to use harsh or inconsistent punishments, and are less likely to form strong attachments with their children.

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<sup>7</sup> Gottfredson and Hirschi (1990) contend that the relationship between social structure (e.g., poverty, SES, neighborhood of residence) and crime is the result of individuals with low-self control selecting themselves into poor social circumstances. The same argument could be applied to the indirect effect of social structure on childhood antisocial behavior. Specifically, it might be argued that individuals with low self-control are poor parents and also select themselves into poor social environments.

Sampson and Laub (1993) also theorize that family socioeconomic status affects delinquency largely through its effects on family processes (see also, Larzelere and Patterson, 1990; McLeod, et al., 1994). More precisely, lower social status parents have more stress and fewer resources than middle class parents. Within mainstream criminology, this mediation model represents a change in the way in which the effect of socioeconomic status is conceptualized. In most cases, past mainstream criminological theories hypothesized that financial adversity operated directly and during young adulthood to promote crime (Merton, 1939; Cloward and Ohlin, 1960). For example, Merton (1938) suggested that limited economic opportunities in the context of the “American dream” ethos (where everyone can succeed) placed a strain on individuals that was often resolved through criminal behavior.

At the individual level, however, economic status typically has weak effects on criminal behavior (Tittle, Wayne, Villemez, and Smith, 1978; Loeber and Dishion, 1983), leading some authors to criticize mainstream criminology’s obsession with economic hardship (Andrews and Bonta, 1998). Thus, the mediation model (Larzelere and Patterson, 1990; McLeod et al., 1994; Sampson and Laub, 1993) recasts the role of SES from a direct effect on delinquency and crime, to an indirect effect on childhood antisocial behavior and early delinquency.

As with the evidence regarding direct parental controls, the empirical evidence for the relationship between structural adversity and childhood conduct problems or delinquency is largely supportive. The empirical evidence for socioeconomic status, parental deviance, family structure, and family size are summarized below.

As noted above, SES (or other measure of financial adversity or class status) typically has weak direct effects on delinquency and criminal behavior. Research testing the indirect effects (operating through parenting practices), however, supports the mediation model for both delinquency (Larzelere and Patterson, 1990; Sampson and Laub, 1994) and childhood antisocial behavior (McLeod and Shanahan, 1993; McLeod et al., 1994).

Parental deviance is a robust and consistent predictor of childhood antisocial behavior and delinquency (Lipsey and Derzon, 1998; Loeber and Stouthamer-Loeber, 1986). In the Cambridge Youth Study of Delinquent Development, for example, over half of all convictions were concentrated in only six percent of families (Farrington, Barnes, and Lambert, 1996). While some attribute this effect to heredity, the empirical evidence suggest it is at least partially due to the effects of parental criminality on parenting behaviors (Nagin, Farrington, and Porgarsky, 1997; Sampson and Laub, 1993).

Like socioeconomic status, family structure has been a staple of mainstream criminological theorizing. In most cases, the evidence suggests that children in single parent families are at increased risk for childhood antisocial behavior and delinquency (Thornberry, Smith, Rivera, Huizinga, and Stouthamer-Loeber, 1999; Wells and Rankin, 1991). Additionally, the evidence suggests that this relationship is indirect, operating through socialization variables such as supervision and discipline (Sampson and Laub, 1993; Shaw and Winslow, 1997).

Until recently, family size, despite its robust empirical relationship with delinquency, was largely ignored by criminologists (Gottfredson and Hirschi, 1990). The empirical evidence, again, suggests that large family size makes parenting more difficult,

and therefore increases the probability of childhood conduct problems and delinquency (Sampson and Laub, 1993; Shaw and Winslow, 1997).

Rather than focus on the influence of specific causal mechanisms, developmental psychologists tend to focus on the effect of exposure to multiple adversities. The empirical evidence suggests that adversity is not random, but rather tends to cluster in individuals (or families), and that individuals exposed to more types of adversity (e.g., cumulative risk) evidence higher levels of maladaptive behavior (Fergusson, Horwood, and Lynskey, 1994; Rutter, 1997a; Shaw and Winslow, 1997).

In sum, there is a substantial body of evidence supporting the mediation model. Specifically, structural adversity appears to foster childhood the development of antisocial behavior and delinquency by decreasing the likelihood of parental efficacy and parent-child attachment. Terrie Moffitt's (1993a) theoretical model also includes the concept of structural adversity, but the hypotheses derived from her theory are quite different from the mediation model.

*Moffitt's Dual Taxonomy of Offending: Child Effects and the Interaction Hypothesis*

Moffitt's (1993a) dual taxonomy of offending identifies two types of offenders that can be distinguished from their offending trajectories. Specifically, life-course-persistent (LCP) offenders evidence antisocial behavior in childhood, and remain stable in their antisocial propensity throughout their life. Adolescent limited (AL) offenders, by contrast, begin and end their offending careers during the period from adolescence to young adulthood. Because Moffitt hypothesizes different causal pathways for each

offending trajectory, only the causal mechanisms for the LCP offenders are germane to childhood antisocial behavior.<sup>8</sup>

According to Moffitt (1993a, 1994, Moffitt et al., 1996) the causal mechanisms for the LCP trajectory begin early in the offender's life. Specifically, she states that, "if some individuals' antisocial behavior is stable from pre-school to adulthood as the data suggest, then investigators are compelled to look for its roots early in life, in factors that are present before or soon after birth" (Moffitt, 1993a: 680).

For Moffitt, the early roots are factors that influence the neuropsychological health of an infant. By combining "neuro" with psychology, she refers to the extent to which biological and physiological processes within the nervous system influence psychological characteristics such as temperament, behavioral development, or cognitive abilities (Moffitt, 1993). Countless factors may influence the neuropsychological health of an infant. Examples include prenatal maternal drug or alcohol abuse, low birth weight, brain insult suffered due to pregnancy complications, or inherited individual differences in the nervous system.

According to Moffitt, even subtle neuropsychological deficits can produce an infant with a "difficult temperament." Specifically, these infants may be "clumsy and awkward, overactive, inattentive, irritable, impulsive, hard to keep on schedule, delayed in reaching developmental milestones, poor at verbal comprehension, deficient at expressing themselves, or slow at learning new things" (Moffitt, 1993b: 681). Such an ill-tempered infant may be hard to socialize, and evokes challenges from even the most

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<sup>8</sup> In other words, regardless of whether there is evidence for distinct groups of offenders, a subject covered later in this chapter, Moffitt's causal mechanisms for LCP offenders can be applied to childhood antisocial behavior.

competent, loving parents. For a number of reasons, however, children with a difficult temperament (and those with neurological problems) are more likely to be raised in less ideal parenting environments.

This is true because many of the possible causes of neurological problems mentioned earlier (e.g., low birth weight, maternal smoking during pregnancy, heredity) co-occur with poor parenting and adverse social conditions. For example, mothers who engage in behaviors that put an unborn child at risk may be less likely to have the characteristics associated with good parenting. Alternatively, low birth weight or exposure to toxins may be the result of adverse social conditions. Also, because parents and children tend to resemble each other on temperament, personality, and cognitive ability, parents of children who are difficult to manage may lack the necessary psychological and physical resources to cope with a difficult child. In Moffitt's (1993b: 681) words, "with regard to risk for antisocial behavior, nature does not follow a 2 X 2 design with equal cells."

Thus, the main causal mechanism for initiation into the LCP trajectory is the interaction between a toddler with subtle neuropsychological problems (and therefore a difficult temperament), and an adverse parenting context. Moffitt (1993a) theorizes that this combination of child effects and family adversity lead to a transactional process of failed parent-child encounters. To explain how the child may affect parents and parenting strategies, she uses the example of low birth-weight, premature infants: "they arrive before parents are prepared, their crying patterns are rated as more disturbing and irritating, and parents report that they are less satisfying to feed, less pleasant to hold, and more demanding to care for than healthy babies" (Moffitt, 1993a: 682).

As the toddlers with neuropsychological deficits age, they are more likely to resist the socialization efforts of parents. Parents, in turn, may become less willing to actively supervise or correct deviant behavior. This may be especially true of parents in adverse circumstances, or those who lack parenting skills. In short, Moffitt (1993b) predicts that there is an interaction between “child effects” (driven by subtle neuropsychological deficits) and adverse parenting environments, deviant parents, or both.

Thus, in contrast to the mediation model, Moffitt articulates what “child effects” are important, and how they relate to social structural factors<sup>9</sup>. To different extents, mediation model theorists acknowledge the validity of such child effects, but neither include them in their core causal concepts, or articulate how they relate to the larger context of the family. Further, the logic of Moffitt’s theory suggests that common measures of parenting efficacy (e.g., supervision, harsh punishment) probably reflect both initial parental competency as well as the effects of early childhood conduct problems on parenting.

The available evidence regarding Moffitt’s main constructs can be organized into three areas: (a) evidence that connects neuropsychological deficits to antisocial behavior, (b) evidence that connects adverse parenting contexts or poor parenting to the child’s antisocial behavior, and (c) evidence that there is an interaction between child effects and parenting. As noted earlier, both observed parenting skills (e.g., monitoring, supervision,

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<sup>9</sup> To be sure, most advocates of the mediation model agree (to differing extents) that individual differences in child characteristics such as temperament or cognitive ability are important. However, they fail to articulate both what may cause these individual differences, and how they may combine with structural influences. For example, while Gottfredson and Hirschi (1990) recognize that children may differ in the degree to which they originally manifest traits consistent with low self-control (e.g., impulsivity, intelligence), they argue that is always possible, to effectively socialize a child. Similarly, Sampson and Laub (1993) include measures of temper tantrums (a proxy for individual differences in temperament), but only to demonstrate that parenting and adversity remain significant in the mediation model.

consistent punishment) and adverse parenting contexts are consistently related to childhood antisocial behavior. Therefore, the discussion that follows is focused on the main and interactive effects of neuropsychological deficits.

Neuropsychological deficits (especially subtle ones) are difficult to detect and measure. Nevertheless, some available research exists that links various proxies for the deficits to childhood antisocial behavior, delinquency, or persistent offending (Kandel, Brennan, and Mednick, 1989; Mednick and Kandel, 1988; Moffitt, 1990; Farrington et al., 1990). For example, "minor physical anomalies," thought to be observable markers for deficits in neural development, have been linked to violent adult offending. Also, brain insult suffered from child delivery complications has been empirically connected to antisocial behavior (Kandel and Mednick, 1991).

Moffitt argues that the empirical relationship between deficits in neuropsychological functioning (measured during childhood or adolescence) is one of the most robust in the study of antisocial behavior. Specifically, she points to evidence linking both verbal and executive functions to antisocial behavior. Verbal deficits include problems with receptive listening and reading, problem solving, expressive speech and writing, and memory. Moffitt (1990a; 1993a, 1993b; Moffitt and Henry, 1991; Lynam, Moffitt, and Stouthamer-Loeber, 1993; Lynam and Moffitt, 1995) argues that the IQ-crime relationship (especially verbal IQ) consistently found in the empirical literature is independent of social class, test motivation, race, and academic attainment, and therefore represents a true relationship between verbal deficits and antisocial behavior. This position stands in stark contrast to mainstream criminologists who

typically view IQ as having an indirect effect (operating through academic achievement) on delinquency (Ward and Tittle, 1994; Hirschi and Hindelang, 1977).

Executive functions refer to normal functions of the frontal lobe, including abstract reasoning, the ability to sustain attention, self-monitoring, abstract reasoning, and the inhibition of inappropriate or impulsive behavior. Moffitt views general intelligence scores as a broad index of executive functioning. Additionally, there are numerous tests (e.g., card sorting, maze tests) that tap into a child's ability to stay on task, and sustain attention. The limited evidence available suggests that these tests do discriminate between youths with and without conduct problems or juvenile delinquency (Skoff and Libon, 1987; Moffitt, 1990a; Moffitt, Lynam, and Silva, 1994).

Finally, as noted earlier, children with ADHD are more likely to display childhood antisocial behavior than non-ADHD children (Lahey and Loeber, 1997). In fact, measures of attention deficit symptoms (restlessness, impulsivity) and childhood antisocial behavior tend to be very highly ( $r > .5$ ) correlated (Farrington et al., 1990). While some have suggested collapsing ADHD and CD into a single dimension, the empirical evidence suggests that they each have distinct precursors and outcomes (Fergusson, Horwood, and Lloyd, 1991; Loeber and Van Kammen, 1990; Rapport, Scanlan, and Denney, 1999).

Specifically, ADHD children are much more likely to have executive deficits than children with only conduct problems, and ADHD is more strongly related to academic achievement than CD (Rapport et al., 1999; Farrington et al., 1990). Indeed, Moffitt and Henry (1991) question whether "executive deficits" and ADHD might represent the same

concept. Finally, there is evidence that ADHD has a strong genetic component, whereas CD does not (Rutter, 1997b).

Thus, there is some evidence that neuropsychological functioning is related to delinquency, especially persistent antisocial behavior that begins in childhood. As noted earlier, there is also substantial support for the effect of a wide range of adverse parenting contexts, and for poor parenting techniques. The crux of Moffitt's theory, however, is a biosocial interaction--the co-occurrence of parental context and neuropsychological deficits.

Recent research has demonstrated the importance of biosocial interactions in the explanation of both offending patterns in general, and violence in particular (Brennan et al., 1997; Moffitt, 1990b; Kandel and Mednick, 1991; Raine et al., 1994, 1997; Tibbetts and Piquero, 1999). Biosocial interactive processes include the co-occurrence of birth complications and poverty or maternal rejection (Raine et al., 1994) and the combination of low birth weight and low SES or weak family structure (Tibbetts and Piquero, 1999). Yet, the majority of research to date has not examined the effect of biosocial interactions in the context of Moffitt's framework. Further, many of these studies used violent adult criminality (or antisocial personality disorder) as an outcome. This may provide indirect evidence of a link between biosocial interactions and childhood antisocial behavior because most antisocial adults were antisocial children (e.g., the stability effect).

Specific tests of Moffitt's interaction hypothesis have been supportive of the link between early life circumstances and childhood antisocial behavior or early delinquency. For example, Tibbetts and Piquero (1999) found that the interaction between low birth weight and disadvantaged environment was related to early onset delinquency, but not

late onset in a sample of inner city black youth. Results from Moffitt's (1990b) New Zealand study indicated that boys with low neuropsychological test scores and adverse home environments had mean aggression scores that were four times higher than boys with just one of those characteristics. Later analyses indicated that neuropsychological test scores were related to early onset delinquency, and high rate offending status, but not late onset (adolescent) offending (Moffitt et al., 1994).

Interactions between more proximate measures of neuropsychological status and social adversity have also been supportive of Moffitt's theory. For example, there is strong evidence that youth with both CD and ADHD (e.g., comorbidity) have worse long-term outcomes than children with only one of the disorders (Farrington et al., 1990; Loeber and Lahey, 1997; Rutter, 1997a). Taken together with evidence suggesting executive deficits within ADHD groups, and adverse parenting (and parenting context) for CD children, the negative consequences for the comorbidity of CD and ADHD provides support for Moffitt's interactional hypothesis. A less tautological approach would be to test the effect of the interaction between impulsive, hyperactive youth (a proxy for neuropsychological deficits) and either adverse parenting environments or poor parenting on childhood antisocial behavior.

In short, there is some evidence that the interaction between neuropsychological deficits and adverse parenting circumstances increases the likelihood of delinquency and crime. Less is known about how this biosocial interaction affects childhood antisocial behavior. In contrast, the control theory perspective (and the moderation model) has received extensive empirical examination and support. The present dissertation therefore

focuses on the interaction model by examining the following research questions and hypotheses.

*Research Question #1: Do adverse social circumstances (e.g., poverty, maternal deviance, low maternal education, adolescent motherhood, single parent status) interact with proxies for neuropsychological deficits to increase the likelihood of childhood antisocial behavior?*

Research hypothesis 1a: The interaction between an adversity index and low birth weight will increase the likelihood of antisocial behavior independent of main effects of either of these variables.

Research hypothesis 1b: The interaction between an adversity index and pre/perinatal maternal smoking will increase the likelihood of antisocial behavior independent of main effects of either of these variables.

Research hypothesis 1c: The interaction between an adversity index and pre/perinatal maternal alcohol use will increase the likelihood of antisocial behavior independent of main effects of either of these variables.

Research hypothesis 1d: The interaction between an adversity index and a measure of cognitive ability will increase the likelihood of antisocial behavior independent of main effects of either of these variables.

Research hypothesis 1e: The interaction between an adversity index and a measure of hyperactivity will increase the likelihood of antisocial behavior independent of main effects of either of these variables.

## **THE STABILITY OF ANTISOCIAL BEHAVIOR**

A central theme in this dissertation is that childhood antisocial behavior has important implications for the study of delinquency and crime. Indeed, the stability of antisocial behavior from childhood to adulthood is well documented (Huesmann et al., 1984; Lipsey and Derzon, 1998; Loeber, 1982; Loeber and Stouthamer-Loeber, 1987). Almost without exception, the early antisocial behaviors of youth are predictive of adolescent delinquency, and remain predictive at later ages (Loeber and Dishion, 1983). Researchers have documented that childhood behavior problems (e.g., "difficult to

manage”) measured as early as age five are among the strongest predictors of later (age 11) antisocial behavior (White, Moffitt, Earls, Robins, and Silva, 1990).

Despite our knowledge regarding the stability of antisocial behavior, many issues remain unresolved. This purpose of this portion of the chapter is to provide an overview of both the empirical literature documenting stability, as well as the explanations for continuity. Special attention is paid to stability from childhood to adolescence.

### ***Empirical Support for the Continuity of Antisocial Behavior***

Although research almost universally documents a degree of continuity in antisocial behavior, the strength of stability estimates depend upon several factors, including (a) the measure of antisocial behavior, (b) the measurement lag, and (c) the developmental period (e.g., childhood to adolescence versus adolescence to adulthood) of study (Lipsey and Derzon, 1998; Loeber and Dishion, 1983; Loeber and Stouthamer-Loeber, 1987). Stability in criminal offending from adolescence onward is perhaps the most well documented aspect of continuity. Loeber and Stouthamer-Loeber (1987) used meta-analytic techniques to review studies that measured stability from juvenile delinquency to adult offending.

The stability of offending in four well-known longitudinal studies of criminal offending (Polk, 1975; McCord, 1979; Osborn and West, 1980; Wolfgang et al., 1987) yielded RIOC coefficients ranging from 30.4 to 60.0. Framed in terms of the percentage of delinquents who became adult offenders, the estimates varied from 39.2% to 71%. These stability estimates were based on official measures (e.g., arrest or conviction) of both juvenile delinquency and adult crimes. Longitudinal studies that relied upon self-report measures of delinquency and crime, and assessment periods averaging two years,

produced RIOC coefficients ranging from the low thirties to the low forties (Loeber and Stouthamer-Loeber, 1987). It is unclear at this point why there is a reduction in strength of stability between studies that use official versus self-report measures. For example, the inclusion of more “minor” offenses in self-report studies may deflate stability estimates. Conversely, the high stability estimates for official measures of crime may reflect a higher probabilities of police detection (LeBlanc and Loeber, 1998).

In addition to the relationship between past and future criminal offending, there is a substantial body of literature examining the relationship between childhood antisocial behavior and subsequent criminal activity (Lipsey and Derzon, 1998; Loeber, 1982; Loeber and Stouthamer-Loeber, 1987). Child developmental studies indicate that conduct disorder, particular conduct problems (aggression, lying, truancy, stealing), and general problem behaviors—are predictive of later delinquency (LeBlanc and Loeber, 1998).

In a recent meta-analysis of this literature, Lipsey and Derzon (1998) outlined the strongest predictors of “serious and violent” offending during late adolescent to early adulthood (ages 15-25). For measures collected when subjects were aged 6-11 years, the mean effect size was strongest for measures of general offenses ( $r = .38$ ) followed by substance abuse ( $r = .30$ ), aggression ( $r = .21$ ) and problem behavior ( $r = .13$ ). In later childhood (ages 12-14) the rank ordering of predictors changed slightly, with general offenses ( $r = .26$ ) remaining the strongest, followed by aggression ( $r = .19$ ), problem behavior ( $r = .12$ ) and substance abuse (.06).

Regardless of whether stability is measured from childhood to adolescence, or from adolescence to adulthood, those exhibiting greater levels of antisocial behavior

demonstrate greater stability. Reviewing the literature on childhood predictors of delinquency, for example, Loeber (1982) noted that continuity is highest for individuals whose early problem behavior were: (a) high in frequency or variety, (b) occurred in multiple settings or (c) occurred at an early age. Similarly, “chronic” juvenile offenders, and those with an early onset of delinquency, evidence greater stability (LeBlanc and Loeber, 1998; Lahey et al., 1999; Tolan, 1987).

Despite the consistency of empirical findings regarding stability, several issues remain unresolved. First, as LeBlanc and Loeber (1998) note, there are relatively few studies that focus on stability during early to late childhood. Second, most studies focus either on boys alone—if females are included in the sample, they are not assessed separately (Loeber and Stouthamer-Loeber, 1986; Lipsey and Derzon, 1998). Third, and most importantly, despite the impressive consistency of studies indicating high levels of continuity, stability coefficients are far from perfect (Loeber and Stouthamer-Loeber, 1998). Comparing retrospective and prospective studies underscores this point.

Retrospectively, most chronic adult criminals were antisocial children. Robins’ (1978: 617) studies of African-American men and Vietnam veterans, for example, lead her to conclude that, “antisocial personality rarely or never arose *de novo* in adulthood.” Prospectively, it has been estimated that over half of antisocial children do not become antisocial adults (Moffitt, 1993a; Moffitt et al., 1996). Thus, despite strong stability effects, within individual change in antisocial behavior over time is also clearly present (Sampson and Laub, 1993). Therefore, explanations of stability must also account for change in antisocial behavior.

### *Explanations of Continuity*

As noted in Chapter one, there are two broad types of explanations for continuity in antisocial behavior. The first type, usually called either a “population heterogeneity” or a “trait” explanation, suggest that individuals differ in some biological or psychosocial factor that makes them more likely to engage in delinquent and criminal activities. This factor, labeled “criminal potential” (Farrington, 1997), “low self-control” (Gottfredson and Hirschi, 1990), “impulsivity” (Wilson and Herrnstein, 1985) or simply “criminality” (Hirschi and Gottfredson, 1986), is hypothesized to be stable over the life-course, and therefore explain the stability of antisocial behavior. In a pure trait explanation, propensity is the sole cause of crime, and any relationships between social influences and crime are hypothesized to be the spurious consequence of social selection.

In contrast to this position, mainstream criminological theories (Akers, 1985; Hirschi, 1969; Merton, 1938; Sutherland, 1947) have long maintained that social relationships alone caused crime (Wright, Caspi, Moffitt, and Silva, 1999). For example, Hirschi (1969) argued that humans were inherently motivated towards antisocial behavior, and refrained from criminal activity only because of their attachments to social institutions (e.g., peer groups, family, school, employment). More recently, researchers have argued that both social causation and social selection are implicated in the explanation of offending (Farrington, 1986; Moffitt, 1993a; Patterson, 1993; Sampson and Laub, 1993).

The interplay between social selection and social causation, referred to as state dependence, cumulative continuity, or as a “stepping-stone” approach, is the second type of stability explanation (Farrington, 1986; Moffitt, 1993a; Sampson and Laub, 1993;

Wright et al., 1999). Theorists operating within this framework typically argue that initial antisocial behavior (or propensity) has causal effects on the social environment. The environment, in turn, has causal effects on later antisocial behavior. Referring to childhood antisocial propensity, Caspi, Elder and Bem (1987: 308) summarize this position: "The child acts; the environment reacts; and the child reacts back in mutually interlocking evocative interactions."

For example, Moffitt (1993a) suggests that children with antisocial tendencies tend to alienate themselves from prosocial peers and the school environment. Failure in these domains may limit these children's ability to acquire and practice prosocial skills. In adolescence, antisocial youth are likely to fail in school, and to be exposed to deviant peers (Patterson, 1993; Wright et al., 1999). Finally, in the transition from adolescence to adulthood, antisocial behavior may limit opportunities for both a quality job and a quality marriage (Sampson and Laub, 1993).

Empirical tests of these stability explanations have sought to answer three related questions: (a) is early propensity sufficient to explain later offending? (b) if early propensity is insufficient, what additional social factors are required? and (c) do social factors mediate or moderate the effect of childhood antisocial propensity on delinquency and crime? The discussion that follows reviews the evidence regarding each of these questions. The departure point for this discussion is a review of the evidence concerning the most recent pure population heterogeneity explanation.

Gottfredson and Hirschi's (1990) general theory of crime is a classic population heterogeneity explanation. As noted earlier in the chapter, the central causal tenant of this theory is that poor parenting (parents failure to adequately supervise, monitor and

punish) leads to low self-control. According to the theorists, individuals with low self-control will, "tend to be impulsive, insensitive, physical (as opposed to mental), risk-taking, short-sighted, and nonverbal" (Gottfredson and Hirschi, 1990: 90). This constellation of traits crystallizes in early childhood (by age eight), and is largely immutable to alternative socialization efforts (e.g., school, corrections, marriage, friends) thereafter.<sup>10</sup>

As with the parenting mechanisms that foster self-control, the characteristics of this trait were largely gleaned from existing empirical research. Again, it is not surprising then, that specific tests of the general theory are largely supportive (Grasmick, Tittle, Bursik, Arneklev, 1993; Piquero and Tibbetts, 1996; Evans, Cullen, Burton, Dunaway, Benson, 1998; Pratt and Cullen, 2000). For example, using meta-analytic techniques, Pratt and Cullen (2000) found that both attitudinal (.257) and behavioral (.277) measures of low self-control had robust mean effects on delinquency or crime. The logic of Gottfredson and Hirschi's theory, however, also suggests that controlling for low self-control should render relationships between social factors (e.g., delinquent peers, school failure) and crime insignificant.

Empiricists can test this claim in one of two ways. First, researchers can directly measure low self-control (or other theoretical conceptualizations of propensity), and include the measure with variables from competing theories. This research strategy has uncovered evidence both favorable and unfavorable to the pure population heterogeneity position (Evans et al., 1997; Sampson and Laub, 1993). Evans et al. (1997), for example, tested the effect of low self-control on crime in a sample of Midwest adults. After

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<sup>10</sup> Technically speaking, of course, Gottfredson and Hirschi's general theory is a social causation theory in childhood, but a pure trait theory from early adolescence onward (Sampson and Laub, 1995).

controlling for both behavioral and attitudinal measures of low self-control, most measures from competing theories (e.g., criminal associates, criminal values) failed to maintain a significant relationship to offending. The dominance of low self-control, however, was not complete. A measure tapping neighborhood disruption maintained an independent effect on crime.

Using data from Moffitt's Dunedin sample, Wright et al. (1999) also found evidence of social causation. Specifically, after controlling for low self-control in childhood and adolescence (parent and teacher reports of impulsivity and lack of persistence), they found that several social measures (delinquent peers, educational aspirations, educational achievement) maintained a significant relationship with adult offending. Further, these social factors substantially (attenuation effects ranged from 14% to 44%) mediated the relationship between low self-control and crime.

Sampson and Laub (1993) controlled for "propensity" using multiple strategies, including: (a) running models within samples classified as officially delinquent or non-delinquent, (b) controlling for the frequency of offending in adolescence, and (c) controlling for parent, teacher, and youth reports of troublesome and delinquent behavior. Despite these controls, other social factors, including job stability and marital attachment, remained predictors of adult crime.

In social science research, regardless of how well a concept is operationalized, measurement is never perfect, and measurement error is always present. Gottfredson and Hirschi (1994: 49) claim that any significant relationships beyond low self-control are

likely due to empiricists' inability to adequately measure this concept<sup>11</sup>. To test this assertion, researchers have used measures of "unobserved population heterogeneity," within random effects models. With one exception (Nagin and Farrington, 1992) these studies have replicated the findings of studies using only direct measures of propensity (Nagin and Paternoster, 1991; Paternoster and Brame, 1997; Paternoster et al., 1997).

For example, Paternoster and Brame (1997) used both observed (behaviors and attitudes) and unobserved (correlated error term) measures of propensity to examine stability in a sub-sample of the National Youth Survey. Despite these controls for population heterogeneity, both past offending and exposure to delinquent peers had a significant effect on criminal offending.

In short, regardless of whether or not measures of propensity are "observed" via behaviors and attitudes, or statistically derived to capture unobserved individual differences, the conclusion remains rather clear. Individual differences in self-control, or antisocial potential, are important predictors of antisocial behavior, but they do not fully explain the stability process. Further, there is evidence that that at least part of the

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<sup>11</sup> Gottfredson and Hirschi (1990) note that, in addition to low self-control, there must be "opportunities" to offend in order for a criminal event to occur. Thus, some authors have tested for interaction effects between measures of opportunity and self-control. As is discussed below, Gottfredson and Hirschi claim that significant relationships between social factors and crime, after controlling for low self-control, are due to either measurement error or "opportunity factors." While measurement error is always problematic in social science research, Gottfredson and Hirschi's use of "opportunity" reeks of a blunt methodological tool aimed at absorbing both meaningful and random variation (Samson and Laub, 1994). In any case, the notion that there is substantial variation in "opportunity" is completely antithetical to Gottfredson and Hirschi's (1990) conceptualization of the nature of crime and criminals. The theorists claim that little or no training is required for committing a criminal act, and that opportunities for criminal behavior are ubiquitous. For example, they note that, "ordinary crime requires little in the way of effort, planning, preparation or skill," and that "the burglar typically walks to the scene of the crime; the robber victimizes available targets on the street; the embezzler steals from his own cash register; and the car thief drives away cars with keys left in the ignition" (Gottfredson and Hirschi, 1990: 17). It is difficult to imagine an individual (especially one lacking self-control) in such a world that could not find any opportunity to commit a crime. The position taken here is that employing opportunity as an explanatory variable is wholly counter to their concept of both the nature of crime and the nature of criminality. Therefore, opportunity is not discussed here as a causal factor.

relationship between childhood antisocial behavior and adult crime is accounted for by social factors implicated in processes of cumulative continuity.

The bulk of theoretical and empirical literature that examines cumulative continuity focuses on the transition from adolescence to adulthood (Nagin and Paternoster, 1991; Paternoster and Brame, 1997; Sampson and Laub, 1993). Relatively little is known about factors that foster stability during childhood. More often, childhood antisocial behavior (or propensity) is treated as an independent predictor of delinquency rather than as an initial form of antisocial behavior.

For example, Sampson and Laub's (1993: 244-245), full theoretical model of crime suggests that early propensity operates entirely through its effect on social control processes (family, school, peers). This represents a pure social causation model, whereby the relationship between childhood antisocial behavior and delinquency is the spurious consequence of the fact that both are related to social control processes. By way of contrast, from adolescence to late adulthood, prior antisocial behavior has both a direct (e.g., individual differences in propensity) and indirect path (operating through social bonds) to later antisocial behavior.

This inconsistency becomes even more intriguing in light of the empirical evidence that they provide as support of their structural/family model of delinquency. In empirical models predicting official or self-report delinquency, where both child effects (temper tantrums, early onset misbehavior, conduct disorder) and social effects are included, child effects exert a significant, direct effect on delinquency (Sampson and Laub, 1993: 92-94). While Sampson and Laub make note of this fact, they treat what others might regard as early propensity as control variables necessary to isolate true

social effects. In other words, “child effects may exist, but they are hardly sufficient for explaining delinquency, especially when compared with the socializing influence of the family” (Sampson and Laub, 1993: 97).

Thus, while the authors clearly concede that early childhood antisocial behaviors are directly related to delinquency, they make no effort to integrate these findings within their control theory framework. Rather, the authors minimize the importance of child effects by claiming that social process variables explain more of the variation in delinquency. In summarizing the early portion of their theory, for example, Sampson and Laub (1993: 24) note that, “whereas difficult children who display early antisocial tendencies (for instance, violent temperament) do sort themselves into later stages of delinquency, the processes of informal social control explain the largest share of variance in adolescent delinquency.”

Rather than pit childhood antisocial behavior against socialization variables in a battle of “who can explain the most variance,” a more promising theoretical and empirical route might be to ask how these variables may interact. For example, are socialization variables (or school attachment) more salient for children with a high propensity toward antisocial behavior, or do socialization variables attenuate the effect of early antisocial behavior on delinquency?

Such questions are central to Moffitt’s (1993a) explanation of life-course-persistent offending. As noted earlier, Moffitt (1993a) theorizes that childhood antisocial behavior is the result of an interaction between a child with a difficult temperament and poor parenting context. She suggests (see Patterson, 1993) that this early propensity towards crime is enhanced by the consequences of antisocial behavior. For example,

antisocial youths are likely to be rejected by peers, and therefore lose out on opportunities to practice prosocial behavior. Further, antisocial children are more likely to get in trouble at school, and therefore miss out on opportunities to improve reading and verbal skills.

The process of cumulative continuity outlined by Moffitt and others suggests that the “excess baggage” accrued by antisocial youths should have additive effects that are independent of antisocial propensity, but may moderate the effect of prior antisocial behavior on delinquency (Wright, Caspi, Moffitt, and Silva, 1999). More recently, Wright and associates (2000) have provided evidence that factors such as school attachment and delinquent peer exposure may moderate (rather than mediate) the effect of childhood antisocial propensities on juvenile and adult offending. Using data from the Moffitt’s Dunedin cohort, the authors found that the delinquent peers amplified offending most strongly, and education reduced crime most strongly, among individuals displaying high levels of childhood antisocial behavior.

In short, the relationship social factors such as academic achievement and exposure to delinquent peers to offending has been viewed by different theorists as either a spurious selection effect or evidence of cumulative continuity. Further, theorists hypothesize that such factors may moderate or mediate (or both), the effect of early antisocial propensity on later delinquency and crime. This dissertation seeks to add to the emerging literature regarding explanations of stability by assessing stability at two different time points. Specific research questions are and corresponding research hypotheses are outlined below.

*Research Question # 2: Are individual differences in antisocial propensity sufficient to account for the stability of antisocial behavior?*

Research hypothesis 2a: Childhood antisocial behavior will have a significant direct effect on pre-adolescence delinquency.

Research hypothesis 2b: The relationship between childhood antisocial behavior and pre-adolescence delinquency will remain significant after controlling for peer rejection and academic achievement.

Research hypothesis 2c: Peer rejection and academic achievement will still be significantly related to pre-adolescent delinquency, even after controlling for childhood antisocial behavior.

Research hypothesis 2d: Peer rejection and academic achievement will partially mediate the relationship between childhood antisocial behavior and pre-adolescent delinquency.

*Research Question #3: Are the effects of peer rejection and academic achievement on early delinquency similar children with high and low levels of childhood antisocial behavior?*

Research hypothesis 3a: Peer rejection and academic achievement will have a stronger effect on delinquency for individuals who were antisocial as children.

*Research Question #4: Are individual differences in antisocial propensity sufficient to account for the stability in antisocial behavior from early to late adolescence?*

Research hypothesis 4a: Pre-adolescent delinquency will have a significant direct effect on late adolescent delinquency.

Research hypothesis 4b: The relationship between early and late adolescent delinquency will remain significant after controlling for peer pressure, academic achievement, religiosity, and neighbor problems.

Research hypothesis 4c: Peer pressure, academic achievement, religiosity, and neighbor problems will remain significance, independent of pre-adolescence delinquency.

*Research Question #5: Are the effects of peer pressure, academic achievement, neighborhood problems, and religiousness similar children with high and low levels of pre-adolescent delinquency?*

Research hypothesis 5a: Peer pressure, academic achievement, religiosity, and neighborhood problems will be more salient predictors of delinquency for those who demonstrated high levels of pre-adolescent delinquency, than for those who did not.

## GENERAL VERSUS TAXONOMIC DEVELOPMENTAL THEORIES

Thus far in Chapter 2, the discussion of precursors and consequence of childhood antisocial behavior has generally proceeded under the assumption that the processes fostering stability and change are the same for all individuals. The exception, of course, has been references to Moffitt's (1993a) taxonomic theory of offending, in which only "life-course persistent" offenders are germane to a discussion of childhood antisocial behavior. The purpose of this section is to explain why Moffitt and others believe that the explanation of criminal offending requires separate explanations for different types of individuals, and why others might disagree with their position. A secondary purpose is to shed light on the empirical evidence regarding general and taxonomic theories of antisocial behavior.

### *General and Taxonomic Theories of Antisocial Behavior*

Mainstream criminology has been, and continues to be dominated by general theories of crime (Agnew, 1992; Akers, 1985; Gottfredson and Hirschi, 1990; Hirschi, 1969; Merton, 1938; Sampson and Laub, 1993; Sutherland, 1947). "General," in this context, simply means that the theorists argue (or implicitly assume) that the causal mechanisms producing deviance operate similarly for all individuals. Accordingly, variation in offending is due to the fact that individuals differ in the exposure to causal mechanisms. In contrast, taxonomic theories suggest that different causal mechanisms

produce different types of offenders. The recent typological theories advanced by Patterson (1993) and Moffitt (1993a) have created a heated debate in criminology over whether general theories are sufficient to explain the development and persistence of antisocial behavior.

Like many debates in criminology, this argument was foreshadowed by a similar clash that began over a half-century ago. Despite the popularity of general theories, such as social control (Hirschi, 1969), social learning (Sutherland, 1947) and strain (Merton, 1938), a debate began in the 1950s between advocates of general theories and those who preferred typological explanations (Paternoster and Brame, 1997). Advocates of a taxonomic approach argued that criminal offenders and offenses were much too diverse to be captured by any single theory of crime (Gibbons, 1975). For example, Glaser (1972) hypothesized a five-category taxonomy of offenders based on both the type of offense (e.g., subcultural assaulters) and characteristics of the offender (e.g., adolescent recapitulators). Other typological approaches were based on both the cognitive development and personality characteristics of offenders (Eysenck, 1970; Warren, 1971).

Although a hotly contested debate for twenty years, the argument between general and taxonomic theorists subsided in the 1970s (Paternoster and Brame, 1997). As evidenced by contemporary theoretical developments, (Akers, 1985; Agnew, 1992; Gottfredson and Hirschi, 1990) the generalist approach appeared to win out. The general-typological debate, however, was rekindled in the early 1990s. The sparks igniting this recent debate are typological theories that categorize offenders based on developmental trajectories of antisocial behavior rather than personality or offense type.

As noted in Chapter 1, developmental subtypes of offending were derived, in large part, by “criminal career” researchers, who disaggregated age-crime relationships into discrete (e.g., chronics, limiteds) offending trajectories (Blumstein et al., 1986, 1988). Developmental theorists capitalized on these findings by providing specific causal models for different offending trajectories. Current developmental theory focuses largely on a two-group model that differentiates stable, chronic offenders from offenders that experiment in offending during adolescence (Moffitt, 1993a; Patterson and Yoerger, 1993; Simons et al., 1994). One group of offenders (early starters, or life-course-persisters) exhibits high rates of childhood antisocial behavior, and displays extraordinary stability and variety in offending over the life course.

Although a number of authors outlined similar two-group models based on offending patterns, the two particular theories—Moffitt’s (1993a, 1994) dual taxonomy of offending and Patterson’s (1993) early/late starter model—have since garnered most of the attention. Earlier in this chapter, the early starter pathway for each of the theories were explained in detail and treated as general explanations of childhood antisocial behavior. Indeed, viewed from a lens narrowly focused on childhood, these theories are similar to more general developmental (and static) theories of antisocial behavior (e.g., Gottfredson and Hirschi, 1990).

The theories of Moffitt (1993a) and Patterson (1993) diverge from more general explanations of deviance with their explanations of adolescent and adult offending. Specifically, they theorize that individuals who maintain continuity in antisocial behavior from childhood on are joined by a new group of offenders during adolescence. Moffitt refers to these individuals as “adolescent limited offenders” (AL). She explains their

entry into delinquency with a combination strain and social learning concepts. AL offenders are pushed towards delinquency by the strain of the gap between biological and social maturity—while most adolescents have the biological capacities of adults, they are not afforded adult status or privileges by society.

Similar to logic of other strain theories (Cohen, 1955) this “maturity gap” either directly (e.g., engaging in status offenses or drug use) or indirectly (e.g., obtaining money illegally) pushes youth to pursue alternative means of status achievement. While the maturity gap provides motivation towards delinquency, Moffitt suggests that some measure of learning is also necessary. Specifically, she hypothesizes that AL youth emulate, or “mimic” the antisocial lifestyle of LCP youth. Subsequently, their newfound delinquent repertoires are maintained or discarded according to principles of social learning theory (e.g., Akers, 1985).

These two causal mechanisms—specific to AL offending, allow Moffitt to clearly articulate why most delinquent youths desist from antisocial behavior as young adults. First, the maturity gap closes as youth leave high school attain some measure of adult status. Second, the reinforcement contingency that supported delinquency during adolescence shifts to favor conformity in adulthood. During adolescence, for example, delinquency may be rewarding because it symbolizes a youth’s ability to “knife off childhood apron strings” (Moffitt, 1993a: 689). As youths mature and attain adult status, the consequences of delinquency are no longer valued—indeed, they are viewed instead

as punishment.<sup>12</sup> In essence, these youth simply adapt to changing reinforcement contingencies.

Patterson refers to Moffitt's AL group as "late starters." He argues that the primary causal mechanisms for this group are family disruption and exposure to delinquent peers. Specifically, he hypothesizes that parents' socializing influences (e.g., supervision, monitoring) are interrupted by conflict, separation, death or divorce. This interruption allows the youth to "wander," or spend unsupervised time on the streets. In turn, unsupervised street time exposes these youth to delinquent peers. Consistent with social learning theory (Akers, 1985), Patterson hypothesizes that exposure to delinquent peers has a direct causal influence on subsequent adolescent offending.

In short, both Moffitt and Patterson suggest that there are two distinct types of offenders—each traveling down separate offending trajectories that are determined by unique causal forces. Further, both use this typology to explain the juxtaposition of change and stability. Of course, critics of typological theories argue that general theories of offending are sufficient to capture both stability and change (Gottfredson and Hirschi, 1990; Sampson and Laub, 1993).

Gottfredson and Hirschi's (1990) general theory of crime (or any trait theory, for that matter) seems, on the surface, ill suited to explain desistance. Their arguments that low self-control crystallize in early childhood and remain stable thereafter, and that low self-control is the *sole* cause of crime, appear to preclude reduction in antisocial behavior over time. Gottfredson and Hirschi bring their theory into line with the empirical fact of

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<sup>12</sup>Moffitt does note that some adolescent delinquency may "ensnare" some AL offenders into an antisocial lifestyle. For example, drug or alcohol use may lead to addiction, or high levels of truancy may knife off later educational or occupational opportunities.

change by falling back on their earlier position that the age-crime relationship is invariant (Hirschi and Gottfredson, 1983). Thus, they deny that the aggregate age-crime curves “hide” individual offending trajectories, and assume that all individuals “age out” of offending over time. In short, Hirsch and Gottfredson believe that because the age-crime relationship is invariant, it defies empirical explanation.

General theorists who proffer more dynamic explanations of offending are not forced to fall back on the invariance assumption. For example, Sampson and Laub (1993) hypothesize that stability is due both to individual propensity and the cumulative disadvantage created by offending. Therefore, because the central causal mechanisms in their theory (e.g., mechanisms of informal social control) are malleable, their theory allows for desistance. Specifically, they theorize that quality jobs and marriages create social bonds that tie individuals to society, and therefore reduce the likelihood that they will commit criminal acts.

Despite differences in causal mechanisms hypothesized to produce antisocial behavior and the interpretation of desistance, all general theories share a common theme. That is, the causal processes that lead to offending unfold in the same general manner for all individuals. Lahey and colleagues (1999) agree that the age of initiation of antisocial behavior (similar to Moffitt and Patterson) is an important predictor of delinquency and crime. They view onset age as an index of propensity (and therefore a continuous variable), however, rather than as a critical determinant of discrete offender groupings.

### *Different Strokes for Different Folks? Empirical Examinations of Generality*

As Paternoster and Brame (1997) note, the generalist position that a single process is sufficient to explain all offending is tantamount to a null hypothesis. The corresponding research hypothesis is that causal factors will relate differently to different types of offenders. Researchers have tested these hypotheses by comparing relationships between offending and risk factors across discrete offender groups. To the extent that the relationships are similar across offender groupings, the null hypothesis (and the generalist approach) cannot be rejected. A corollary of this null hypothesis is that discrete offender groups should not differ in the degree to which they manifest various risks. For example, the logic of theories predicting dual routes to delinquency (Moffitt, 1993a; Patterson, 1993; Simons et al., 1994) suggests that only early starters (or LCP's) should evidence high levels of family adversity, or low levels of cognitive functioning.

Empiricists generally use one of three strategies to create discrete offender groups. First, based on the prominence given to the age of onset in the theories of both Moffitt and Patterson, researchers have assigned individuals to groups based on their age at the time of their first delinquent act (Dean et al., 1996; Mazerolle, 1997; Paternoster et al., 1997; Simons et al., 1994; Tibbetts and Piquero, 1999). This strategy has yielded mixed results. For example, Simons et al. (1994) tested Patterson's early/late starter model with a sample of 177 boys from midwestern states. They found that for boys arrested prior to age 14, lack of parental monitoring and discipline increased the likelihood of a coercive, non-compliant orientation, (and exposure to delinquent peers), which in turn, increased the probability of offending. For youths arrested after age 14, the measure of non-compliant orientation had no effect on offending. Other researchers

using age of first arrest to create discrete offender groups have also found evidence that the relationship between causal forces and offending varied by group status (Dean et al., 1996; Mazerolle, 1997; Tibbetts and Piquero, 1999).

However, other researches (Paternoster et al, 1997; Mazerolle, 1997) have failed to replicate these findings. For example, Paternoster and his associates (1997) divided a group of males released from a North Carolina training school into high and low propensity groups based on age of first arrest, using several cut-points. They found little difference in predictors of antisocial behavior across these groups<sup>13</sup>.

A second strategy is to retrospectively assign individuals to discrete offender groups based on their offending trajectories from adolescence to late adulthood (Nagin et al., 1995; Nagin and Land, 1995). This strategy has yielded results both favorable and unfavorable to taxonomic theorists. For example, Nagin et al. (1995) probabilistically assigned individuals from Farrington's Cambridge study, based on their adult offending patterns, to one of four groups (high level chronics, low level chronics, adolescent limiteds, and non-offenders). Subsequent analyses revealed that the three offender groups could not be distinguished on most measures of risk (troublesomeness, truancy, general deviance). However, adolescent limiteds had greater job stability and were more attached to their spouse at age 32 than either of the chronic groups.

A final approach is to prospectively assign individuals to discrete offender groups based on direct observations of antisocial behavior in the early life course. Moffitt and her colleagues (1996), using their Dunedin sample, created discrete offender groups

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<sup>13</sup> At least part of the inconsistency of these findings may be due to differences in sample composition. For example, if one assumes that youth in a training school have relatively high levels of propensity (by definition these youth evidenced antisocial behavior in childhood), the variation in "propensity" is restricted.

based on patterns of childhood antisocial behavior and adolescent delinquency. Although a number of measures failed to discriminate AL's from LCP's, the two groups did differ on measures of parental attachment, school dropouts, and adult personality profiles. Further, LCP offenders were more likely to commit violent crimes than AL offenders.

In short, the empirical evidence to date has not settled the debate regarding whether typological or general theories best explain offending behavior. This dissertation seeks to add to the growing body of literature surrounding this issue by comparing discrete offender groups (life-course persistent, childhood recovery, adolescent limited, and normal) defined prospectively, on measures of adversity, parenting, and individual characteristics. Specifically, the analyses address the following research question and hypotheses:

*Research Question #6: Do discrete offender groups differ on social structural or individual level predictors of antisocial behavior and delinquency?*

Research hypothesis 6a: The families of LCP offenders will be characterized by higher levels of structural adversity than the families of AL offenders.

Research hypothesis 6b: LCP offenders will have exhibit higher levels of risk for neuropsychological impairment than AL offenders.

Research hypothesis 6c: LCP offenders participate in more violence than AL offenders.

Research hypothesis 6d: LCP offenders are more ensnared in the consequences of their childhood antisocial behavior than AL offenders. This will be reflected in school difficulties and risky behaviors.

## CHAPTER 3

### METHODS

This dissertation investigates the predictors of childhood antisocial behavior, the continuity of antisocial behavior over time, and the possible need for typological theories to explain continuity and change. Given the developmental nature of this inquiry, and the research questions outlined in Chapter 2, the data requirements are substantial.

Specifically, the research questions require prospective, longitudinal data that spans from birth through late adolescence. Further, the data must include information on important biological, social, and psychosocial characteristics of both the subjects and their parents.

Given these data requirements, primary data collection would be prohibitively expensive and the time span of data collection untenable. Therefore, the present study takes advantage of the availability of secondary data. Specifically, this study uses the National Longitudinal Survey of Youth (NLSY), and NLSY Child-Mother data sets. These data have been used in numerous studies to examine topics ranging from job mobility and educational attainment to childcare arrangements and childhood behavior adjustment (CHRR, 1999).

The NLSY is an ongoing, prospective longitudinal study funded by the United States Department of Labor. It has been administered yearly since 1979 to a national probability sample of individuals ages 14-21 at the start of the survey. The primary purpose of the NLSY is to collect data pertaining to labor force experiences of the respondents, including their labor market attachment and experiences, and investments in education and training. The content of the NLSY has become broadened over time, due

to interests from additional funding agencies, including the Department of Defense, the National Institute of Education, the National Institute on Alcohol Abuse and Alcoholism, and the National Institute of Child Health and Human Development (CHRR, 1997).

In 1986, a separate data collection process was started to gather information about all children born to females in the original NLSY cohort. These children and their mothers have been interviewed biannually from 1986 to 1996. Because of extensive input from developmental psychologists regarding design and measure selection, the data include rich measures of psychologically oriented mediating and outcome variables, home observations, and repeated measures of children's behavior (Brooks-Gunn, Phelps, and Elder, 1991). Taken together, the NLSY and the NLSY Child-Mother merged data files provide a unique opportunity to examine the research questions outlined in Chapter 2. Specifically, the data contain measures that tap into important domains of biological risk, prenatal social circumstances, parenting, and antisocial behavior from early childhood through adolescence.

The remainder of this chapter is structured into four sections. The first section describes the NLSY and NLSY Mother-Child data sets, and discusses in detail the data collection procedures for each data set. The second section provides an overview of the sub-sample selected for the analyses. The third section describes the selection and construction of measures. The final section of the chapter outlines the analytic strategies that are used to address the research questions.

## THE NLSY DATA

The NLSY sample was designed to represent the entire population of American youth age 14-21 as of December 31, 1978. The full sample (N = 12, 686) was comprised of three independent probability samples drawn by the National Opinion Research Center at the University of Chicago. The main sample (N = 6,111) was designed to be representative of the non-institutionalized civilian segment of American youths born between January 1, 1956 and December 31, 1964. The remaining samples include an oversampling of Hispanic, black, and economically disadvantaged non-Hispanic, non-black youth (N = 5,295); and a sample (N = 1,280) designed to mirror the military population aged 17 to 21 (CHRR, 1999).

The samples were drawn through a multi-stage stratified area probability sample of dwelling units and group quarter units. This sampling design specified that all individuals residing in a selected household who were aged 14-21 be retained. Accordingly, the 16,686 subjects interviewed in 1979 were drawn from 8,779 unique households (CHRR, 1999). In other words, multiple respondents were drawn from 2,862 households.<sup>14</sup>

### *Data Collection Procedures*

With the exception of one wave (1987), respondents have been interviewed face-to-face with one of two data collection techniques.<sup>15</sup> During the first decade of the study (1979 to 1989) the survey was administered using a paper and pencil survey instrument.

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<sup>14</sup> It is possible that including multiple children from the same family may bias the data and artificially reduce the standard error of coefficient estimates. To check for this possibility, analyses are re-run on a reduced sample consisting of only the youngest child from each family.

<sup>15</sup> In 1987, surveys were administered by phone due to budget constraints.

In 1989 and 1990, computer-assisted personal interviews (CAPI) were administered on sub-samples of the NLSY<sup>16</sup>. Citing improvements in data quality over the paper and pencil technique, CCHR has used the CAPI method on all NLSY respondents since 1993 (CHRR, 1999). The average interview length is approximately one hour, and respondents who complete interviews are paid 10 dollars.

Face-to-face interviews have several well-documented advantages over mail or telephone surveys (Maxfield and Babbie, 1995). First, face-to-face interviews typically yield higher response rates than alternatives, because it is easier for respondents to hang up a phone or throw away a mailed instrument than it is to turn away an interviewer. High response rates are desirable because nonparticipation can bias the data. Second, (and for the same reasons noted above), face-to-face interviews are preferred for lengthy interview processes. Third, with the face-to-face technique, interviewers can provide a guard against confusing questionnaire items or skip patterns in the survey instrument—though they must be careful not to bias the data themselves. Finally, the face-to-face technique allows data collectors to observe the subjects as well as ask questions. NLSY interviewers recorded information ranging from housing conditions to the type and frequency of parent child-interactions.

Face-to-face interviews also have some disadvantages. Most notably, interviewers can introduce bias into the survey process by their demeanor, dress, or interviewing skills. To reduce the likelihood of such bias, the CHCR conducts several training sessions and pilot tests to insure that interviewers are prepared and that ambiguities associated with coding or skip patterns are addressed. A related problem is

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<sup>16</sup> For the CAPI interviews, interviewers take a laptop computer into the field instead of questionnaire booklets. A computer program automatically selects the appropriate questions, prevents the entry of illegal values, and warns the interviewer about implausible answers.

that respondents may be hesitant to report acts of a sensitive (e.g., crime) nature. Finally, face-to-face interviews can be prohibitively expensive. Indeed, despite receiving funding from multiple sources, budget constraints dictated a limited telephone interview rather than the full, face-to-face interview.

### *Attrition and Sample Drops*

Any research design that collects data from the same individuals over time is likely to suffer some attrition. Attrition is a concern because (assuming that it is not random) it may bias the data. Attrition is simply the percentage of eligible respondents who are not interviewed. In addition to sample attrition, funding constraints required that selected respondents in the military and supplemental sub-samples be dropped from interviewing. Specifically, after the 1984 survey, interviewing ceased for 1,079 members of the military sub-sample (201 respondents were randomly selected and retained). After the 1990 survey, all (N = 1,643) of the economically disadvantaged non-black, non-Hispanic respondents from the supplemental sample were dropped. Individuals who were dropped from the sample are not considered "eligible" for interviews, and are therefore not included in the calculation of attrition rates.

The attrition rate for NLSY respondents have remained close to 10% during the 18 interview rounds, with a low of 3.7% and a high of 10.8% (CHRR, 1999). This level of attrition is unlikely to bias estimates derived from the NLSY sample.

### *Overview of the Data*

As noted earlier, the primary purpose of the NLSY was to collect data pertaining to labor force experiences of the respondents. Accordingly, the NLSY surveys have contained core sets of questions for each wave on the following topics: (a) work and non-work experiences, (b) training investments (c) schooling and school record information, (d) family income and assets, (e) health conditions and injuries, (f) household composition (g) geographical residence, (h) military service, and (i) marital and fertility histories (CHRR, 1999).

Additionally, select survey years have included questions tapping the following domains: (a) job search methods, (b) school discipline, (c) child care, (d) self-esteem, (e) delinquency, (f) drug and alcohol use, (g) educational/occupational aspirations, (h) prenatal and postnatal health behaviors, (i) attitudes toward work, (j) childhood residences, and (k) neighborhood problems.

### **CHILDREN OF THE NLSY**

As noted earlier, a separate data collection process was started in 1986 to gather information about all children born to females in the original NLSY cohort. The children of the NLSY are interviewed and assessed biannually, during the same field period as the parent interviews. The original NLSY sample included 6,283 women. The sample size was reduced to 4,994 women when the military (1984) and economically disadvantaged (1990) white respondents were dropped. Of the 4,994 remaining women, 88% (4,361) were interviewed in 1996. Of these women, 30% (3,498) were mothers. In order to be

included in the most recent (1996) interview, children must have been born by December 31, 1996. The 7,103 children interviewed in 1996 represents a cross section of children born to a nationally representative sample of women who were between the ages of 31 and 38 on January 1, 1996. It is estimated that the children in the sample represent approximately the first 80% of childbearing to a contemporary cohort of American women (Center for Human Resource Research, 1998).

### *Data Collection Procedures*

As with the NLSY data collection, data for the children of the NSLY were collected through face-to-face interviews. Interviewers observe the home environment and parent-child interactions, administer surveys, and completed direct assessments of the children (e.g., PIAT achievement tests, intelligence tests). Again, as with the NLSY, interviewers utilized pencil and paper instruments until 1994, when they were replaced by CAPI methodology. NLSY interviewers meet with the children and their mothers (or occasionally other guardians) in the mother's residence. The child assessment and interview generally take place during the same time as the mother's interviews, and add approximately 45 minutes to the total survey administration time. Households with multiple children, however, require that interviewers schedule additional days for assessments. Mothers receive additional payment (\$5 for each child, and \$10 for each young adult) for completing the child interviews and assessments.

Because child assessments may pose special difficulties and challenges, NORC attempts to use interviewers with prior NLSY experiences—especially those with experience on prior NLSY child interviews. Also, the child survey instrument is pre-

tested several months prior to the actual fielding period, in order to pinpoint difficult wording or items, and to time the various sections of the instrument. Further, all interviewers attend in-depth classes designed to train interviewers to: (a) build rapport with the child, (b) deal with distractions, (c) gain parental cooperation, (c) administer the assessment materials smoothly, (d) decide how much persistence is appropriate to gain the child's cooperation, and (e) gauge respondent burden. Finally, each interviewer mails the first two completed cases, accompanied by a cassette recordings of the child interviews, to the supervisor and then awaits feedback before proceeding with additional interviews (Baker, Keck, Mott, and Quinlan, 1993).

### *Attrition*

The baseline attrition rate for the children of the NLSY mirrors that of the parents. In other words, if the parents were not interviewed, neither were the children. For eligible children (living in the homes of their mothers), whose mothers were interviewed, some information is collected for virtually all respondents (98% in 1990). An additional attrition concern, however, stems from the methodology used for the child assessments. Specifically, data is obtained from the respondents from multiple interview schedules and assessment instruments. Because many of the assessments are age specific, they are disaggregated into multiple components. Therefore, in addition to sample attrition (mother not interviewed), assessment attrition occurs when a child is not given a specific age-appropriate assessment. Fortunately, the assessment completion rates for the children of the NLSY range typically approximate 90%. In 1990, for example, completion rates ranged from 85.5% for the PPVT-R (an intelligence test) to a high of 97.6% for assessments of temperament (Baker et al., 1993). Because the sample attrition

is relatively modest, and the completion rates high, it is unlikely that attrition biases the data.

### *Overview of the Data*

As noted above, each child interview includes the administration of a number of field instruments. For youth under the age of 15, the instruments include: (a) the Mother Supplement, (b) the Child Supplement, (c) the Child Self-Administered Supplement.

Youths older than 14 years are considered “young adults,” and are interviewed using the Young Adult CAPI Questionnaire, and the Young Adult Self-Report Booklet.

The Mother Supplement is completed by the mother or guardian of each child, and includes the following sections: (a) an adaptation of Bradley and Caldwell’s Home Observation for Measurement of the Environment (HOME) scale based on maternal reports, (b) Temperament scales from Rothbart, Kagan, and Campos, (c) items drawn from Poe, Bayley, Gesell and the Denver Developmental Screening Test, that measure motor and social development, (d) Zill and Peterson’s adaptation of the Child Behavior Checklist, (e) school and family background information.

The Child Supplement is used by the interviewer to record general background and health information from the mother of each child, responses from each child to assessment items, evaluations of testing conditions, and the interviewer observations of the child’s home environment. This supplement contains the following sections: (a) child background information on the child’s age, gender, and grade in school, (b) child health information, (c) What I am Like/Self-Perception Profile for Children, (d) Memory for Digit Span, a component of the revised Wechsler Intelligence Scales for Children, (e) Peabody Individual Achievement Tests (PIAT) for math, reading recognition, reading

comprehension, and hearing vocabulary, and (f) the HOME scale based on interviewer observations.

The Child Self-Administered Supplement (CSAS) is a self-report booklet, filled out by children 10 years of age or older. The CSAS records information on a wide range of topics, including: (a) child-parent interactions, (b) family decision-making, (c) attitudes toward school, (d) extra-curricular activities, (e) child employment, (f) peer relations and dating, (g) religious identification and commitment, (h) delinquency, and alcohol and drug use, (i) peer pressure, and (f) neighborhood safety.

As noted above, after the age of 14, respondents are considered young adults, and no longer complete the CSAS, CS, or MS. Rather, they partake in an hour-long interview that is similar to the NLSY parent interview. The main sections of the young adult interview include: (a) schooling, (b) dating/marital history, (c) labor force status/job information, (d) fertility, (e) child care, (f) depression/self-esteem. Additionally, young adults respond to items in a self-report booklet. Topics in this instrument include risk taking, alcohol and drug use, delinquency/official contact with the criminal justice system, peer behaviors, marital and birth expectations, dating/sexual activity, and prosocial activities (e.g., volunteer work).

### *Summary*

This dissertation addresses three central areas of developmental criminology: (a) predictors of childhood antisocial behavior, (b) processes that foster continuity, and (c) developmental subtypes of antisocial behavior. The NLSY and Children of the NLSY data sets are appropriate for these research areas for at least three reasons. First, there are rich biological, social, and psychosocial measures taken early (prenatal in some cases) in

the life of the respondents that allow for the prediction of childhood antisocial behavior. Second, the data contain measures (intelligence, academic aptitude) that may moderate or mediate the effect of childhood antisocial behavior on delinquency. Finally, there are repeated measures of antisocial behavior from multiple sources (mother and self-report) that allow for the creation of developmental subtypes based on antisocial trajectories.

### SAMPLE

Although there are currently 10,500<sup>17</sup> individuals in the NLSY Mother-Child data set, analyses are based on a sub-sample of 1,030 youth ages 15 through 18 during their most recent (1996) interview. There are two reasons for this restricted sample. First, because the first wave of the survey occurred in 1986, there are no measures of childhood antisocial behavior for older respondents. For example, individuals aged 21 years during wave 6 (1996) would have already been 13 years old during wave 2 of the survey.<sup>18</sup>

The lower age limit is necessary for two reasons. First, respondents below the age of five in the initial child assessment would be younger than 15 years of age during the final wave of the assessment. This is both a methodological and conceptual concern. Methodologically, youths under the age of 15 years are considered "children" rather than young adults, and are therefore queried about a very limited subset of antisocial behavior rather than the full range of delinquency items to which young adults respond.

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<sup>17</sup> The actual data set contains at least some information on 10,500 individuals. As noted earlier, however, the majority of the military and the economically disadvantaged white mothers were dropped from the sample. Due to the sample drops and attrition, 7,103 individuals were actually interviewed in 1996.

<sup>18</sup> Using wave 2 measures of antisocial behavior (rather than wave 1) is critical for maintaining the temporal order of predictors. This is because some of the constructs (e.g., parenting, attachment) hypothesized to mediate the effect of more distal factors on antisocial behavior were first measured in wave 1.

Establishing a valid “adolescent limited” offender group, and assessing continuity in antisocial behavior from childhood to late adolescence requires delinquency outcome measures. Second, a related point is that youth under the age of 15 have yet to reach the peak ages for offending (Blumstein et al., 1986).

Although not a primary selection criteria, the sample is advantageous for this dissertation for an additional reason. Namely, the sample is restricted to older respondents (relative to the full cohort), the mothers were relatively young at the time of their birth. Specifically, the age of the study child’s mother at the time of birth ranged from 14 to 24 (mean = 19.5). This is important for at least two reasons. First, having an adolescent mother is itself a risk factor for both childhood antisocial behavior (Elster, Ketterlinus, and Lamb, 1990) and delinquency (Morash and Rucker, 1989; Nagin, Farrington, and Pogarsky, 1997). Second, adolescent mothers are more likely than older mothers to raise their children in a high-risk family environment. Specifically, they are more likely than older mothers to participate in deviant activities (Passino, Whitman, Borkowski, Schellenbach, Maxwell, Keogh, and Rellinger, 1993) raise their children in poverty (Grogger and Bronars, 1993), and head single parent households (Butler, 1992).

In short, the fact that many of the individuals in the sample were born to adolescent mothers places them at risk for conduct problems and delinquency. A high-risk sample is advantageous for the present study because the creation of discrete offending groups based on offending trajectories requires a sufficient number of persistent offenders to be meaningfully studied. Moffitt (1993a) estimates that life-course-persistent offenders make up less than five percent of any cohort. Therefore,

using a high-risk sample increases the likelihood that the sample will contain a sufficient number of stable, antisocial youth.

### *Sample Attrition*

In any longitudinal research design, sample attrition is a concern because large amounts of attrition may bias the data. The final sample size noted above (N = 1,030) consists of all respondents within the selected age range (N = 1,423) who completed an interview during each of the six waves of data collection<sup>19</sup>. In other words, the attrition rate for the 10-year duration of data collection for this sample of individuals is 28% (N = 393). The sample attrition from wave to wave varied from a high of 10% (137 individuals in 1990) to a low of five percent (73 individuals in 1986). These yearly attrition rates are comparable to other longitudinal research efforts that track children over time (Elliott and Morse, 1989; Jessor, VanDenBos, Vanderryn, Costa, and Turbin, 1995).

To investigate the effects of the sample attrition, the 393 individuals dropped from the sample were compared with the remaining 1030 individuals on demographic characteristics (age, race, sex), maternal risk markers, (maternal education, maternal criminality, mothers age at birth, and family poverty status) and measures of antisocial behavior (childhood antisocial behavior). Table 3.1 displays the results of mean level comparisons on each of the measures. Inspection of Table 3.1 reveals three significant differences between the sample, and the eligible individuals who were not interviewed

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<sup>19</sup> Towards the end of the research process, CCHR released the Wave 7 (1998) data. An index of Wave 7 delinquency is included in this dissertation in two sections of the analyses. Because this new wave was used only for a single delinquency item that applies to a limited portion of the analysis, the sample was not restricted to those who were assessed in 1998. Rather, for those analyses incorporating the 1998 data, non-interviews are treated as missing data. Attrition between 1996 and 1998, with respect to the sample, was modest. Specifically, 98 of the 1030 respondents in the sample (9%) were not interviewed in 1998.

Table 3.1 Mean level comparisons of study sample (N = 1030) to attrition (N = 398) sample.

Variable	Sample		Sample Attrition		t value
	$\bar{x}$	sd	$\bar{x}$	sd	
<b>Demographic</b>					
Age (1996)	16.23	1.06	16.35	1.08	1.44
Race (1 = white)	0.39	0.49	0.29	0.45	3.44*
Sex (1 = male)	0.50	0.50	0.52	0.50	0.54
Years of Education (1996)	10.87	1.91	10.48	2.11	3.06*
<b>Maternal/family risk</b>					
Poverty status (1986)	0.37	0.48	0.45	0.50	2.50*
Maternal years of education	11.38	4.99	11.12	3.29	0.27
Mother's age at birth of study child	19.56	2.13	19.43	2.02	1.04
Maternal self-reported crime (1980)	1.78	1.95	1.74	2.20	0.40
<b>Antisocial behavior</b>					
Childhood antisocial behavior (1986)	107.50	13.53	107.51	13.94	0.005
Self-reported delinquency (1996)	1.58	2.17	1.84	2.56	1.30

\*p<.05

during at least one wave. Specifically, individuals who were dropped from the sample because of non-interviews had a lower educational attainment, were more likely to be non-white, and were more likely to have been in a household below the poverty line in 1986.

### *Sample Weights*

The NLSY data includes sampling weights for children and young adults for two reasons, (a) to adjust the unweighted data for sample attrition of mothers and children between the first and last wave of data collection and the loss of the military and economically disadvantaged white oversample, and (b) to adjust the sample for the over-representation of black and Hispanic youth (CHRR, 1998). Sampling weights are computed only for individuals who were interviewed (for young adults) or assessed (for children) in any given year—those not assessed are given a sampling weight of zero.

A child's sampling weight is computed by multiplying the mother's 1979 sampling weight by an adjustment factor. The adjustment factor is the reciprocal of the rate at which children in a particular age, sample-type, and sex cell are assessed. To avoid large fluctuations in child weights, age, sample-type, and sex cells that contained small counts were grouped across ages (CHRR, 1998).

Using the sample weights translates the unweighted sample of assessed or interviewed individuals into one that is approximately representative of all children by a given survey date to a nationally representative sample of women who were aged 14 to 21 years as of January 1, 1979. Despite the desirability of having such a nationally representative sample, the weights are not used in this dissertation for two reasons. First, the research questions noted in Chapter 2 require longitudinal data analysis strategies.

The CHRR (1998) advises against using the sampling weights for analysts using multiple waves of data, because the composition of the sample can change in subtle ways depending upon who was interviewed or assessed. Further, CHRR advises that, “analyzing data from persons interviewed in multiple years also creates problems since the yearly weights are not appropriate to such a universe” (Baker et al., 1993: 29).

Second, some research questions are addressed by using multivariate statistics. Again, CHRR (1998: 26) advises researchers who use multivariate statistics to avoid using the sampling weights. CHRR also advises against the “quick and dirty” approach of obtaining average estimates (e.g., through WLS procedures) across groups. While this procedure does prevent the oversample from having a disproportionate effect on regression coefficients, it is unlikely that computed standard errors from a pooled, weighted regression will be the true standard errors (Baker et al., 1993).

## MEASURES

This section reviews in detail the measures used to answer the research questions outlined in Chapter 2. Because this dissertation addresses three areas of developmental research, this section is organized accordingly. The first part of the section reviews measures for predicting childhood antisocial behavior. The second section reviews the measures for assessing continuity. The final section reviews the procedures for creating discrete offender groups are reviewed.

## *Prediction of Childhood Antisocial Behavior*

As noted in Chapter 2, the mediation model has garnered empirical support both for delinquency and childhood antisocial behavior. Indeed, the mediation model was tested by McLeod et al. (1994) using these same data, but with a slightly different sample. The gist of these analyses is to test the applicability of Moffitt's (1993a) interaction model to childhood antisocial behavior. Testing the interactional model requires measures of adversity and measures of risk for neuropsychological deficits. Most of the adversity measures outlined below are drawn from the McLeod and Shanahan's (1993) prior research. Measures for neuropsychological risk were gleaned from the extant psychology and criminology literature. The outcome measure for these analyses is childhood antisocial behavior. Each of these measures is discussed in detail below. Descriptive statistics for all measures are displayed in Table 3.1, and the specific items contained in additive scales are illustrated in Appendix 3.0.

Adversity. Adversity, as applied here, refers to structural characteristics that may impede parent's ability to socialize their youth. The measures of adversity included here are maternal deviance, persistent poverty, maternal education, adolescent motherhood, family disruption, and family size. While these factors do not cover the full range of structural factors linked to delinquency and conduct problems, they do represent a cross-section of constructs outlined in the extant empirical and theoretical literature.

Maternal Criminality. Research has consistently documented the relationship between the criminality of parents and their children (Loeber and Stouthamer-Loeber, 1986; Farrington, Barnes, and Lambert, 1996; Lipsey and Derzon, 1998). The maternal criminality employed here is a variety index based on self-report information.

Specifically, in 1980, as part of the main NLSY interview, mothers were asked to report whether or not they engaged in any of seventeen different illegal activities in the past year. The responses (coded as yes =1, no =0) were summed to create an index that tapes the variety of maternal delinquent involvement ( $\alpha=.84$ ). Although no measure of the father's deviance is available, prior research suggests that (a) the majority of deviant mothers mate with deviant males; and (b) maternal deviance is a robust predictor of child delinquency (Farrington et al., 1996).

Poverty Status. Children growing up poor are more likely than children who are not poor to experience difficulties in school, become teenage mothers, use illicit drugs, and engage in childhood problem behaviors and delinquency (Harper and Vandivere, 1999; Duncan and Brooks-Gunn, 1997). Theorists suggest that poverty diminishes parental capacity for supportive, consistent parenting which, in turn, increases the likelihood of conduct problems and early delinquency (Luster and McAdoo, 1994; Sampson and Laub, 1994; Leadbeater and Bishop, 1994; McLeod and Shanahan, 1993).

The NLSY data set includes a variable, created by the CHRR, that indicates whether or not a family was below the poverty line for each year of the data collection. CHRR analysts created this variable by computing the total family income for each household; and determining whether the total income was above or below projected poverty levels given the number of members in the family.

Table 3.1. Descriptive statistics for unweighted sample (N = 1030).

Variable	N	x	sd	range
Control Variables				
Age (1996)	1030	16.23	1.06	15-18
Race (1 = nonwhite)	1030	0.39	0.49	0-1
Gender (1 = male)	1030	0.52	0.50	0-1
Adversity Variables				
Poverty Status	1015	0.30	0.49	0-1
Father Absence	1028	0.51	0.50	0-1
Family Size	1030	0.17	0.37	0-1
Maternal Criminality	984	0.27	0.44	0-1
Adolescent Mother	1030	0.18	0.39	0-1
Maternal Education	1026	0.39	0.49	0-1
Adversity Index	964	1.88	1.44	0-6
Proxies for Neuro-deficits				
Low Birth Weight	1023	0.08	0.27	0-1
Maternal Smoking	1023	0.07	0.25	0-1
Maternal Alcohol	1023	0.08	0.27	0-1
Verbal Intelligence	1005	87.58	18.16	40-136
Hyperactivity	1015	2.38	1.53	0-5

Table 3.1. Descriptive statistics for unweighted sample (continued).

Variable	N	x	sd	range
Mediation Variables (1988 to 1992)				
Peer problems (1990)	1022	0.55	0.87	0-3
Academic achievement (1990)	980	96.98	13.59	65-135
Mediation/Moderation Variables (1992-1998)				
Peer pressure	924	0.43	1.02	0-5
Religiousness	1025	0.00	1.00	-2.64- 3.67
Academic achievement	972	97.06	12.67	65-135
Neighborhood Problems	881	15.57	4.27	5-21
Measure of Antisocial Behavior				
Antisocial behavior (1988)	971	1.68	1.51	0-6
Self-report delinquency (1992)				
Self-report delinquency (1996)	951	1.58	2.17	0-13
Violence index (1996)	951	0.82	1.15	0-5
Self-report delinquency (1998)				
Self-report delinquency (1998)	870	1.27	2.12	0-12
Violence index (1998)	870	0.65	1.07	0-5

Accordingly, the variable poverty status” (coded 1 for in poverty, and 0 for not in poverty) indicates whether the respondent’s family was in poverty during in 1986.<sup>20</sup>

Maternal education. Parental education generally, and maternal education in particular, have been either incorporated into a “socio-economic status” variable, or maintained independently as a measure of structural adversity in prior research on childhood antisocial behavior (Leadbeater and Bishop, 1994; Dubow and Luster, 1990). Maternal education is measured here as the number of years of education completed by the respondent’s mother as of 1986.

Adolescent motherhood. Children born to adolescent mothers have a higher probability of engaging in delinquency or crime (Morash and Rucker, 1987; Nagin et al, 1997), and childhood antisocial behavior (Furstenberg, Brooks-Gunn, and Morgan, 1987; Morash and Rucker, 1987) than children born to older females. Extant research suggests that the relationship is probably indirect—operating through its effect on social support, family structure, and financial resources (Nagin et al., 1997). Adolescent motherhood has been used in past research as an indicator of structural adversity (Moffitt, 1990b).

Consistent with prior research, adolescent motherhood is measured here as a dichotomous variable based on the age at which the study child was born (Nagin et al., 1997). While there is inconsistency in the research regarding what age constitutes “adolescent” motherhood (e.g., see Nagin et al., 1997; Brooks-Gunn et al., 1987), convention (and past research) dictate that mothers aged 18 years or older are no longer

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<sup>20</sup> A number of variables (e.g., family size, income from multiple sources) were used by CHRR to create the poverty status variable. If any of the component variables were missing, the poverty variable was also coded as missing. This resulted in a substantial amount of missing data. To alleviate the number of missing cases, missing data was recoded to “1” if the respondent’s family was below the poverty line in 1987, and “0” if it was above the poverty line during that year. This procedure capitalizes on the stability of poverty evident in the sample. The bivariate correlation for the two measures of poverty status (e.g., 1986, 1987) was .69.

adolescents. Accordingly, the variable "adolescent motherhood" was coded as zero if the individual's mothers was older than 17 when he or she was born, and one, if the mother was less than 18 years of age.

Family Size. As Gottfredson and Hirschi (1990) point out, despite its robust empirical relationship with delinquency, large family size has been ignored. It is perhaps more common in studies of childhood antisocial behavior, and has been used as a measure of adversity in prior research on both conduct problems and delinquency (Moffitt, 1990b; Dubow and Luster, 1990; Sampson and Laub, 1994). In each year of the NLSY survey, respondents were asked how many individual were living in the household were below the age of 18. Consequently, the variable "family size" indicates the number of children that reside in the household of the respondent during the first wave (1986) of the NLSY interview.

Father Absence. Family structure is identified as an important aspect adversity by most theories of childhood antisocial behavior and delinquency (Gottfredson and Hirschi, 1990; Moffitt, 1990b; Sampson and Laub, 1993; Shaw, Owens, Vondra, Keenan, and Winslow, 1996). Children who are raised in single parent households, or in homes in which marital relationships have been disrupted, are more likely to evidence both childhood conduct problems and delinquency (Wells and Rankin, 1991). Beginning in 1984, mothers were asked (each year) whether the child's father was living in the household at the time of the interview. The variable "father absent" is coded as one if the mother reported an absence between 1984 and 1986, and zero if the mother reported that the father was present during each year.

Adversity Index. The causal mechanism for initiation into the LCP offending trajectory is the interaction between neuropsychological deficiencies of the child and an adverse parenting environment. Testing this assertion within multivariate models requires the analyst to create multiplicative interaction terms. In order to limit the number of interaction terms (to lessen the chance of type I error), each measure of adversity was dichotomized, and then added to form an index of adversity. The concept of an adversity index is consistent with both past research testing Moffitt's theory (Moffitt, 1990), and with evidence suggesting that: (a) adversity is not random, but rather clustered in families, and (b) individuals exposed to more types of adversity exhibit higher levels of maladaptive behavior (Rutter, 1997a; Shaw and Winslow, 1997).

The variable "adversity index" is an additive scale created by first recoding, where necessary, the measures of adversity into dummy variables (1 = adverse factor present, 0 = absent) and then adding each of the dummy variables. The variables that required recoding included maternal deviance, maternal education, poverty status, and family size. A review of past research (cf., Dubow and Luster, 1990; Moffitt, 1990; Moffitt et al., 1996; Rutter, 1978) reveals no "cut and dry" procedure to dichotomize these variables. In other words, the cut-points for these variables are somewhat arbitrary.

Maternal education was coded as "one" for mothers who finished twelve or more years of education, and zero for those who did not. Maternal deviance was cut at the 75<sup>th</sup> percentile—mothers at or above the highest quartile of the deviance scale were coded as one, and those below as zero. Family size was recoded such that individuals living in a household with more than three children were coded as one, and those in households with less than three children were coded as zero. Finally, poverty status was coded as one if

the family below the poverty line during at least two time points, and zero if they were not.

*Risk For Neuropsychological Deficits.* As noted above, Moffitt asserts that the LCP trajectory initiates with an interaction between subtle neuropsychological deficits and an adverse parenting context. The limited research on this interaction hypothesis has used either distal (e.g., low birth-weight) or proximal (e.g., neuropsychological test scores) measures of neuropsychological functioning (Moffitt, 1990b; Tibbetts and Piquero, 1999). This dissertation employs both distal and proximal measures of neuropsychological deficits. Distal measures (or “proxies”) include low birth-weight, maternal smoking during pregnancy, maternal alcohol consumption during pregnancy, and an index of prenatal risk. Proximate measures include hyperactivity and verbal intelligence. The empirical evidence linking each of these measures to neuropsychological functioning is reviewed below.

*Low birth weight.* Researchers have used low birth weight as a proxy for neuropsychological deficits specifically to examine Moffitt’s interaction hypothesis (Kratzer and Hodgins, 1999; Moffitt, 1990b; Tibbetts and Piquero, 1999), and more generally as a predictor of childhood antisocial behavior (Cohen, Velez, Brook, Smith, 1989; Silva, McGee and Williams, 1984) and adult offending (Neugebauer, Hoek, and Suser, 1999). The empirical evidence linking low birth-weight to behavioral outcomes consistent with neuropsychological deficits is convincing (Tibbetts and Piquero, 1999). For example, low birth weight children are more likely than children of normal birth weight to have mild learning disabilities, attention disorders, hyperactivity, behavioral problems, low intelligence, and poor academic achievement, and a difficult temperament

(Botting, Powlis, Cooke, and Marlow, 1997; Brennan, Mednick, and Raine, 1997; Hack, Klein, and Taylor, 1995; Hack, Taylor, Klein, and Eiben 1994; Hertzog, 1983; Ross, Lipper, and Auld, 1990).

For example, Hertzog's (1983) study of 66 pre-term low birth weight infants from intact middle class families is cited extensively as evidence of the link between neuropsychological deficits and a "difficult temperament" in Moffitt's (1993a) initial theoretical statement of her offending taxonomy. Specifically, Hertzog (1983) found that symptoms of brain dysfunction detected during neurological examinations were significantly related to an index of "difficult temperament" measured yearly during the first three years of the infant's life. Over time, parents of the children with neurological impairments and difficult temperaments more often sought help from child psychiatrists for problems with over-activity, temper tantrums, poor attention, and poor school performance.

Low birth weight is defined in the medical literature as less than or equal to five pounds eight ounces (Shiono and Behrman, 1995: 17). Accordingly, the variable "low birth weight in the current study is coded as "1" for birth weight less than or equal to 5 pounds, 8 ounces, and "0" for heavier birth weights.

Maternal Smoking During Pregnancy. Like low birth weight, maternal smoking during pregnancy has been used in past research as a proxy for neurological deficits (Brennan et al., 1999). Indeed, perinatal maternal smoking is often listed among the causes of low birth weight (Shiono and Behrman, 1995; Moffitt, 1993a). Children born to mothers who smoked during pregnancy have exhibited elevated rates of conduct problems, impulsivity, and attention deficit disorder (Bagley, 1992; Wakschlag, Lahey,

Loeber, Green and Gordon, 1997). Further, perinatal maternal smoking has been linked with adverse infant medical outcomes, including increased startle response, hypoxia, and hypertonicity, that suggest central nervous system deficits (Brennan et al., 1999: 216).

Despite its relation to low birth weight, Brennan et al. (1999) found that maternal smoking predicted adult criminal outcomes (both property and violence offenses) independent of birth weight in a sample of Danish males. Further, maternal smoking was significantly related only to “life course persistent offending,” defined in this case as a criminal conviction prior to 18 years of age. Contrary to Moffitt’s theory, however, interactions between maternal smoking and various measures of adversity were not significant predictors of offending.

In the NLSY interview, mothers were asked how much they smoked per day during twelve months prior to the birth of the study child. Responses included none, less than one pack, one pack, and two packs or more. Brennan et al. (1999), using a similar ordinal measure of maternal smoking found significant relationships only for smoking during the 3<sup>rd</sup> trimester. Because no analogous measure is available in the present data the variable “maternal smoking” was created by dichotomizing the responses into (coded as “0”) smoked less than a pack per day, and (coded as “1”) smoked a pack per day or more.

Maternal Alcohol Use During Pregnancy. Prenatal exposure to alcohol has been linked to a variety of negative outcomes at various stages in the life-course, including infant irritability (Brown et al., 1991; Sher, Righardson, Coble, and Stoffer, 1988), childhood and adolescent antisocial behavior (Olson et al., 1997; Strissguth et al., 1999), and poor cognitive functioning (Steinhausen, 1996). Maternal consumption of alcohol in

high doses during pregnancy can result in “Fetal Alcohol Syndrome” (FAS), a condition defined by a constellation of characteristics, including central nervous system (CNS) dysfunction, growth retardation, and organ anomalies (Kelly, Day, and Streissguth, 2000). Even when prenatal exposure to alcohol occurs at lower “doses” than would be necessary for a FAS diagnosis, however, CNS related impairments are evident (Kelly et al., 2000).

Germane to its use here as a proxy for neuropsychological deficits within Moffitt’s theoretical framework, prenatal exposure to alcohol has been linked to infant “irritability” (Coles and Platzman, 1993). For example, infants exposed to alcohol during pregnancy show elevated levels of disturbed sleep patterns and feeding difficulties (Chernick, Childiaeva, and Ioffe, 1983; Scher et al., 1988). Further, as they age, children that were exposed to alcohol during pregnancy are more likely than other to evidence attention, learning, and cognitive dysfunction (Brown et al., 1991).

In the NLSY interview, mothers were asked to report their level of alcohol use during pregnancy and the responses categories ranged from “never” to “daily.” The variable “maternal drinking” a dichotomous variable, coded as “0” if the respondent reported drinking less than three or four days per month, and “1” if they reported drinking at least three or four days per month.

Verbal Intelligence. Moffitt (1993a, 19993b) notes that intelligence tests (especially those measuring verbal intelligence) predict antisocial behavior independent of race, class, or test motivation, and therefore argues that they tap into deficits in neuropsychological functioning. Although research demonstrates that IQ alone is a moderate predictor of delinquency at best (Cullen, Gendreau, Jarjoura, and Wright).

Moffitt (1993a) suggests that it is an important variable because it may condition the effect of adversity.

In 1986 and 1988, respondents were assessed using the revised version of the Peabody Picture Vocabulary Test (PPVT-R). The PVVT is among the most well established indicators of childhood verbal intelligence (Baker et al., 1993)<sup>21</sup>. In the assessment, children nonverbally (point) select one of four pictures that best describes a particular word's meaning<sup>22</sup>. The assessment is given using a "basal and ceiling" procedure. Specifically, a basal is established when the child correctly identifies eight consecutive items, and a ceiling is established when a child incorrectly identifies six of eight consecutive items. An individual's raw score is computed by adding the number of correct responses between the basal and the ceiling to the basal score (Baker et al., 1993). In addition to raw scores, the NLSY data include standardized scores that were normed on a nationally representative sample of children and youth in 1979. Accordingly, the measure "verbal intelligence" refers to the standardized score from the PVVT.

Hyperactivity. As noted in Chapter 2, measures of hyperactivity (or a diagnosis of ADHD) share considerable overlap with measures of childhood antisocial behavior. Nevertheless, prior research demonstrates that these constructs are conceptually distinct, with divergent precursors and consequences (Lahey and Loeber, 1997). Further, youths diagnosed as ADHD (or those displaying high levels of hyperactivity) evidence elevated

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<sup>21</sup> Most of the children who were not assessed in 1986, were assessed in 1988. Given the stability of verbal intelligence (the stability correlation for those who were assessed at both time points exceeded .75) missing PVVT assessments (in 1986) were replaced with the PVVT scores from 1988.

<sup>22</sup> To reduce possible cultural bias, Hispanic children were given the option of taking the Spanish version of the PVVT.

rates of executive dysfunctions (Moffitt, 1990b). Therefore, hyperactivity is used here as a proxy for neuropsychological deficits.

The measure of hyperactivity used here is drawn from the Behavior Problems Index (BPI) created by Zill and Peterson (1986). Many of the specific items were adopted from the Achenbach Child Behavior Checklist. For this assessment, mothers were asked to report whether or not their child engaged in any of five behaviors indicative of hyperactivity during the three months prior to the interview. Examples of specific items include, “has difficulty concentrating or paying attention,” and “is restless, overly active” (CHRR, 1998). Each response is coded as zero if the behavior is absent, and one, if it is present. Accordingly, the variable “hyperactivity” is an additive scale created by summing each of the individual responses.

*Childhood Antisocial Behavior.* As noted in Chapter 2, childhood antisocial behavior has been conceptualized and measured in a number of manners, including discrete diagnoses (e.g., CD and ODD), dimensional measures, and early onset delinquency. The measure of antisocial behavior for the is derived from the antisocial subscale of the BPI. The antisocial subscale is an additive scale created from maternal reports of child behaviors in the three months prior to the interview. Examples of specific items include, “cheats or tells lies,” and “bullies or is cruel mean to others.” For each item, mothers reported “how true” the statement was (not true =0, sometimes true =1, often true =2). The variable “antisocial behavior” was created by summing the responses for all six items ( $\alpha = .68$ ).

*Delinquency Measures.* Self-report measures of delinquency and antisocial behavior are available for Wave 4 (1992), Wave 6 (1996) and Wave 7 (1998). In 1992,

respondents were asked to report how often (never, once, twice, more than twice) they engaged in any of four delinquent behaviors in the prior year. Specific items tapped into violence (hurt somebody badly enough to need bandages or a doctor), shoplifting, drinking alcohol, and vandalism. The variable "Wave 4 delinquency" was created by recoding each of the items (never = 0, once =1, twice =2, more than twice = 3) and summing each of the four items ( $\alpha = .64$ ). In 1996 and 1998, individuals completed a more extensive self-report delinquency schedule. Specifically, respondents reported whether or not they engaged in any of thirteen delinquent acts, ranging in severity from shoplifting to robbery in the year prior to the interview. The variable "delinquency index" was created for each of these waves by recoding (1 = engaged in behavior, 0 = did not) and summing the responses for the thirteen items ( $\alpha = .78$ ).

In addition to an overall delinquency index, a violence index was created from Wave 6 and Wave 7 self-reported delinquency. These measures are used in the final set of analyses comparing LCP type offenders to AL type offenders. The violence indexes were created by summing individual's reports of whether or not (yes coded as "1") they committed any of five violent acts ranging in severity from "getting into a fight at work or school," to "using force to get money from someone" ( $\alpha = .74$ ).

### ***The Stability of Antisocial Behavior, Mediation and Moderation (1988 to 1992).***

Moffitt (1993a) and others (Sampson and Laub, 1993; Patterson, 1993) argue that stability of antisocial behavior is due, in part, to processes of cumulative continuity. That is, antisocial behavior produces negative consequences (e.g., peer rejection, academic failure) that (independent of prior antisocial behavior) increase the likelihood of future deviance. Others argue that once time-stable individual differences in propensity are

controlled, such social effects are rendered insignificant. Finally, recent evidence suggests that the negative consequences of offending may interact with childhood antisocial behavior to increase the likelihood of later childhood antisocial behavior and delinquency (Wright, Caspi, Moffitt, and Silva, 2000).

There are numerous negative consequences of childhood antisocial behavior that may be important contributors to delinquency. As noted earlier, Moffitt (1993a) suggests that two of the more salient consequences of childhood antisocial behavior are academic failure and peer rejection.

Academic Achievement (Wave 4). Past research demonstrates that academic achievement is related to both delinquency and crime (Hirschi, 1969; Wiatrowski, Griswold, and Roberts, 1981). Antisocial children are more likely to evidence behavioral problems in school, and are less likely to attain basic math and reading skills. Such failures, in turn may increase the probability of future delinquency (Moffitt, 1993a). The measure of academic achievement used here is the mathematics subset of the Peabody Individual Achievement Test (PIAT). The PIAT test is among the most widely used measure of academic achievement, and demonstrates high test-retest reliability and concurrent validity (Baker et al., 1993).

The math assessment measures a child's skill level in mathematics as taught in mainstream education. The assessment consists of 84 multiple-choice items (children answer by pointing to one of four answers), and is scored with a basal and ceiling procedure. Raw scores are equivalent to the ceiling (where 5 of 7 items are answered incorrectly) item less the number of incorrect responses between the basal and the ceiling.

The measure used here is a standardized score (normed for age), calculated by CHRR analysts.

Peer Problems. Moffitt (1993a) theorizes that antisocial children are rejected by their prosocial peers. In turn, these children learn to expect rejection, and may withdraw or strike out at peers in later settings, precluding opportunities to affiliate with prosocial peers and acquire or practice social skills. The measure of peer rejection used here is derived from the Behavior Problems Index. Mothers were asked to report (not true = 0, sometimes true = 1, often true = 2) whether any of the following three items described their child: (a) is withdrawn and not involved with others, (b) has trouble getting along with others, and (c) is not liked by other children. The variable "peer problems" was created by summing the responses for these three items ( $\alpha = .65$ ).

***The Stability of Antisocial Behavior (1992 to 1998).***

As individuals move through childhood and into adolescence, different factors may foster the processes of continuity and change (Patterson, 1993). For example, peer rejection may lose importance, whereas exposure to deviant peers may become more salient (Moffitt, 1993a). Unfortunately, the NLYS is less equipped to test the "mediation hypothesis," during late childhood and adolescence than it is for the early childhood. There are several theoretically relevant variables, however, that may predict adolescent delinquency independent of pre-adolescent deviance. Further, each of these factors may moderate the effect of pre-adolescent deviance on delinquency. If the moderation hypothesis derived by Wright and colleagues (2000) is correct, the variables described below should have a stronger effect on youth with a prior disposition towards antisocial behavior than on those without such a disposition.

Neighborhood Problems. Neighborhood characteristics are invoked by several theories of crime and delinquency. Within the social disorganization framework, neighborhood level features (e.g., physical decay, transient population) are believed to impact a communities' ability to supervise youth (especially street corner gatherings), and maintain a cohesive informal social control network (Sampson and Groves, 1989). Earlier statements of social disorganization also suggested that certain neighborhoods were vulnerable to the "cultural transmission" of delinquent values (Shaw and McKay, 1942). It is certainly possible that living in a "disorganized" neighborhood increases one's odds of being exposed to delinquent and criminal individuals, a notion consistent with social learning theory (Akers, 1985). More recently, Mazerolle (1998) has conceptualized neighborhood problems (vandalism, run-down buildings, presence of winos or junkies) as "noxious stimuli," consistent with Agnew's (1992) revised strain theory of delinquency. Specifically, he emphasized neighborhood problems as a stressful environment that may create negative emotions (that are conducive to delinquency and criminal behavior), for it's inhabitants.

Regardless of one's theoretical position, it is possible that neighborhood problems may influence delinquency independent of antisocial propensity. Indeed, in a recent test of the General Theory, Evans et al. (1997) found that a measure of neighborhood problems was one of the few variables that predicted delinquency independent of low self-control. An intriguing, but untested hypothesis is that neighborhood problems may be particularly salient for youth with a high disposition towards antisocial behavior.

In Wave 6 of the NLSY young adult survey, respondents were asked to report the degree to which any of seven negative characteristics were problems in their

neighborhood. Responses were coded as follows: "0" = not a problem, "1" = somewhat of a problem, "2" = a big problem. The responses were summed to form a 7-item scale ( $\alpha = .79$ ) labeled "neighborhood problems."

Peer Pressure. In Wave 4 of the NLSY, respondents were asked to report whether or not they were pressured by their friends to engage in five different types of delinquent or deviant behaviors, ranging from skipping school to committing a criminal act. The responses (coded "1" = yes, "0" = no) were summed to form a five item index indicating the degree to which respondents felt pressured by their friends to commit deviant acts ( $\alpha = .79$ ). Peer relations are at the heart of social learning theory (Akers, 1985). Specifically, Akers (1985) hypothesizes that exposure to deviant peers promotes the acquisition of antisocial attitudes and behaviors. However, social learning theory has been criticized because of the inability of researchers to clearly demonstrate the causal direction (e.g., "birds of a feather" may flock together) of the relationship between delinquent peer associations and delinquency (Hirschi, 1969; Sampson and Laub, 1994).

At face value, the measure of "peer pressure" may seem superior to the more typical measure of "exposure to deviant peers," because it measures an articulated pressure towards deviance rather than assuming such a process through simple exposure. However, it must be noted that prior research has demonstrated that the behaviors of peers may be a better predictor than the verbal endorsement of such behaviors (Warr and Stafford, 1991). Nevertheless, peer pressure towards deviance does seem to have face validity as a measure of differential association or social learning.

Academic Achievement (Wave 5). As noted above, past research demonstrates that academic achievement is related to both delinquency and crime (Hirschi, 1969;

Wiatrowski, Griswold, and Roberts, 1981). Further, several theorists suggests that school performance may mediate the effect of early antisocial tendencies on delinquency (Moffitt, 1993a). The measure employed here is, except for the assessment date, identical to the measure of academic achievement reported above. Specifically, the measure used to tap academic achievement is the Wave 5 standardized PIAT math assessment. Details of PIAT assessment and scoring procedure are reviewed above.

Religiousness. Involvement with (and commitment to) religion may decrease the probability of delinquency for at least two reasons. First, affiliation with religious institutions may foster informal social control. Simply put, religious sanctions (e.g., fear of hell, or sanctions in the “afterlife”) may deter potential offenders from violating the law. Simply by being bonded to a social institution, however, individuals may increase their stake in conformity (Hirschi, 1969). Werner (1992) suggests that religious affiliations can also impede delinquency because they are a source of social support in times of crisis (Cullen, Wright, and Chamlin, 1999). This is consistent with Agnew’s (1992) position that strain or stress create negative emotions that, if left unresolved, can lead to delinquency.

The measure of religiousness used here was adopted from previous research using these same data (Turner, 2000). Specifically, in Wave 6, respondents answered two questions related to religiousness. First, respondents reported the extent to which religion was important in their lives. Response categories included very important (coded as 1), fairly important (2), fairly unimportant (3) and not important at all (4). These responses were reverse coded such that higher scores reflect a greater level of importance. Second, respondents reported the frequency with which they attended religious services.

Response categories ranged from “more than once per week” (coded as 1) to “not at all” (coded as 6). Again, this question was reverse coded such that a higher score reflected a higher frequency of religious attendance. Because these questions contained different types of response categories, each measure was standardized. Next the measures were summed to create the variable “religiousness” ( $\alpha = .65$ ).

### *Control Variables*

In the multivariate analyses, age (in months at time of assessment), race (coded zero for white, and one for nonwhite), and sex (males coded as 1, females as zero) are included as control variables.

### *Construction of Discrete Offender Groups*

As noted in Chapter 2, researchers have constructed discrete offender groups (based on developmental subtypes) in a number of manners. The present research follows the strategy outlined by Moffitt and her colleagues, in their test of discrete offender groups (Moffitt et al., 1996). Specific tests of this dual offender paradigm requires classifying youth as “antisocial” or “non-antisocial” in two developmental periods—childhood and adolescence. In this dissertation, individuals were classified as “childhood antisocial” if they: (a) scored above the 75<sup>th</sup> percentile of antisocial subscale of the BPI or the 75<sup>th</sup> percentile during each of the first 3 waves of assessments, and (b) scored above the 75<sup>th</sup> percentile on the Wave 4 self-report antisocial behavior index. Youth were classified as

“adolescent antisocial” if were above the 75<sup>th</sup> percentile on either the Wave 6 or Wave 7 self-report delinquency scale<sup>23</sup>.

Based on their antisocial behavior in childhood and adolescence, all youth were classified into one of four discrete groups; life-course-persistent (LCP), adolescent limited (AL), childhood desisters (CD), and abstainers (A). Youth who exhibited high levels (e.g., above the 75<sup>th</sup> percentile) of antisocial behavior in both childhood and adolescence were classified as LCP. Individuals were classified as AL type offenders if they exhibited high levels of antisocial behavior in adolescence, but not in childhood. Respondents that displayed high levels of antisocial behavior during childhood, but not during adolescence were categorized as childhood desisters. Finally, those who refrain from high levels of antisocial behavior at all time points were classified as “abstainers”<sup>24</sup>.

## ANALYTIC STRATEGY

In accordance with the three themes explored in this dissertation, the analyses proceed in three stages. The first stage of the analyses focuses on the interaction between proxies for neuropsychological deficits and an index of structural adversity. The dependent variable for these analyses, childhood antisocial behavior at Wave 2, has a

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<sup>23</sup> Older youths are more likely to have elevated rates of antisocial behavior. In multivariate models, this effect is statistically controlled through the inclusion of a variable measuring age. In order to construct discrete offender groups, age-normed measures of antisocial behavior are required. The NLSY provides age-normed measures (based on a 1981 national survey) for all of the BPI subscales. Accordingly, these standardized measures were used in preference to the raw scores, to construct discrete offender groups.

<sup>24</sup> In recognition that any cut-off point used to distinguish antisocial youth from non-antisocial youth is arbitrary, the analyses of discrete offender groups include a sensitivity analysis. The sensitivity of the specific criteria for discrete offender groups is analyzed by repeating the categorization procedure using cut-points at one standard deviation above the mean.

limited range (0-6) and substantial skew. Ordinary least squares (OLS) regression operates under the assumption that the dependent variable is continuous and normally distributed (Blalock, 1979). In practice, using OLS regression with a limited and skewed dependent variable results in problems with unequal error variance, and ultimately to inflated standard errors, which decreases the likelihood of rejecting the null hypothesis.

Fortunately, there are a number of statistical techniques designed to analyze “count variables,” (e.g., number of arrests, number of problems) that by their nature tend to be limited and skewed (Long, 1997). Poisson regression is the most basic statistical model for analyzing count variables, and most other techniques are based on the Poisson model. Poisson regression is a maximum likelihood estimation technique, where the probability of a “count” is determined by a Poisson distribution. The mean of the Poisson distribution is a function of the independent variables (Long, 1997). A defining characteristic of this model is that the conditional mean of the outcome is equal to the conditional variance. This circumstance is often not true in practice. Typically, the conditional mean exceeds the conditional variance—a condition referred to as “overdispersion.”

Practically speaking, using the Poisson model when overdispersion is present will result in spuriously large z values, because the standard errors will be biased downward (Long, 1997). Preliminary models indicated the presence of overdispersion for all three outcome measures employed in this dissertation (childhood antisocial behavior, Wave 4 delinquency, and Wave 7 delinquency). Therefore, the analyses are conducted using Negative Binomial regression. The Negative Binomial regression model extends the Poisson model by adding a parameter that allows the conditional variance of the

dependent variable to exceed the conditional mean. In practice, this results in a more conservative test of the null hypothesis.

Testing for interactions within the Negative Binomial model is accomplished using the same procedures that are employed within other types of regression. Specifically, the two component variables (in this case, structural adversity and each proxy for neuropsychological deficit) are multiplied, and each component, as well as the multiplicative term are included in the model. In the present analyses, two of the proxies for neuropsychological status (verbal intelligence and hyperactivity) are ordinal level variables. To lessen the chance of multicollinearity, the multiplicative interaction terms were created by first standardizing, and then multiplying each of the component variables (Aiken and West, 1991). To further reduce the likelihood of multicollinearity, each interaction term (along with the component variables) are stepped into the model separately.

The second stage of the analysis examines explanations of the stability of antisocial behavior for two different time periods. First, childhood antisocial behavior in Wave 2 (from the BPI subscale) is used to predict self-reported delinquency in Wave 4. Again, the analyses (for both time frames) will use Negative Binomial models. The initial models contain only control variables and the measures of antisocial behavior. Measures hypothesized to mediate (peer problems, academic achievement) the effect of delinquency will then be stepped to assess their impact on both initial levels of antisocial behavior (e.g., the predictor variable) and on the outcome measure. To assess interactive effects, the sample will be split (above and below the median of the childhood antisocial

behavior measure) into high and low level antisocial groups. Separate models are run to assess the effects of academic achievement and peer rejection for these groups.

The second stability analysis employs the Wave 4 measure of delinquency as an independent variable, with Wave 7 delinquency as the dependent variable. The model building procedure is the same as the prior stability analysis. Variables hypothesized to mediate or moderate the effect of Wave 4 delinquency on Wave 7 delinquency include religiousness, neighborhood problems, academic achievement, and peer pressure.

The final stage of the analysis involves comparing discrete offender groups across several relevant measures, including adversity, indicators of neuropsychological health, and involvement in risky behaviors. Following the strategy outlined by Moffitt and her associates, (Moffitt et al., 1996) mean levels of each of these variables are compared across the discrete offenders groups using Analysis of Variance (ANOVA) techniques. Where mean level differences are observed, post-hoc comparisons indicate whether or not AL type offenders differ from LCP type offenders. Analysis of differences in the prevalence of a characteristic across groups (e.g., a dichotomous dependent variable) are conducted using cross-tabs.

## CHAPTER FOUR

### FINDINGS

#### *Introduction*

This chapter is organized into three sections that are consistent with the three themes explored in this dissertation, (a) prediction of childhood antisocial behavior, (b) analysis of the stability of antisocial behavior, and factors that may moderate or mediate stability processes, and (c) the analysis of discrete offender subtypes. For diagnostic purposes, bivariate correlation matrices (containing all of the variables used in that particular analysis) are presented prior to each set of multivariate analyses. Following this, multivariate statistics are employed to address each of the research questions presented in Chapter 2. The exception to this procedure is the final set of analyses, which involves mean level comparisons among developmental subgroups across several psychosocial and structural factors.

#### *Predicting Childhood Antisocial Behavior*

The purpose of this section is to test the proposition, derived from Moffitt's dual taxonomy of offending, that childhood antisocial behavior is caused by an interaction between subtle neuropsychological deficits, (producing a "difficult temperament" in the child) and structural adversity, which hampers parents' ability to socialize their children. Table 4.1 displays a correlation matrix that contains all of the measures that are used in subsequent analyses to test this proposition. Several relationships within this matrix are noteworthy.

Table 4.1 Correlation Matrix for Predicting Childhood Antisocial Behavior

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.00														
2	-.01	1.00													
3	-.04	.04	1.00												
4	-.04	.01	.07*	1.00											
5	.05	-.02	-.07*	.06	1.00										
6	.03	-.02	-.31**	.09**	.25**	1.00									
7	.05	-.05	-.15**	.01	.23**	.27**	1.00								
8	.24**	-.05	-.08**	.03	.18**	.19**	.07*	1.00							
9	.05	.01	-.25**	.13**	.07*	.39**	.07*	.19**	1.00						
10	.11**	-.02	-.28**	.41**	.56**	.69**	.46**	.48**	.60**	1.00					
11	.05	-.03	-.09**	.05	.07*	.05	.08*	.05	.04	.10**	1.00				
12	-.02	.00	.03	.07*	.00	.07*	.01	-.06	.04	.04	.04	1.00			
13	-.03	.01	.15**	.06	.07*	-.01	.04	.01	.01	.06	.01	.10**	1.00		
14	-.05	.14**	-.02	.07*	.04	.14**	.05	.03	.07*	.12**	-.02	.03	.07*	1.00	
15	.07*	.01	.48**	.02	-.22	-.30**	-.25**	-.05	-.16**	-.30**	.08*	-.04	.08**	-.13**	1.00
16	.06	-.04	-.12**	.19**	.20**	.16**	.21**	.17**	.17**	.34**	.27**	.06*	.00	-.01	-.10**
17	.02	-.03	.05	.16**	.17**	.19**	.13	.11**	.09**	.26**	.01	.04	.20**	.04	-.06
18	.07*	.00	-.06	.17**	.18**	.24**	.10**	.05	.18**	.31**	.09**	.12**	.04	.03	-.13**
19	-.05	-.05	-.07*	-.02	-.07*	-.11**	-.19**	.00	-.01	-.12**	-.04	-.07*	.02	-.01	-.05
20	.01	.01	-.01	.01	-.03	.02	.06	-.02	-.04	.00	-.05	-.01	.02	.05	-.01
21	.07*	.12**	-.10**	.08*	.07*	.17**	.12**	.01	.07*	.15**	-.03	.04	.07*	.46**	-.20**

\* p<.05 \*\*p<.01

1 = Age

2 = Sex

3 = Race

4 = Maternal Criminality

5 = Maternal Education

6 = Poverty Status

7 = Large Family

8 = Adolescent Mother

9 = Father Absent

10 = Adversity Index

11 = Low Birth Weight

12 = Alcohol During Pregnancy

13 = Cigarettes During Pregnancy

14 = Hyperactivity

15 = Verbal Intelligence

16 = Low Birth Weight x Adversity

17 = Cigarettes During Pregnancy x Adversity

18 = Alcohol During Pregnancy x Adversity

19 = Verbal Intelligence x Adversity

20 = Hyperactivity x Adversity

21 = Childhood Antisocial Behavior

Table 4.1 Correlation Matrix for Predicting Childhood Antisocial Behavior (continued)

	16	17	18	19	20	21
16	1.00					
17	.15*	1.00				
18	.16**	.19**	1.00			
19	-.13**	.03	-.10**	1.00		
20	-.04	.06	.00	-.12**	1.00	
21	-.01	.06*	.04	.02	.11**	1.00

\* p<.05 \*\*p<.01

1 = Age  
 2 = Sex  
 3 = Race  
 4 = Maternal Criminality  
 5 = Maternal Education  
 6 = Poverty Status  
 7 = Large Family

8 = Adolescent Mother  
 9 = Father Absent  
 10 = Adversity Index  
 11 = Low Birth Weight  
 12 = Alcohol During Pregnancy  
 13 = Cigarettes During Pregnancy  
 14 = Hyperactivity

15 = Verbal Intelligence  
 16 = Low Birth Weight x Adversity  
 17 = Cigarettes During Pregnancy x Adversity  
 18 = Alcohol During Pregnancy x Adversity  
 19 = Verbal Intelligence x Adversity  
 20 = Hyperactivity x Adversity  
 21 = Childhood Antisocial Behavior

First, testing for interactions within a multivariate model requires the creation of multiplicative interaction terms. Because each of the component variables—in this case a proxy for neuropsychological deficits and the adversity index—and the multiplicative interaction term must all be included in the multivariate model, multicollinearity is a concern. To alleviate this concern in the present analyses, each of the continuous variables were standardized (mean of zero, standard deviation of one), prior to the multiplication procedure. Inspection of Table 4.1 reveals moderate correlations between the multiplicative interaction terms and their component variables, but none of the correlations exceed .35. For example, the variable “low birth weight x adversity” is significantly related to both adversity ( $r = .34$ ) and low birth weight ( $r = .27$ ).

Second, the correlations displayed in Table 4.1 also alleviates a concern regarding the construction procedures for the index measure of adversity. The concern is that one or two of the variables within the index may “drive” the relationship between the index and the outcome variable (childhood antisocial behavior). Inspection of the matrix reveals that none of the variables contained in the adversity index (variables 4-9) has a particularly high correlation with childhood antisocial behavior. Rather, the correlations hover around .10.

Third, inspection of Table 4.1 reveals that the majority of variables relate in theoretically expected fashions. For example, higher levels of adversity and hyperactivity, and lower verbal intelligence are related to higher levels of childhood antisocial behavior. Further, the control variables (particularly age and sex) are related to childhood antisocial behavior in the expected direction. Specifically, older children and male children are more likely to evidence higher levels of antisocial behavior. As

evidenced by the strong relationship between verbal intelligence and adversity (which might indicate a spurious relationship between verbal intelligence and childhood antisocial behavior), it is important not to make too much of bivariate correlations. Accordingly, the following section reviews multivariate models predicting childhood antisocial behavior.

### *Multivariate Analyses*

As noted earlier, the nature of the dependent variable (childhood antisocial behavior) precludes the use of OLS regression. Specifically, the variable is limited and skewed right. Therefore, the interaction hypotheses are tested using Negative Binomial regression. Negative Binomial regression uses maximum likelihood estimation procedures to calculate the probability of a count based on conditional probabilities within the sample. Therefore, while the unstandardized coefficients (b) reported in the tables indicate the direction of the relationship between independent and dependent variables, they do not indicate (as do OLS coefficients) the unit change in y for a unit change in x. However, the z score, used primarily to test significance, reflects the coefficient divided by its standard error. Therefore, it provides a means for comparing the relative strength of coefficients within a given model.

Table 4.2 and Table 4.3 display the results of the Negative Binomial regression models predicting childhood antisocial behavior with interactions. The three models presented in Table 4.2 focus on distal proxies for neuropsychological deficits, and the two models presented in Table 4.3 focus on proximal measures of neuropsychological functioning. The base set of variables (control variables and the adversity index) remains the same across each model. Each column (or model), in addition, contains one proxy

(for neuropsychological deficits) variables and the multiplicative interaction term. The interaction hypotheses of Moffitt's theory are supported to the extent that any of these multiplicative terms are significantly related to childhood antisocial behavior.

Inspection of Table 4.2 reveals little support for the interaction hypotheses drawn from Moffitt's theory. Focusing on the first column, the significant predictors of childhood antisocial behavior include age, sex, and adversity. Each of these significant predictors operates in the theoretically predicted direction. Specifically older children, males, and those in households characterized by high levels of adversity evidence more antisocial problem behaviors. Neither low birth weight nor the multiplicative variable capturing the interaction between low birth weight and adversity are significantly related to childhood antisocial behavior.

Moving to the second two columns in Table 4.2, a similar pattern emerges. Specifically, age, sex, and adversity remain significant predictors of childhood antisocial behavior. However, neither maternal smoking during pregnancy nor maternal use of alcohol during pregnancy has a direct effect on the outcome variable. Further, neither of the multiplicative interaction terms significantly predicts childhood antisocial behavior.

Table 4.3 again displays Negative Binomial regression models predicting childhood antisocial behavior with the control variables (age, race, sex) and adversity. However, the variables used as proxies for neuropsychological deficits are proximal rather than distal (as in the last table). Inspection of the first column reveals that, similar to earlier models, age, sex, and adversity are significantly related to childhood antisocial behavior. Additionally, the model reveals that children who demonstrate higher levels of

Table 4.2. Negative Binomial Regression equations prediction childhood antisocial behavior with distal measures of neuropsychological functioning.<sup>a</sup>

Variable	(N = 904)		(N = 906)		(N = 906)	
	b	z	b	z	b	z
Age	.002**	3.12	.002**	3.04	.002**	2.73
Race	-.100	-1.53	-.100	-1.53	-.101	-1.58
Sex	.274**	4.52	.274**	4.53	.274**	4.58
Adversity	.101**	4.43	.100**	4.48	.105**	4.73
Low Birth Weight	-.096	-0.78	--	--	--	--
Adversity x Low Birth Weight	-.067	-0.76	--	--	--	--
Maternal Smoking	--	--	.041	0.34	--	--
Adversity x Maternal Smoking	--	--	-.010	-1.01	--	--
Maternal Smoking	--	--	--	--	.169	1.50
Adversity x Maternal Alcohol	--	--	--	--	-.174	-1.70
Model Chi Square	32.29**		31.55**		30.46**	

<sup>a</sup>Unstandardized regression coefficients reported. \* p<.05 \*\* p<.01

Table 4.3. Negative Binomial Regression equations predicting childhood antisocial behavior with proximal measures of neuropsychological functioning.<sup>a</sup>

Variable	(N = 904)		(N = 906)	
	b	z	b	z
Age	.001	0.9	.005**	3.53
Race	-.131	-2.09*	-.012	-0.17
Sex	.212**	3.65**	.285**	4.88
Adversity	.067**	3.25**	.105**	4.86
Hyperactivity	.155**	8.13	--	--
Adversity x Hyperactivity	-.004	-0.14	--	--
Verbal Intelligence	--	--	-.004*	-2.46
Adversity x Verbal Intelligence	--	--	.056	1.82
Model Chi Square	32.29**		31.55**	

<sup>a</sup>Unstandardized regression coefficients reported. \* p<.05 \*\* p<.0

hyperactivity are also more likely to exhibit more antisocial behavior. The interaction term capturing both adversity and hyperactivity, however, is not significant.

The second column in Table 4.3 displays the regression model when verbal intelligence and the interaction term for verbal intelligence and adversity are added to the equation. The results are consistent with prior research focusing on the relationship between intelligence and delinquency. Specifically, verbal intelligence has a significant negative impact on childhood antisocial behavior. The multiplicative interaction term adversity x verbal intelligence, approaches, ( $z = 1.82$ ,  $p = .068$ ) but does not attain statistical significance.

Replication with a sub-sample of children from unique households. As noted in Chapter 3, the NLSY contains information on all children within a given household in the sample. In other words, some of the individuals in the sample originate from the same household. Because many of the measures in the adversity index are derived from either stable maternal characteristics or household characteristics, it is possible that clusters of children within a few households inflate the relationship between adversity and childhood antisocial behavior. To rule out this possibility, the analyses with a sample restricted to children originating from unique households. This sample was constructed by randomly selecting one sibling from all multiple respondent households ( $N = 854$ ).

The substantive pattern of bivariate relationships (e.g., the bivariate correlation matrix) was very similar to the pattern observed for the full sample. Of particular interest, the relationship between adversity and childhood antisocial behavior remained virtually unchanged ( $r = .15$  for full sample,  $r = .14$  for restricted sample). Similarly, replication of the multivariate analyses revealed no substantive differences.

### *The Stability of Antisocial Behavior*

As noted in Chapter 2, one of the most consistent and robust findings in criminology is the stability of antisocial behavior at different points in the life course. The following analyses are designed to assess the stability of antisocial behavior in this sample for two distinct time periods. The first set of analyses focus on stability from Wave 2 to Wave 4—from maternal reports of antisocial behavior, to self-reported preadolescent delinquency. The second set of analyses track antisocial behavior in the sample from Wave 4 to Wave 7—using measures of self-reported delinquency at both time points.

Both of these analyses proceed in four stages. First, I present a correlation matrix containing all of the variables that are used in subsequent analyses. Second, a measure of delinquency is predicted with control variables (age, race, and sex) as well as a measure of prior antisocial behavior. Third, the variables thought to mediate stability, or to predict delinquency independent of prior antisocial behavior, are entered into the equation. Finally, the final model is repeated after splitting the sample based on the median level of prior antisocial behavior. This final step facilitates testing the moderation hypothesis that those with a higher propensity towards delinquency are most affected by other predictor variables (e.g. peer pressure, neighborhood problems).

Antisocial Behavior—1988 to 1992. Table 4.4 displays bivariate correlations between all of the variables included in subsequent multivariate models assessing stability from Wave 2 to Wave 4. Inspection of the table reveals moderate correlation between childhood antisocial behavior and pre-adolescent delinquency ( $r = .19, p > .01$ ). Clearly, this relationship is weaker than typically reported in studies focusing on the

stability of antisocial behavior. The reader is reminded, however, that prior analyses focusing on childhood antisocial behavior, and those with greater time between assessments have found similar results (Lipsey and Derzon, 1998). Also, because the two measures of antisocial behavior are derived from different sources (maternal report and self report) the association lends validity to each measure.

The correlations displayed in Table 4.4 also reveal that the two variables hypothesized to mediate and moderate the effect of childhood antisocial behavior (peer problems and academic achievement) are related to the measures of antisocial behavior in theoretically expected directions. Specifically, youth with higher levels of peer problems and lower levels of academic achievement are more likely to have had higher levels of childhood antisocial behaviors, and are also more likely to have higher levels of pre-adolescent delinquency. The remaining question is whether peer problems or academic achievement mediate or moderate the effect of childhood antisocial behavior on pre-adolescent delinquency. The multivariate analyses presented below seek to address this question.

Table 4.5 displays the results of two Negative Binomial regression models predicting pre-adolescent delinquency. The first model (first column from the right) contains the control variables (age, race, and sex) the adversity index, and childhood antisocial behavior. Inspection of this initial model reveals that all of the variables are related to delinquency in a theoretically consistent manner. Looking first at the control variables, children that are older, non-white, and male are more likely to report involvement in delinquency. The fact that age and delinquency are positively related

stems from the developmental time frame—older youths in the sample are entering into adolescence, where the prevalence of delinquency is greater.

Both adversity and childhood antisocial behavior are positively related to delinquency, and the  $z$  values (the coefficient divided by its standard error) indicated that the relationship is stronger for adversity than for childhood antisocial behavior. This suggests that structural adversity has enduring effects beyond its relation to childhood antisocial behavior. Further, the difference in strength suggests that during this developmental period, structural adversity is more salient than individual differences in antisocial propensity.

The second column in Table 4.5 displays the Negative Binomial regression output when peer problems and academic achievement are added to the model. The hypothesis tested here is that these variables mediate the relationship between childhood antisocial behavior and delinquency. The hypothesis appears to receive partial support. While addition of the variables renders the association between childhood antisocial behavior and delinquency insignificant, neither peer problems nor academic achievement have a significant, direct effect on delinquency.

Table 4.4. Bivariate correlations among variables used for stability analyses, 1988 to 1992.

	Age	Race	Sex	Adversity	Peer Problems	Academic Achievement	Childhood Antisocial	Wave 4 Delinquency
Age	1.00							
Race	-.03	1.00						
Sex	-.02	.04	1.00					
Adversity	.11**	-.28**	-.02	1.00				
Peer Problems	.02	.01	.06	.09**	1.00			
Academic Achievement	.00	.26**	.04	-.23**	-.12**	1.00		
Childhood Antisocial	.10**	-.09**	.14	.17**	.31**	-.14**	1.00	
Wave 4 Delinquency	.10**	-.13**	.20**	.20**	.12**	-.10**	.19**	1.00

\* p<.05 \*\* p<.01

Table 4.5. Negative Binomial regression models predicting pre-adolescent delinquency.

Variable	N = 811		N = 794	
	b	z	b	z
Age	.089**	11.51	.011**	4.37
Race	-.245**	-3.14	-.290**	-3.52
Sex	.408**	5.49	.400**	5.05
Adversity Index	.115**	4.27	.107**	3.83
Antisocial Behavior (1988)	.060*	2.04	.038	1.25
Peer Problems	--	--	.086	1.80
Academic Achievement	--	--	-.002	-0.74
Model Chi Square	1062**		921**	

Unstandardized regression coefficients reported.

\* p<.05 \*\* p<.01

The final set of analyses for this developmental period assesses whether or not peer problems or academic achievement moderate the effect of childhood antisocial behavior on delinquency. Prior research suggests that these variables should be more salient for children with a higher propensity towards delinquency than for youth with low levels of antisocial propensity (Wright et al., 2000). To test the assertion, the individuals were assigned to high and low propensity groups based whether they were above or below the median of the childhood antisocial behavior measure. Next, the negative binomial models were re-computed, omitting the measure of childhood antisocial behavior. The results of these models are displayed in Table 4.6.

Inspection of the models displayed in the two columns of Table 4.6 reveal little support for the hypothesis that the effect of peer problems and academic achievement on delinquency vary by childhood propensity towards antisocial behavior. Specifically, neither peer pressure nor academic achievement significantly predict delinquency in either of the models. Further, the effects of age, race, sex, and adversity are similar across models.

Antisocial Behavior 1992 to 1998. The following analyses are designed to assess the stability of antisocial behavior and mediation or moderation effects for a second developmental period. Specifically, the Wave 4 (1992) measure of self-reported delinquency is used to predict Wave 7 (1998) self-reported delinquency.

Developmentally, this time period ranges from pre-adolescence (respondents were aged 11-14 years in Wave 4) to late adolescence (respondents ages ranged from 17 to 20).

Despite the fact that these analyses are performed at a different developmental period, the

analyses address the same core issues, and follow the same strategy as the previous set of analyses.

Table 4.7 contains the bivariate correlations for all variables used in the analyses for this developmental period. Inspection of the correlation matrix again indicates stability in antisocial behavior from 1992 to 1998 ( $r = .20, p < .01$ ). Again, the modest size of the correlation is likely due to the time lag (6 years) between measurements. Focusing on the mediation/moderation variables, peer pressure ( $r = .15, p < .05$ ) and religiousness ( $r = -.08, p < .05$ ) are significant related with Wave 7 delinquency, while neighborhood problems and academic achievement are not. Specifically, youths demonstrating less religiousness, and those receiving more peer pressure towards deviance are more likely to be delinquent. Whether these relationships hold after controlling for pre-adolescent delinquency is tested next.

Table 4.8 displays Negative Binomial regression equations predicting Wave 7 delinquency. In the first model (column furthest to left), only the control variables and pre-adolescent delinquency are included as predictor variables. Inspection of this model reveals that age is now negatively related to delinquency, which suggests that the older youth are exiting their "crime-prone" years. Additionally, the results indicate that male respondents, and those reporting higher levels of pre-adolescent delinquency are more likely to report delinquency in Wave 7.

Table 4.6. Negative Binomial regression models predicting pre-adolescent delinquency for the split sample.

Variable	Low Propensity N = 418		High Propensity N = 375	
	b	z	b	z
Age	.012**	3.83	.011**	3.08
Race	-.263*	3.17	-.294*	-2.51
Sex	.423**	-2.18	.395**	3.45
Adversity Index	.124**	3.02	.106**	2.69
Peer Problems	.061	1.04	.138	1.58
Academic Achievement	-.001	-0.31	-.002	0.56
Model Chi Square	422**		506**	

Unstandardized regression coefficients reported.

\* p<.05 \*\* p<.01

Table 4.7. Bivariate correlations among variables used for stability analyses, 1992 to 1998.

	Age	Race	Sex	Academic Achiev.	Peer Pressure	Neighbor. Problems	Religious	Delinquency 1992	Delinquency 1998
Age	1.00								
Race	-.03	1.00							
Sex	-.02	.037	1.00						
Academic Achievement	-.06	.32**	.05	1.00					
Peer Pressure	.07*	-.04	.06	-.08*	1.00				
Neighborhood Problems	.05	-.22**	-.03	-.26**	.06	1.00			
Religiousness	-.05	-.16**	-.12**	.07*	-.03	.01	1.00		
Delinquency (1992)	.10**	-.13	.20**	-.13**	.36**	.14**	-.07*	1.00	
Delinquency (1998)	-.042	.05	.25**	.00	.15**	.02	-.08*	.20**	1.00

Unstandardized regression coefficients reported.

\* p<.05 \*\* p<.01

Table 4.8. Negative Binomial regression models predicting Wave 7 delinquency.

Variable	N = 783		N = 664	
	b	z	b	z
Age	-.007**	-5.23	-.010**	-2.70
Race	.192	1.46	.251	1.67
Sex	.762**	6.07	.740**	5.41
Delinquency Wave 4	.072**	4.05	.055**	2.73
Religiousness	--	--	.026	0.61
Peer Pressure	--	--	.157*	2.05
Neighborhood Problems	--	--	.011	0.68
Academic Achievement	--	--	.002	0.56
Model Chi Square	553**		413**	

Unstandardized regression coefficients reported.

\* p<.05 \*\* p<.01

The second column of the table displays the full model, which includes (in addition to the model in the first column) peer pressure, neighborhood problems, religiousness, and academic achievement. With the addition of these variables, the relationship between Wave 4 delinquency and Wave 7 delinquency remains significant. This suggests that the variables do not mediate, or foster the stability process.

The sole significant variable, among those added in the second model, is peer pressure. Specifically, respondents reporting greater levels of peer pressure towards deviance in Wave 4, report greater levels of delinquency at Wave 7. As noted earlier, peer pressure towards deviance is perhaps a cleaner (less tautological) measure of social learning than exposure to deviant peers. The fact that it maintains significance after controlling for prior delinquency, therefore, supports learning based theories.

The final step in this analysis involves testing the moderation hypothesis. Specifically, this research hypothesis is that youth with a high disposition towards delinquency will be influenced by peer pressure, neighborhood problems, religiousness and academic achievement to a greater extent than youth without a low disposition towards delinquency. To test this proposition, the sample was first divided into "high" and "low" propensity groups based on respondent's reports of Wave 4 delinquency. Those reported delinquency that scored above the median were classified as "high propensity" and those who scored below the median were classified as "low propensity."

Table 4.9. Negative Binomial regression models predicting Wave 7 delinquency for sample split based on propensity towards delinquency.

Variable	High Propensity N = 300		Low Propensity N = 376	
	b	z	b	z
Age	-.005*	-2.35	-.004*	2.38
Race	.431*	2.21	.010	0.04
Sex	.727**	3.79	.791**	3.63
Religiousness	.000	0.01	.031	0.44
Peer Pressure	.214*	2.44	.026	0.18
Neighborhood Problems	.010	0.47	.024	0.75
Academic Achievement	.005	0.86	.003	0.41
Model Chi Square	211**		191**	

Unstandardized regression coefficients reported.

\* p<.05 \*\* p<.01

The results of Negative Binomial regression models predicting Wave 7 delinquency for each group of respondents are reported in Table 4.9. Inspection of the results for the “high propensity” group, (right hand columns) indicate that age, race, sex and peer pressure are significant predictors of Wave 7 delinquency. For the “low propensity group,” only age and sex remain significant. The fact that peer pressure is salient for high, but not low propensity youths offers partial support for the mediation hypothesis.

### *Developmental Subtypes of Offending*

This final set of analyses focuses on the description, and comparison of discrete groups of respondents classified according their offending trajectories. The analysis proceeds in three stages. First, the reader is reminded of the method (and rationale) for the construction of discrete offender groups. Second, the discussion focuses on the prevalence and demographic characteristics of the groups. Third, a series of one-way ANOVA’s compare the groups on measures of adversity, types of offending, and other risk factors.

As noted in Chapter 3, respondents were classified into one of four discrete groups based on their offending trajectories. The primary purpose of this classification was to separate adolescent offenders with a history of childhood antisocial behavior (life-course-persistent, or LCP) from offenders whose delinquency and crime is confined to adolescence (adolescent limited, or AL). Offenders were fit to these categories based on reports of antisocial behavior or delinquency from their mothers or themselves. LCP offenders exceeded the 75th percentile of measures of antisocial behavior in at least three of the four childhood waves (e.g., Waves 1 through 4), and exceeded the 75th percentile

of the delinquency index in either Wave 6 or Wave 7. AL offenders did not meet the criteria for childhood antisocial behavior, but were above the 75th percentile on the delinquency index (again, in either Wave 6 or Wave 7).

The remaining offenders were classified as either childhood recoveries (CR)—those who met definition of childhood antisocial, but not delinquent—or normal (did not meet the criteria for antisocial behavior in either childhood or adolescence). This selection procedure, while somewhat arbitrary, was modeled after a similar analysis with different data (Moffitt et al., 1996). To test the sensitivity of these “cut-points,” the groups were re-constructed using the cut-point of one standard deviation above the mean. The characteristics of the developmental sub-groups created from each of these classification procedures are illustrated in Table 4.10.

The characteristics of the discrete developmental groups created based on cut-points at the 75<sup>th</sup> percentile are reported in the upper half of the Table 4.1. Inspection of the first two columns suggests that this methodology produced, in terms of the percentage of respondents within each groups, categories similar to those developed by Moffitt and her colleagues (1996) with the Dunedin sample. Specifically, LCP offenders (N = 54) make up roughly 6% of the sample, AL offenders constitute 18% of the sample, and 10% of the sample is classified as CR. More than half of the sample (66%) is classified as normal.

The largest difference between the present analyses and others employing the similar methodologies is the gender of respondents in each category. While Moffitt (1993a) hypothesizes that the casual mechanisms for offender are similar across gender, she suggests that female LCP offenders are exceedingly rare.

Table 4.10. Description of developmental sub-groups constructed based on two cut-points for measures of antisocial behavior.

Developmental Subgroup	N	Percent of Sample	Percent Male	Percent non-White
Based on 75th Percentile				
Life Course Persistent	54	5.7%	77.8%	68.5%
Adolescent Limited	171	18.0%	61.4%	59.6%
Childhood Recovery	96	10.1%	69.8%	69.8%
Normal	630	66.2%	44.2%	61.1%
Based on 1SD Above Mean				
Life Course Persistent	26	2.5%	92.3%	57.7%
Adolescent Limited	162	15.7%	67.3%	64.2%
Childhood Recovery	47	4.6%	78.7%	68.1%
Normal	716	69.5%	45.0%	61.5%

Indeed, the focus of her research testing the dual taxonomy of offending is almost exclusively on male subjects. In the present analysis almost one quarter of those identified as LCP are female. There at least two possible explanations for this finding.

First, it may be that females in this sample are particularly “high-risk.” Given that this is a national sample, this explanation seems unlikely. Second, the finding could be due to either the measurement of antisocial behavior or the process by which the discrete groups were constructed. With regard to measurement, these data are somewhat limited because they rely upon a single source for information pertaining to antisocial behavior within each developmental period—maternal reports during childhood and self-reports during adolescence. Thus, while mothers may view a girl’s behavior as antisocial, a teacher (or other informant) may view this behavior as less serious relative to boy’s antisocial behavior.

With regard to the construction techniques it is possible that 75<sup>th</sup> percentile is not far enough out in the tail of the distribution to capture “severe” antisocial behavior. This proposition was tested by re-constructing the groups based on a cut-point of one standard deviation above the mean. The lower half of Table 4.10 illustrates the results of this construction technique. Inspection of the first two columns reveals that changing the cut-point resulted in fewer cases in the offender groups (LCP, CD, and AL) and more cases in the remaining (normal) group. Notably, the LCP group dropped from 6% of the sample to 2.5%, and the AL group dropped from 18% to roughly 16% of the sample. Inspection of the third column reveals that this change affected the gender composition of the LCP groups—only 7.7% of the LCP offenders are female.

Because the distribution of offenders within developmental subgroups using the first method (75<sup>th</sup> percentile) is consistent with Moffitt's (1993a) description, and because this method was articulated, in Chapter 3, as the main approach, the analyses reported below assess the groups outlined in the upper half of Table 4.10. Each analyses was repeated, however, using the second approach. Inconsistencies in findings are reported where appropriate<sup>25</sup>.

Mean Level Comparisons. As noted in Chapter 2, several researchers (Patterson, 1993; Moffitt, 1993a) have hypothesized that different causal processes operate to produce AL and LCP offending. Accordingly, respondents in these different pathways should differ on several characteristics hypothesized to affect offending. Specifically, Moffitt theorizes that LCP offenders will engage in more violent antisocial behaviors as adolescents than AL offenders. Further, LCP offenders should get caught in more "snares," or consequences of their early antisocial behavior. For example, LCP offenders should have more difficulty in school, and engage in more "risky" behaviors that may affect future antisocial behavior than AL offenders. Finally, a logical implication of Moffitt's causal path for LCP type offenders is that these individuals should evidence higher levels of structural adversity and neuropsychological deficits than AL type offenders.

The primary purpose of the present analysis is to document whether AL and LCP type offenders differ on these theoretically meaningful variables. As a point of comparison, however, all four groups are included in the analyses. To analyze mean level differences among the four developmental sub-groups, a series of one-way

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<sup>25</sup> In other words, unless otherwise noted, the findings of differences between groups across the different construction techniques are substantively similar.

ANOVA's were conducted. Where the overall F test is significant, post-hoc comparisons between the groups are completed using the Scheffe test. For dichotomous variables, cross-tabs were conducted to determine differences in proportions between AL and LCP offender groups.

Are LCP offenders more violent? Moffitt (1993a) suggests that the offending patterns of LCP and AL offenders are almost indistinguishable during adolescence. The one exception is that LCP offenders may engage in more violent behavior than AL offenders. To test this assertion, the discrete offender groups were compared on an index of self-reported violence collected during Wave 6 and Wave 7 of the NLSY. The mean level differences are illustrated in Figure 4.1. The ANOVA for the Wave 6 violence index indicated an significant mean differences among the groups ( $F = 325, p < .01$ ). Post-hoc comparisons revealed that that the overall significance reflected the difference between the two offender groups (AL's and LCP's) and the other groups in the sample. This result is expected given that the groups were constructed based on levels of overall delinquency during adolescence. Analysis of variance for Wave 7 violence revealed a similar pattern. Specifically, there was significant differences among the groups ( $F = 32.2, p < .01$ ), but no differences between the AL and LCP groups.

Measures of structural adversity. According to supporters of the two path model of offending (Patterson, 1993; Moffitt, 1993a), persistently antisocial youth should originate from families with higher levels of structural adversity than youth who begin offending in adolescence. Structural adversity is theorized to affect parenting practices, which in turn affects the early onset of antisocial behavior. Accordingly, the groups will be compared on each of the measures contained in the adversity index used in

multivariate analyses. The relationship between group membership and maternal deviance is illustrated in Figure 4.2. Inspection of Figure 4.2 reveals that the mean relationships operate in the expected direction, with LCP offenders having the highest mean level of maternal deviance. Analysis of variance revealed overall group differences ( $F = 4.6, p < .01$ ), but post-hoc comparisons reveal that the only significant mean difference is between the LCP and normal groups.

Analysis of variance revealed also no significant differences among the groups with respect to maternal age at birth ( $F = 1.4, p > .05$ ). It should be noted, however, that LCP offenders did have the lowest absolute mean maternal age at birth. The relationship between maternal education (high school degree or better) and group status is illustrated in Figure 4.3. Inspection of this figure reveals that the mothers of offenders in the LCP group were the least likely to (46%) have a high school degree. A cross-tabulation comparing AL with LCP offenders revealed that this difference is statistically significant ( $\chi^2 = 4.82, p < .01$ ). This relationship supports the hypothesis that LCP offenders are characterized by greater levels of structural adversity.

The adversity measures thus far, due to either measurement limitations or the nature of the measure, have been static. The two remaining measures of adversity (poverty status and father absence) are less static (although relatively time-stable), and therefore the comparisons are presented for multiple years. This allows the examination of whether the families of AL offenders are characterized by higher levels of adversity prior to or during adolescence. Figure 4.4 illustrates the percent of offenders in each group who were in poverty over three different time periods (1987, 1991, 1995). There are three noteworthy trends contained in this figure.

Figure 4.1. Mean Level Comparisons of Violence Index for Discrete Offending Groups

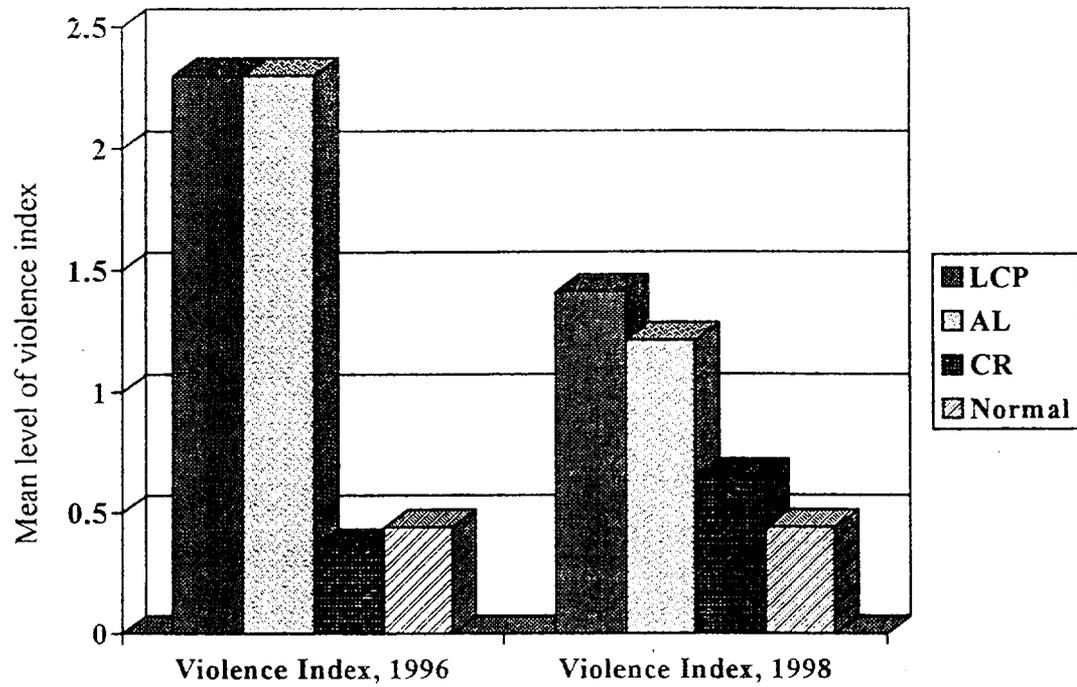


Figure 4.2. Group differences in mean level of maternal deviance index.

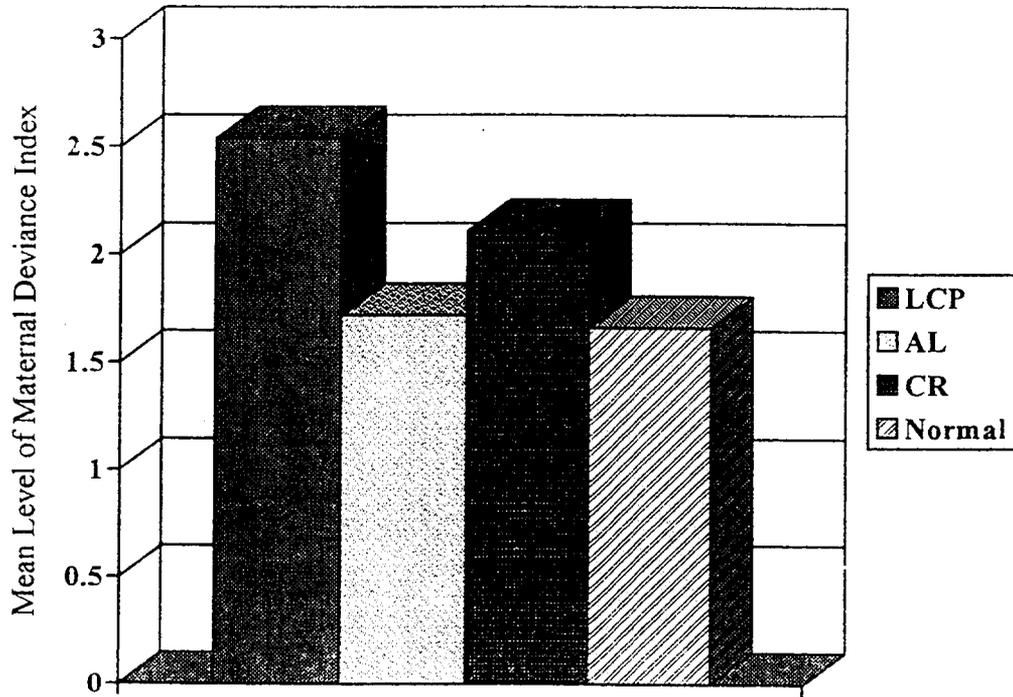


Figure 4.3. Group differences in maternal education status.

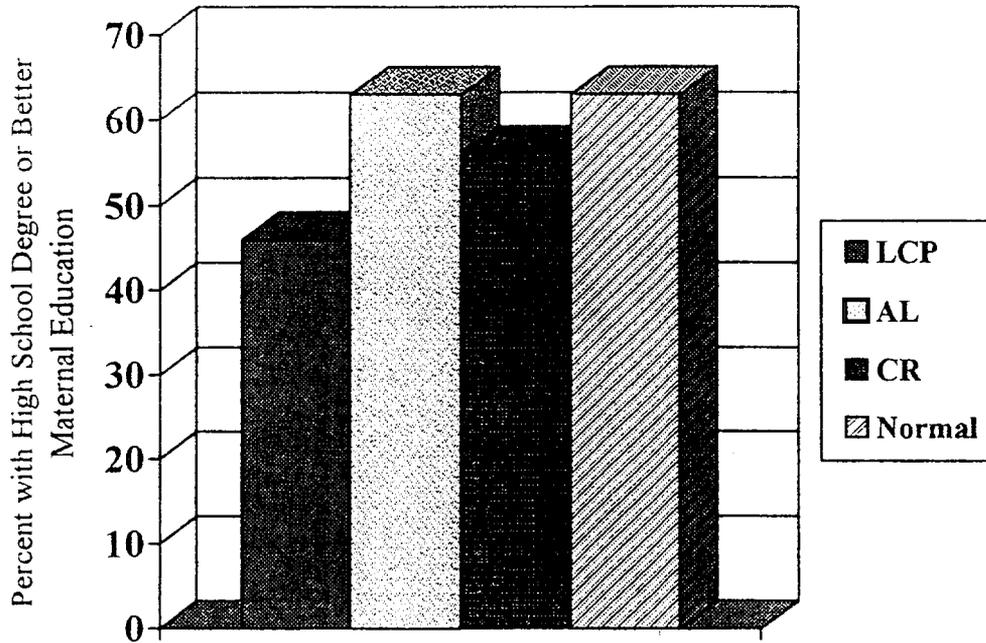
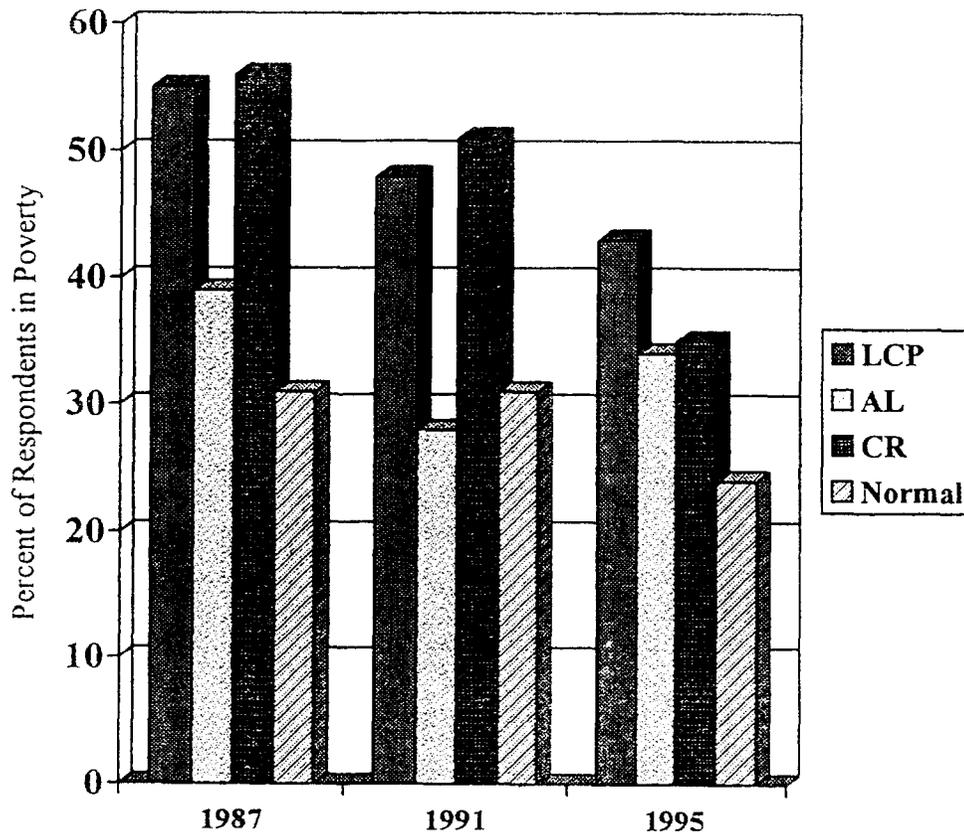


Figure 4.4. Group Differences in Poverty Status, 1987, 1991, and 1995.

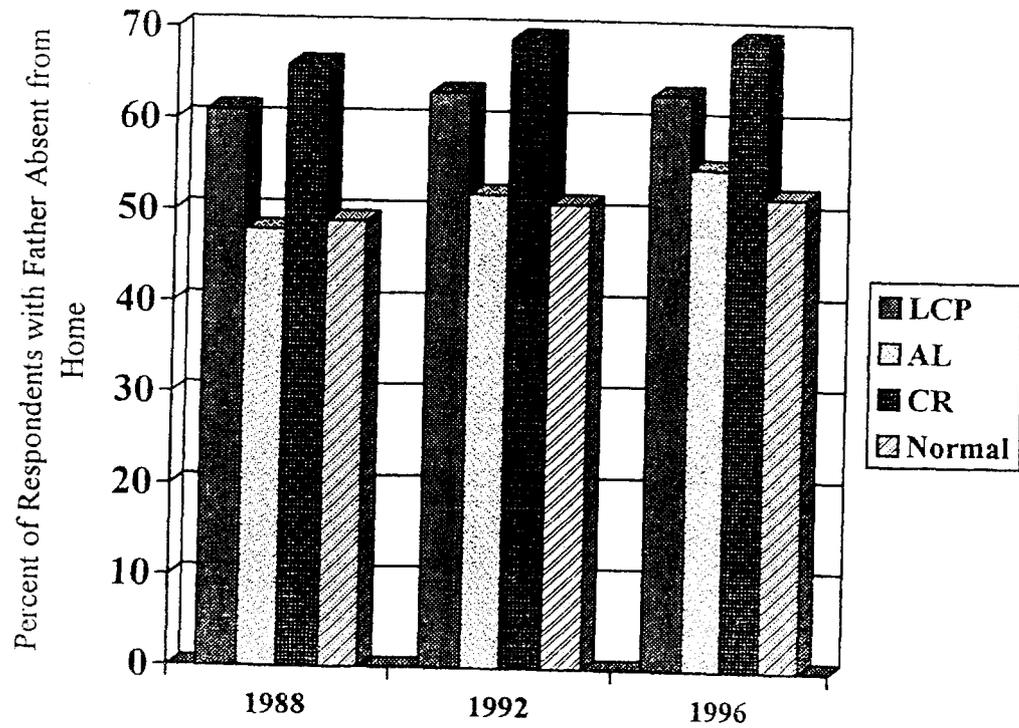


First, the overall trend over time is a decrease in the percent of individuals (regardless of group) who were in poverty, which suggests an improved economic conditions for the entire sample. Second, a larger percent of LCP type offenders than AL offenders are in poverty in all three periods. Cross-tabulations confirmed that differences between these groups were significant in 1987 ( $\chi^2 = 3.62, p < .05$ ) and 1991 ( $\chi^2 = 6.07, p < .01$ ), but not in 1995 ( $\chi^2 = 1.17, p > .05$ ). Again, this supports the hypothesis that LCP offenders are characterized by greater levels of adversity than AL offenders during childhood, but also suggests the possibility that changes in adversity (notice that the poverty rate actually increases for AL offenders during adolescence) may influence the adolescent onset of antisocial behavior. Third, it is noteworthy that poverty rates for the childhood recovery group declined from over 15% from 1991 to 1995, a decline that was greater than any of the other groups.

The second adversity measure that could possibly vary over time is the presence or absence of the biological father in the household of the child. The percentage of children with absent fathers across each group for the years of 1988, 1992, and 1996 is illustrated in Figure 4.5. The three bar charts in this figure suggest that the pattern for father absence remained the same over time. The CR and LCP groups had the highest rate of father absence, and the normal and AL groups the lowest percentage at all three time points. Cross-tabulations revealed, however, that the differences in percentages between AL and LCP groups were not statistically significant at any of the time points.

Proxy measures for neuropsychological deficits. Apart from adversity, the discrete offending groups are also hypothesized to vary with respect to measures of individual differences in proxies for neuropsychological functioning.

Figure 4.5. Percent of Fathers Absent From Home Across Developmental groups, 1988, 1992, 1996.



Specifically, Moffitt (1993a) suggests that LCP type offenders are characterized by subtle neurological deficiencies, while AL offenders are not. To test this assertion, the groups are compared with respect to prevalence of low birth weight, and mean levels of measures of maternal smoking, alcohol use during pregnancy, and verbal intelligence.

The percent of offenders within each discrete offending group that were born at a weight of less than 5 pounds, 7 ounces is displayed in Figure 4.6. Visual inspection of this figure reveals little difference in the prevalence of low birth weight across the discrete groups. This was confirmed by a cross-tab testing that indicated a non-significant difference between the AL and LCP groups ( $\chi^2 = 0.18, p > .05$ ). Figure 4.7 and Figure 4.8 illustrates mean level differences among the offending groups for measures of risky maternal behaviors during pregnancy.

Inspection of Figure 4.7 reveals a small absolute difference in mean scores on the measure of maternal alcohol use that is consistent with the research hypothesis. Specifically, LCP offenders score higher than any of the other groups. This difference, however, is neither substantively large nor statistically significant ( $F = 1.1, p > .05$ ). As shown in Figure 4.8, there is not even an absolute difference between AL and LCP offenders with respect to maternal use of cigarettes during pregnancy<sup>26</sup>.

The final proxy for neuropsychological health is verbal intelligence. Again, the hypothesis here is that LCP offenders, and not AL offenders will have deficits in verbal intelligence. Figure 4.9 illustrates mean level differences among the discrete groups in standardized measures of verbal intelligence taken in 1988 and 1992. The pattern of

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<sup>26</sup> Relatively few mothers reported using either cigarettes or alcohol during pregnancy, resulting in low mean scores across all categories, and raising the question of whether the mean accurately reflects the "typical case." For this reason, supplemental analyses were conducted with cross-tabs and dummy variables. The results of these analyses corroborated the ANOVA tests.

Figure 4.6. The Prevalence of Low Birth Weight Across Discrete Offending Groups.

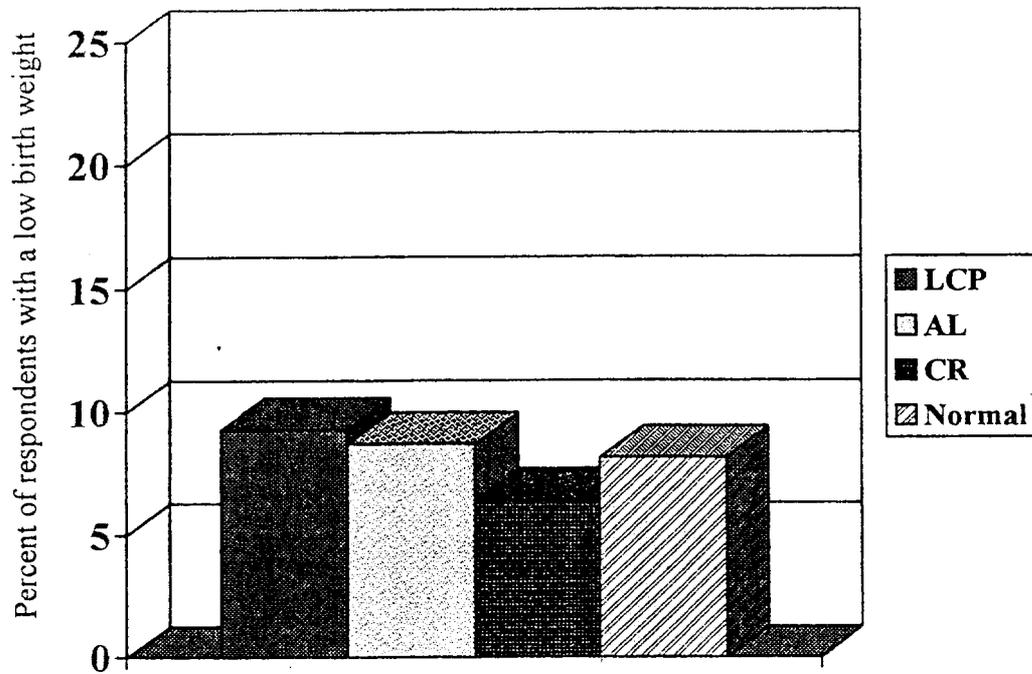


Figure 4.7. Mean Level Differences in Maternal Use of Alcohol During Pregnancy Among Discrete Developmental Groups.

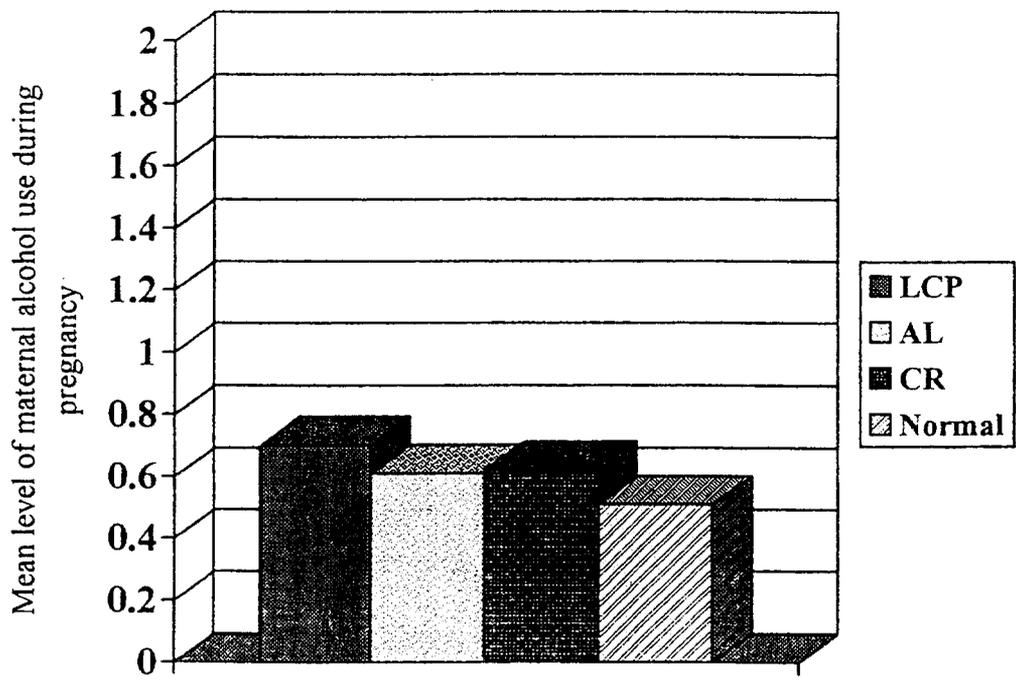


Figure 4.8. Mean Level Differences in Maternal Use of Cigarettes During Pregnancy Among Discrete Developmental Groups.

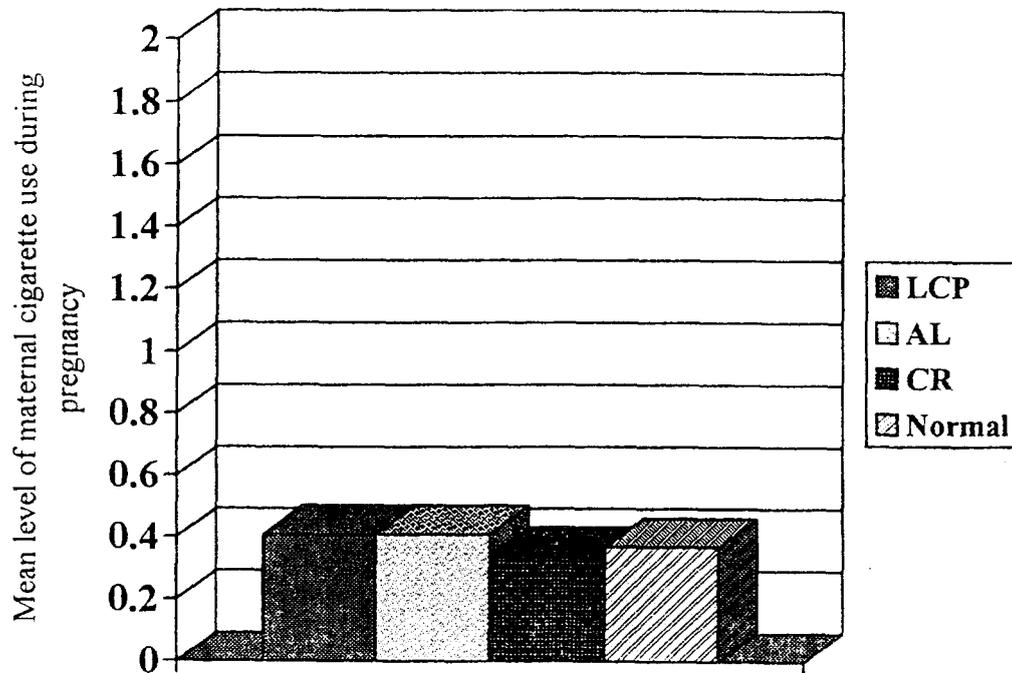
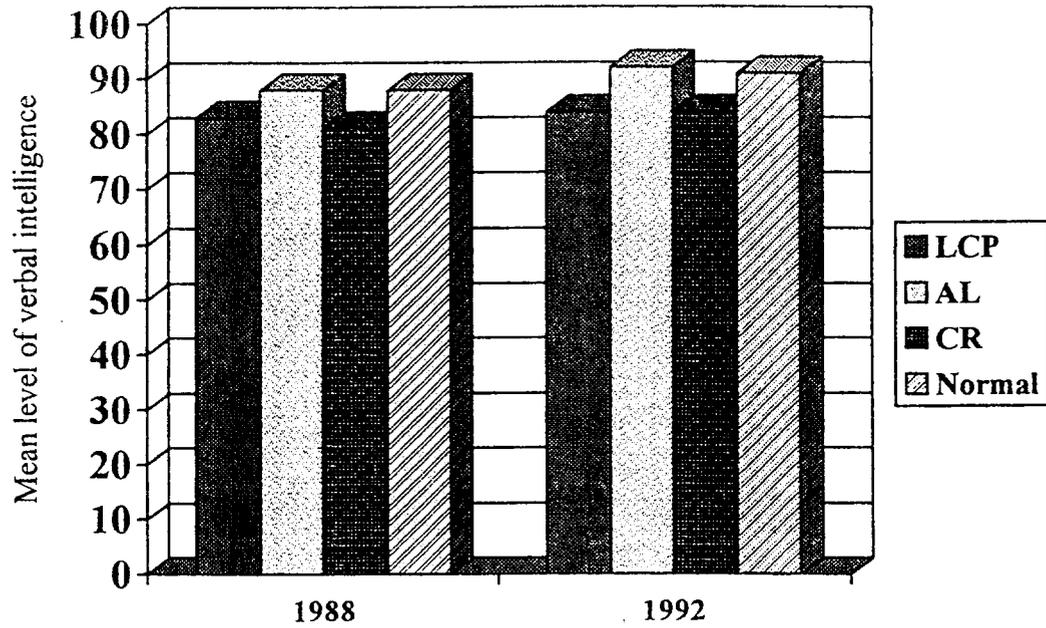


Figure 4.9. Mean level differences in verbal intelligence among discrete groups, 1988, 1992.



differences is consistent across time, and (for the sample) the differences between AL and LCP offenders are consistent with the research hypothesis. ANOVA's revealed significant differences among the groups for both 1988 ( $F = 4.8, p < .01$ ) and 1992 ( $F = 8.1, p < .01$ ). Post-hoc Sheffe tests, however, revealed that only the difference between AL and LCP groups attained significance only in 1992 (mean difference = 8.56,  $p < .01$ ). Thus, with respect to proxy measures of neuropsychological health, some measures were consistent (in terms of sample differences) with the research hypothesis; however, only one statistically significant difference was observed.

Measures of snares. Several theorists (Moffitt, 1993a; Patterson, 1993) suggest that antisocial youth accumulate social disadvantages as they move towards adolescence—in other words, they hypothesize a process of cumulative continuity. Moffitt (1993a) has termed the baggage resulting from childhood antisocial behavior “snares,” as they may ensnare an individual in the consequences of their early behavior patterns. Moffitt (1993a) suggests that snares should be most evident for LCP offenders, but that some AL offenders might also get trapped in the consequences of their behavior. For example, individuals may alienate themselves from social institutions (the family, school), and engage in risky behaviors (e.g., unprotected sex, substance abuse) that knife off opportunities for prosocial interactions.

Unfortunately, the NLSY contains little information on family closeness or bonding during the late adolescent period. Measures are available, however, that tap into schooling and engaging in risky behaviors, two types of snares specifically articulated by Moffitt (1993a, Moffitt et al., 1996). Measures related to schooling include whether or not the respondent ever dropped out of school for at least one month, and the respondents

report of the highest grade that they are likely to complete.<sup>27</sup> Figure 4.10 illustrates the percent of individuals in each group that reported ever dropping out of regular school. The differences in (sample) percentages across the groups are consistent with the research hypothesis regarding snares. Specifically, LCP type offenders report the highest drop out rates, followed by those in the AL (12%), CR (9.4%) and normal (5.9%) groups. Cross-tabs comparing the LCP group to both the AL ( $\chi^2 = 1.89, p > .05$ ), and the CR group ( $\chi^2 = 1.44, p > .05$ ) revealed no statistically significant differences.

Respondents' reports of the highest grade that they expect to complete were dummied to indicated whether or not they expected to complete any post-secondary education. The percent of respondents who expect to complete some form of post-secondary education within each group is illustrated in Figure 4.11. Inspection of this figure reveals that the category percentages differ (for the sample) in a manner consistent with expectations. Specifically, respondents classified as LCP are least likely (43%) to report that they expect to attain education beyond high school, as compared to the AL (62%), CR (53%) and normal (74%) groups. Cross tabs revealed that the difference between the LCP and AL groups was significant ( $\chi^2 = 6.75, p < .01$ ).

Moffitt (1993a) notes that individuals who engage in high rate delinquency (especially those with a history of childhood antisocial behavior) are likely to engage in risky behaviors that could incur snares. Specifically, she identifies risky sexual behavior

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<sup>27</sup> Obviously, more objective measures such as whether or not the respondent completed high school, or the highest actual grade completed, would be preferred here. Given the age distribution of the sample, these measures are problematic. Specifically, roughly half of the sample is still in high school, and the bivariate nature of the analyses preclude the use of age as a control variable for an estimate of the highest grade completed. Given these circumstances, the respondent's estimate of the highest grade they are likely to complete is the lesser evil.

(that could result in unwanted pregnancy) and substance abuse problems as examples. NLSY respondents were asked questions related to both types of risky behavior.

Focusing first on substance abuse, respondents were asked whether or not they experienced a variety of problems due to their use of alcohol in the past year. Examples include troubles with school (grades suffered, too hung over to go to school) and with friends, neighbors and family. These types of questions are commonly used to assess whether an individual has a substance abuse problem (c.f., Moffitt et al., 1996). For the present analyses, measures of each problem was first summed, and then dichotomized to produce a prevalence rate for any alcohol related problems. Accordingly, the percent of respondents who reported at least one alcohol related problem within each discrete group is displayed in Figure 4.12.

As can be discerned from the figure, the percentages did differ in the theoretically expected direction. Specifically, LCP type offenders (43%) had a higher prevalence of alcohol related problems than AL (39%), CR (35%), or normal (26%) respondents. Cross-tabs revealed that the difference between the AL and LCP groups, however, was not significant.

With respect to “risky sexual behavior”, respondents reported whether or not they engaged in unprotected (e.g., neither they nor their partner used any birth control) sex over the past month. The percent of respondents who reported unprotected sex for each discrete group is illustrated in table 4.13. Inspection of this figure again reveals sample percentages consistent with the research hypothesis. Specifically, LCP offenders more likely to report engaging in unprotected sex than other groups. These differences, however, are neither substantively large nor statistically significant.

Figure 4.10. The Percent of Respondents who Reported Dropping out of School Across Discrete Offender Groups.

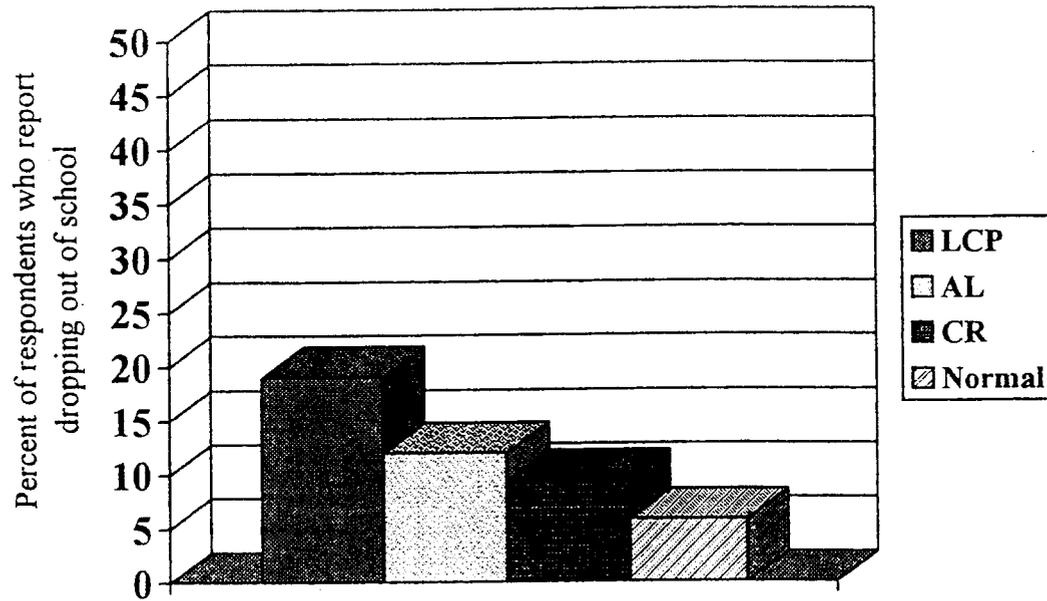


Figure 4.11. The Percent of Respondents who Report That They Expect to Complete Post-secondary Education Across Discrete Groups.

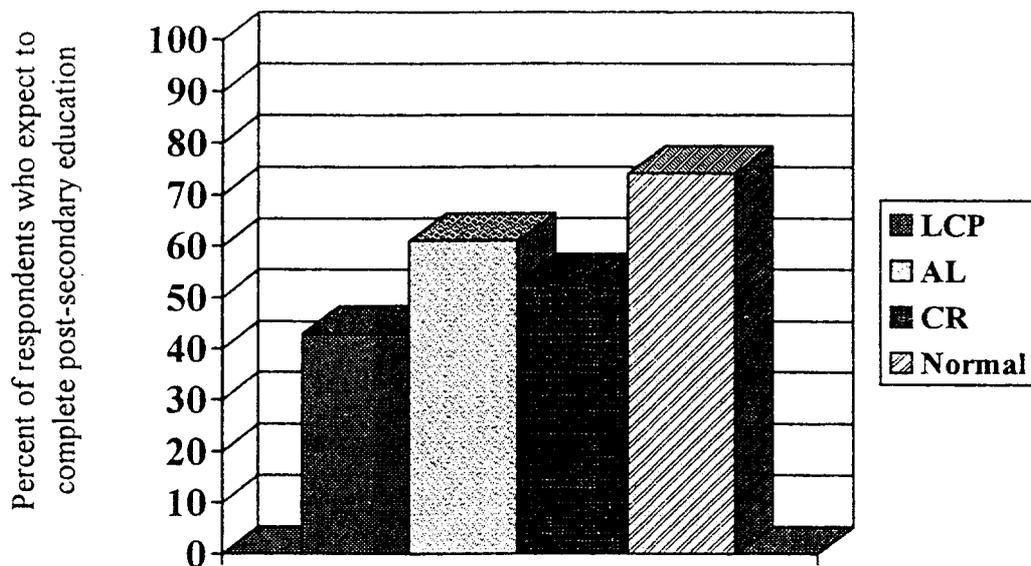


Figure 4.12. The Percent of Respondents who Reported at Least One Alcohol Related Trouble Across Discrete Groups.

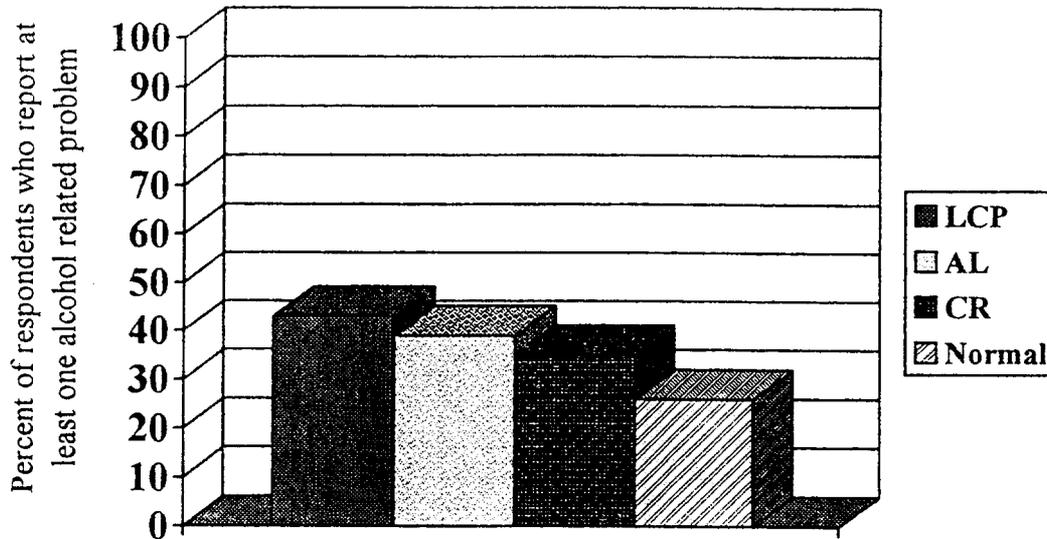
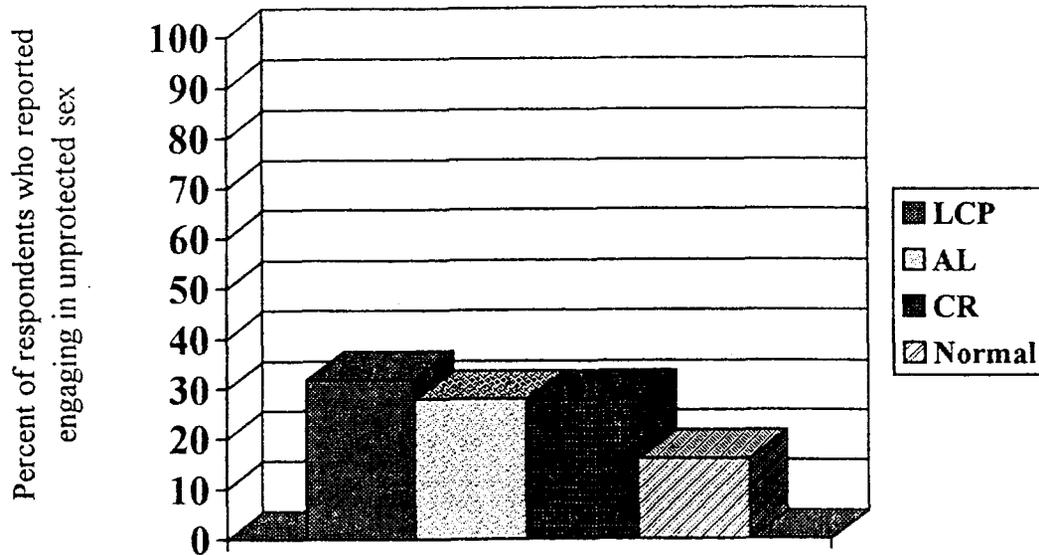


Figure 4.13. The Percent of Respondents Reporting That They Engaged in Unprotected Sex in the Past Month.



### *Summary of Analyses*

The analyses presented in this chapter explored three related themes of life-course criminology. Table 4.11 summarizes the research questions addressed, and indicates the degree of support for each research hypothesis. The first set of analyses (research question #1) focused on the prediction of childhood antisocial behavior with interaction between risk for neuropsychological deficits and a measure of social adversity. The second set of analyses (research questions #3-#5) involved the examination of continuity in antisocial behavior over two developmental time periods. The final set of analyses (research question #6) focused attention on baseline differences in measures of adversity, neuropsychological risk, and potential “snares.” Chapter 5 reviews the findings from each set of these analyses, and identifies the theoretical and policy implications of this research.

Table 4.11. Summary of Research Hypotheses and Level of Support

Research Questions and Hypotheses	Level of Support
Research Question #1: Does adversity interact with neuropsychological functioning to predict childhood antisocial behavior?	
Hypothesis 1a: The interaction between adversity and low birth weight will significantly predict childhood antisocial behavior.	not supported
Hypothesis 1b: The interaction between adversity and maternal smoking will significantly predict childhood antisocial behavior.	not supported
Hypothesis 1c: The interaction between adversity and maternal alcohol use will significantly predict childhood antisocial behavior.	not supported
Hypothesis 1d: The interaction between adversity and verbal intelligence will significantly predict childhood antisocial behavior.	not supported
Hypothesis 1e: The interaction between adversity and hyperactivity will significantly predict childhood antisocial behavior.	not supported
Research Question #2: Are individual differences in antisocial propensity sufficient to account for the stability of childhood antisocial behavior?	
Hypothesis 2a: Childhood antisocial behavior will have a significant direct effect on Wave 4 delinquency.	supported
Hypothesis 2b: The relationship will remain significant after controlling for peer rejection and academic achievement.	not supported
Hypothesis 2c: Peer rejection and academic achievement will still be significantly related to Wave 4 delinquency.	not supported
Hypothesis 3c: Peer rejection and academic achievement will mediate the effect of childhood antisocial behavior on Wave 4 delinquency.	partial support

Table 4.11. Summary of Research Hypotheses and Level of Support (continued)

Research Questions and Hypotheses	Level of Support
<p>Research Question #3: Are the effects of peer rejection similar for children with high and low levels of childhood antisocial behavior?</p>	
<p>Hypothesis 3a: peer rejection and academic achievement will have a stronger effect on delinquency for individuals who were antisocial as children.</p>	not supported
<p>Research Question #4: Are individual differences in antisocial propensity sufficient to account for the stability of in antisocial behavior from late childhood to adolescence?</p>	
<p>Hypothesis 4a: Wave 4 delinquency will have a significant direct effect on Wave 7 delinquency.</p>	supported
<p>Hypothesis 4b: The relationship between Wave 4 and Wave 7 delinquency will remain significant after controlling for social variables.</p>	supported
<p>Hypothesis 4c: Pressure, academic achievement, religiousness, and neighborhood problems predict Wave 7 delinquency, independent of Wave 4 delinquency.</p>	partial support (peer pressure)
<p>Research Question #5: Are the effects of peer pressure, academic achievement, religiousness, and neighborhood problems similar for youth with high and low levels of Wave 4 delinquency?</p>	
<p>Hypothesis 5a: Peer pressure, academic achievement, religiousness, and neighborhood problems will be more salient predictors of delinquency for those with higher levels of prior delinquency.</p>	partial support (peer pressure)

Table 4.11. Summary of Research Hypotheses and Level of Support (continued)

Research Questions and Hypotheses	Level of Support
<p>Research Question #6: Do discrete offender groups differ on social structural, and individual level predictors of antisocial behavior?</p>	
<p>Hypothesis 6a: The families of LCP offenders will be characterized by higher levels of structural adversity than AL offenders.</p>	<p>partial support (poverty)</p>
<p>Hypothesis 6b: LCP offenders will evidence greater neuropsychological risk than AL offenders.</p>	<p>partial support (verbal intelligence)</p>
<p>Hypothesis 6c: LCP offenders will participate in more violence than AL offenders.</p>	<p>not supported</p>
<p>Hypothesis 6d: LCP offenders will be more evidence greater involvement in possible “snares” than AL offenders.</p>	<p>partial support (education expectations)</p>

## CHAPTER 5

### DISCUSSION AND IMPLICATIONS

#### *Introduction*

The analyses performed in Chapter 4 addressed three conceptual areas within the life-course paradigm. The purpose of the following chapter is to summarize the findings from each of these areas. Accordingly, the present chapter is organized into three sections, with each section reviewing analyses from a distinct conceptual area. Each section follows the same structure. First, the research hypotheses (and logic behind them) are reviewed. Second, the findings from the analyses are reviewed. Finally, based on the findings, the theoretical and policy implications are reviewed. The chapter concludes with two sections that broadly place this study in the context of (a) current policy and theory, and (b) future research directions.

#### *Prediction of Childhood Antisocial Behavior*

One of the most consistent findings in criminology is that childhood antisocial behavior and early onset of delinquency predicts later offending. One implication of this finding is that the etiology of delinquency (for some individuals) must be “pushed back” to childhood. Until recently, the researchers assessing childhood antisocial behavior had largely settled on a general causal model. I have referred to this general causal process as the “mediation model,” where structural adversity (e.g., poverty, low SES) weakens parents’ ability to supervise, consistently discipline, and emotionally bond with their children. In turn, parental efficacy predicts childhood antisocial behavior. As discussed in Chapter 2, there is substantial empirical support for the mediation model (Larzelere and Patterson, 1990; Sampson and Laub, 1993; McLeod and Shanahan, 1993).

In spite of this empirical support, recent theorists have questioned the relationship between parental efficacy and childhood antisocial behavior or delinquency (Harris, 1990; Lytton, 1990; Moffitt, 1993a). Specifically, critics suggest that, at the least, this relationship is reciprocal—it is equally plausible that a child with antisocial tendencies or a “difficult temperament” affects parenting behaviors. Indeed, prior research using the NLSY mother-child data found that the relationship between physical punishment (spanking) and childhood antisocial behavior was due largely to children’s effects on parenting (McLeod et al., 1993).

Within the context of this debate, Moffitt (1993a) has suggested that the interaction between “child effects” and either structural adversity or parenting characteristics (rather than main effects in either direction) fosters the development of childhood antisocial behavior. Specifically, she theorizes that the interaction between a child with subtle neuropsychological deficits and a poor parenting context starts children on a track of enduring antisocial behavior. The purpose of the first set of analyses was to test this proposition.

Moffitt’s biosocial interaction hypothesis was tested by creating multiplicative interaction terms between proxies for neuropsychological deficits and a measure of social adversity. Adversity was used in preference to direct measures of parenting for two reasons. First, Moffitt (1993a) views parenting and “child effects” as a reciprocal relationship, meaning that parenting might be a reflection of individual differences in children. Second, the NLSY data does not contain adequate measures of supervision and consistent discipline, the two parental characteristics outlined as critical in extant criminology literature. Distal measures of neuropsychological deficits included low birth

weight, and maternal cigarette and alcohol use during pregnancy. Verbal intelligence and hyperactivity served as proximal measures of neuropsychological deficits and the dependent variable for the analyses was childhood antisocial behavior. Although the adversity index was related to childhood antisocial behavior, none of the multiplicative interaction terms significantly predicted this outcome. In other words, Moffitt's interaction hypothesis was not supported.

What might account for these null findings? Obviously, one possibility is that the research hypothesis is incorrect. That is, subtle neurological deficits do not interact with adversity to explain childhood antisocial behavior. There are, however, several limitations of the analysis that may temper support for this conclusion.

First, it should be noted that the analyses were not a strict test of Moffitt's hypothesis, but rather a test of a proposition derived from her theory. Specifically, Moffitt (1993a) argues that the biosocial interaction distinguishes life-course-persistent offenders from adolescent limited offenders. A logical extension of this statement is that the biosocial interaction should predict childhood antisocial behavior—only LCP offenders demonstrate such behavior. Still it is possible that inclusion of children who are antisocial during childhood, but not adolescence (and therefore not LCP) added fuzziness to the test of Moffitt's hypothesis.

A second limitation of the analyses is the variables employed to tap neuropsychological functioning, and childhood antisocial behavior. With respect to neuropsychological functioning, there are few direct measures (for example, brain scans) of this process. The analyses therefore employed "proxy" measures of neurological impairments—a strategy followed by prior research (Raine et al., 1994; Tibbetts and

Piquero, 1999). Another strategy is to directly measure early child “temperament.” (Shaw and Winslow, 1997). Indeed, measures of temperament (e.g., “difficult temperament”) are available in the NLSY mother-child data, but only for children who are not old enough to be assessed with regard to their antisocial behavior. Future research with this data using more direct measures of temperament may prove more fruitful.

Another possible explanation for the null findings involves the operationalization of Moffitt’s theory. Specifically, Moffitt articulates a “transactional” theory, where a series of failed parent-child interactions eventually leads to a sustained pattern of childhood antisocial behavior. It is possible that multiplicative interaction terms fail to capture the complexity of her theory.

Given that prior research has documented interactions with proxies in support of Moffitt’s theory using multiplicative interaction terms, it is difficult to dismiss the findings here due to a failure to either directly measure neuropsychological functioning, or to model the processes in a more sophisticated manner. However, it is noteworthy that in the present analysis, each of the distal measures had relatively low prevalence rates, which increases the difficulty of detecting significant relationships. Prior findings supportive of interactive effects tended to have either a very large sample (Brennan et al., 1999; Raine et al., 1994) or a high-risk sample (Tibbetts and Piquero, 1999). Perhaps this is one research area where a high-risk sample is preferable to a national sample.

A more serious limitation of the analysis involves the measure of childhood antisocial behavior. Specifically, the measure was derived from a single source (the mother), rather than multiple sources (e.g., teacher, father). While maternal reported

antisocial behavior was significantly related to the child's later self-reported delinquency, this relationship was typically weak. Thus, the fact that they were related suggests that each is a valid indicator of antisocial behavior, but the strength of the relationship suggests high levels of measurement error.

Despite these limitations, the fact that none of the multiplicative interaction terms significantly predicted childhood antisocial behavior must be viewed as negative evidence for Moffitt's theory. Consistent with past research, however, social adversity was positively related to antisocial behavior. Past research has consistently documented the relationship between various measures of social adversity and childhood antisocial behavior or early delinquency (Larzelere and Patterson, 1990; McLeod et al., 1994; Sampson and Laub, 1993, 1994; Shaw and Winslow, 1997).

Further, both Moffitt (1993a) and supporters of the mediation model agree that structural adversity operates to decrease parenting efficacy. The policy implications of this finding are rather clear. The finding that adversity increases childhood antisocial behavior suggests that prevention strategies aimed at parents in adverse social circumstances may reduce the prevalence of childhood antisocial behavior. Further, to the extent that adversity does operate through parenting efficacy, efforts aimed at providing parents with support and training seem warranted. Indeed, the prevention literature suggests that programs designed to aid mothers in poor social circumstances with home visits from nurses (Currie, 1998; Olds et al., 2001) and parent training programs (Capaldi et al., 1997; Tremblay et al., 2001) can reduce the prevalence and level of childhood antisocial behavior.

Apart from to social adversity, the analyses also revealed that both hyperactivity and verbal intelligence, controlling for adversity, significantly predicted childhood antisocial behavior. Because measures of parenting efficacy were not included, it is not possible to rule out they idea that these effects are the result of model misspecification. In other words, hyperactivity and verbal intelligence might predict childhood antisocial behavior only insofar as they reflect parenting practices. Yet, there are a couple of reasons to suspect that these relationships may not be completely spurious.

First, while the measure of hyperactivity and verbal intelligence were correlated with adversity (at the bivariate level), each factor maintained an independent effect within a multivariate model. To the extent that adversity is related to parental efficacy (which is difficult to determine in these data, but is supported in the literature), these effects are also independent of parenting efficacy. Second, the reader is reminded that both hyperactivity and verbal intelligence are thought to have a neurological basis (Moffitt, 1990a; Moffitt and Henry, 1991; Rappport et al., 1999). Indeed, in the present data, distal proxies for neurological deficits (e.g., low birth weight, maternal smoking during pregnancy) were related to both measures, albeit weakly, at the bivariate level.

Obviously, the evidence in support of “child effects” documented here is speculative at best, compared to research designs that are able to include strong measures of parenting behavior (Sampson and Laub, 1993). Nevertheless, assuming that child effects exist, what are the theory and policy implications? From a theoretical perspective, the presence of “child effects” suggests that where possible, measures of childhood temperament or early antisocial behavior should be included in statistical models to avoid

model misspecification. For example, Sampson and Laub (1994) include measures of “severe temper tantrums,” and “child difficulty,” in their tests of the mediation model.

From a policy perspective, child effects (whether they are due to neuropsychological deficits or other factors) are important to the extent that they are consistently linked to antisocial behavior and delinquency, independent of parental efficacy and social adversity. Indeed, some authors (Harris, 1998) argue that child effects are causal, whereas parenting characteristics are not. The weight of current empirical evidence, however, suggests that where child effects exist, they are less potent predictors of antisocial behavior than parental efficacy (Sampson and Laub, 1994; Larzelere and Patterson, 1990). The most powerful evidence in this debate comes from experimental studies, which indicate that changing parental practices reduces childhood antisocial behavior (Capaldi et al., 1997; Patterson, 1980; Tremblay et al., 2001).

*Stability in Antisocial Behavior—1988 to 1992, and 1992 to 1998.*

The analyses that focused on the stability of antisocial behavior covered two time periods. The first set of analyses focused on the stability of antisocial behavior between Wave 2 (1988) and Wave 4 (1992) of the NLSY survey, while the second set of analyses attended to the stability of antisocial behavior from Wave 4 to Wave 7 (1998). Both sets of analyses were designed to address three research questions related to the stability of antisocial behavior.

First, is the effect of early antisocial behavior on later antisocial behavior mediated by intervening variables? This question stems from the debate over whether stability is produced through population heterogeneity in some latent trait (propensity), or through a process of cumulative continuity. Second, do any of the intervening variables

affect delinquency independent of prior antisocial behavior? This question addresses the issue of whether observed relationships between social factors (e.g., bonds, delinquent peer exposure) and delinquency are spurious (social selection) or causal (social causation). Third, does prior antisocial behavior moderate the effect of the intervening variables on delinquency? This question addresses the recently advanced hypothesis of Wright and his colleagues (2000) that social causation is more salient for “high propensity” youth than for “low propensity” individuals. This hypothesis echoes a position taken within the treatment literature (see, Andrews and Bonta, 1998) that high-risk individuals have the greatest potential for reductions in recidivism.

In the previous chapter, two sets of negative binomial models were presented in an effort to address these questions for each developmental period. The following discussion focuses primarily on the findings from these models.

Antisocial behavior from 1988 to 1992. In 1988, respondents in the sample were aged between seven and ten years. During this wave, the source of information for respondent’s antisocial behavior is maternal reports. In 1992, respondents were aged between eleven and fourteen years, and completed a limited (4 items) self-report survey regarding their level of involvement in delinquency. The bivariate correlation between maternal reported antisocial behavior in 1988 and self-reported delinquency in 1992 revealed stability in antisocial behavior ( $r = .19$ ) across these two periods, but the strength of the relationship was weaker than is often reported in the stability literature (Lipsey and Derzon, 1998; Loeber and Stouthamer-Loeber, 1988).

There are several factors that might account for this finding. First, while the existence of a relationship between maternal reported childhood antisocial behavior and

self-reported delinquency lends credence to both measures as valid indicators of antisocial behavior, the weakness of this relationship might suggest relatively high levels of measurement error in either (or both) measures. Second, measures of antisocial, but non-criminal, "problem" behaviors tend to exhibit weaker stability over time. Third, as the time between measurement increases, stability estimates of antisocial behavior decrease (Lipsey and Derzon, 1998). Taken together, the bivariate estimate of stability is consistent with studies employing similar measures over a similar developmental period, if not with the overall literature on stability (Loeber, 1982; Loeber and Stouthamer-Loeber, 1988).

To the extent that the stability estimate derived from the present analysis reflects the true nature of stability for this developmental period, it underscores an important point. That is, stability in antisocial behavior during early childhood is far from perfect (Loeber and Stouthamer-Loeber, 1998). This point is revisited below in the discussion of developmental sub-types.

In a negative binomial regression model, controlling for age, race, sex, and adversity, childhood antisocial behavior maintained a significant relationship to Wave 4 delinquency. The fact that the social adversity index maintained a relationship independent of prior antisocial behavior suggests that at this developmental stage (middle childhood), adversity affects delinquency independent of its effects on childhood antisocial behavior. To the extent that adversity operates through parenting efficacy, a premise not tested here, this is consistent with past research finding that early antisocial behavior is an insufficient explanation of delinquency (Sampson and Laub, 1994).

When measures of peer rejection and academic achievement were entered into the multivariate model, they washed out the relationship between childhood antisocial behavior and delinquency, suggesting a possible mediation effect. Neither measure, however, significantly predicted delinquency, calling this mediation hypothesis into question. Further, when the sample was split based on childhood antisocial behavior into high and low propensity groups, and separate models were calculated for each group, neither peer problems nor academic achievement was a significant predictor of delinquency in either. Thus, for this developmental period, both the mediation hypothesis and the moderation hypotheses failed to garner support.

Antisocial behavior from 1992 to 1998. In 1992 (Wave 4), respondents were aged between 11 and 14 years, which represents the period just prior to adolescence. By 1998, the age range was 17 to 21, meaning that most youths were at either the latter stage of adolescence or the early stage of young adulthood. In these analyses, both measures of antisocial behavior were derived from self-reports of delinquent behavior. The bivariate correlation between each measure of delinquency was significant ( $r = .20$ ), but again, was weaker than might be expected from a reading of the stability literature. The lack of a strong stability effect is likely due, in part, to the large gap (six years) between measures of delinquency. Unfortunately, this gap could not be reduced due to the structure of the data and the availability of key measures.

Still, the relative weakness of this stability estimate underscores an important point. While there is often strong stability over short periods of time (from year to year, for example), the correlation between prior and present antisocial behavior shrinks as the gap between measurements increases (Lipsey and Derzon, 1997). The point here is that

despite strong evidence of stability, there is always an undertow of change, or instability. This is especially apparent in the early life-course generally, and more specifically in the analyses presented in Chapter 4.

In the initial (base) multivariate model, Wave 4 delinquency maintained a significant relationship with Wave 7 delinquency, after controlling for age, race and sex. When social bond and social learning variables were introduced into the model, Wave 4 delinquency remained significant, although the coefficient was reduced. The sole variable that predicted Wave 7 delinquency, independent of Wave 4 delinquency was peer pressure. Further analyses indicated that peer pressure was only salient for the high propensity group. In sum, the analysis of stability for this developmental period indicated that the effect of peer pressure on delinquency represented “social causation” rather than social selection. This relationship also supports Wright et al.’s (2000) hypothesis that social causation is most salient for high propensity youths. From a policy perspective, this suggests that a focus on peer groups, especially for individuals who are already “in trouble,” may reduce subsequent delinquency. Indeed, Andrews and Bonta (1998) advocate disrupting criminal peer networks, and focusing intervention efforts on high-risk youths. From a theoretical perspective, these analyses suggest that early propensity is not the sole cause of crime—that social causation is evident albeit limited.

#### *Developmental Subtypes of Offending*

In the field of criminology, there is currently a debate over whether some offenders are qualitatively different from others. Those in favor of sub-type theories argue that offenders with a history of childhood antisocial behavior and an early onset to delinquency follow a different causal path to crime than offenders who become

delinquent later in life (Moffitt, 1993a; Patterson, 1993). Both Moffitt (1993a) and Patterson (1993) suggest that childhood antisocial behavior is due, in large part to both structural adversity and parental efficacy. Additionally, Moffitt (1993a) emphasizes the rule of subtle neuropsychological deficits. Further, both authors suggest that peer relations are a causal influence for late offending. The opposite position is that offenders differ only in their levels of offending, and early onset to delinquency is nothing more than a measure of an individual's propensity towards offending (Gottfredson and Hirschi, 1990; Sampson and Laub, 1993). In this scenario, the causal mechanisms that produce antisocial behavior are the same for all individuals, regardless of their offending trajectory.

Prior research on this issue has proceeded using two basic strategies. First, analysts have split samples up, based on either age of offending onset (early vs. late) or on offending trajectories (limiteds vs. chronics) and tested whether the predictors of delinquency are similar across groups (Dean et al., 1996; Mazerolle, 1999; Paternoster and Brame, 1997; Paternoster et al., 1997; Simons et al., 1994; Tibbetts and Piquero, 1999). This strategy has yielded mixed results, with some authors finding differences in predictors of delinquency across groups (Simons et al., 1994; Tibbetts and Piquero, 1999) and others finding little or no difference (Mazerolle, 1999; Paternoster et al., 1997). A second strategy is to construct discrete offender groups based on observations of antisocial behavior over the life-course, and to compare these groups on the level and prevalence of risk factors for delinquency.

This is the strategy followed by Moffitt and her associates (1996) using the Dunedin, New Zealand sample, and it is also the strategy employed here. Comparisons

of risk factors across discrete offending groups in the Dunedin sample revealed several differences between AL and LCP offenders. Specifically, LCP offenders were more likely than AL offenders to commit violent acts and drop out of school, and less likely to be emotionally attached to their family.

In the present study, individuals were classified based on their history of antisocial behavior, into one of four groups; life-course-persistent (LCP), adolescent limited (AL), childhood recovery (CR), and normal. The percentage of offenders within each group approximated both Moffitt's (1993a) theoretical expectations and specific percentages discovered within the Dunedin sample (Moffitt et al., 1996). Specifically, LCP offenders made up roughly 6% of the sample, AL constituted 18%, and the CR group 10%. These groups were compared across several domains, including; (a) their level of violence during adolescence, (b) prevalence and level of proxies for neuropsychological functioning, (c) level of social adversity, and (d) possible consequences of antisocial behavior.

AL and LCP offenders did not differ significantly in their level of violence in either Wave 6 (1996) or Wave 7 (1998), although the sample percentages differed in the theoretically expected difference for Wave 7. Thus, in the present analyses, LCP offenders were no more violence-prone during adolescence than their AL counterparts.

According to Moffitt (1993a), a distinguishing feature of LCP type offenders is their neuropsychological impairment. In the analyses, AL and LCP offenders did not differ significantly across measures of low birth weight, maternal cigarette use during pregnancy, or maternal alcohol use during pregnancy. LCP offenders did, however, score significantly lower than AL offenders on a measure of verbal intelligence.

Both Patterson (1993) and Moffitt (1993a) suggest that social adversity exerts a causal influence on childhood antisocial behavior, but not on delinquency that is confined to adolescence. Comparisons of the discrete groups across measures of social adversity yielded mixed results. The mothers of LCP offenders reported lower levels of education and higher levels of deviance, and gave birth at a younger age than mothers of AL offenders. None of these differences, however, reached statistical significance. Similarly, LCP offenders in the sample were most likely to have their biological father absent from the home, but this difference was not significant. Individuals in the LCP group also had higher poverty rates across three time periods, and this difference was significant for two of the three periods.

A final point of comparison for the groups was based on Moffitt's (1993a) description of "snares." Specifically, she argues that LCP offenders are more likely to be ensnared in the consequences of their early antisocial behavior, which include alienation from peers and family, school failure, and engaging in risky behaviors. In the present study, discrete groups were compared on two measures of school related consequences, and two forms of risky behavior. With regard to school, LCP offenders reported the highest dropout rate of any group (including the AL group), but the difference between AL and LCP offenders was not significant. On the other hand, AL offenders were significantly more likely to report that they expected to complete a post-secondary degree than were LCP offenders.

The analyses also included two measures related to the respondents' involvement in risky behaviors—unprotected sexual activity, and alcohol related problems. LCP

offenders reported a higher prevalence for both measures (within the sample) than the AL group, but in neither case were the differences statistically significant.

Thus, the present analyses, consistent with past research, revealed mixed findings regarding differences between AL and LCP (or early and late starters) along several risk domains. While many of the risk measures were related to offender status in a manner consistent with the two group model of offending, most differences failed to attain statistical significance, and many of the observed differences were substantively small.

Aside from differences between AL and LCP offenders, the sub-group analyses also offered the opportunity to uncover factors that may insulate children who exhibit childhood antisocial behavior from delinquency. In the current sample, over half of the individuals who were considered "childhood antisocial," did not demonstrate high levels of delinquency during adolescence. This finding is consistent with past research, and represents the "truism" that many antisocial children (despite strong tendency towards stability) do not become delinquent or criminal at later developmental periods (Loeber and Stouthamer-Loeber, 1998; Moffitt et al., 1996).

Unfortunately, the analyses revealed few answers to this important question. For example, it is possible that youth in the CR group had more cognitive ability, or less structural adversity than members of the LCP group. Yet, in most of the measures stemming from childhood, (adversity, verbal intelligence) the CR group tended to hover close to the LCP group. Future life-course research should be directed towards this issue because of its obvious policy implication.

*Delinquency and Childhood Antisocial Behavior—Theory and Policy Implications*

In the first two chapters of this dissertation the research hypotheses were placed in the context of three general debates in the criminological literature. The purpose of this section is to place the findings of this dissertation back into the context of the broad conceptual areas from which they stemmed. Specifically, this section addresses, (a) theories of childhood antisocial behavior, (b) explanations of the stability of antisocial behavior, and (c) general theories of delinquency versus taxonomic approaches.

A major implication of life-course criminology has been the “pushing back” of the etiology of delinquency. That is, the documentation of the stability of antisocial behavior from an early age has caused criminologists to focus on the prediction of childhood antisocial behavior. The literature on childhood antisocial behavior suggests some consensus on general model of the development of childhood antisocial behavior (Gottfredson and Hirschi, 1990; McLeod and Shanahan, 1993; Patterson, 1993; Sampson and Laub, 1993). Although each author varies the specific causal hypotheses, the general model specifies that negative structural characteristics decrease the probability of parenting efficacy, which in turn increase the likelihood.

I have referred to this causal process as the “mediation model.” In contrast, recent authors (Harris, 1998; Lytton, 1990) suggest that parenting efficacy may be (at least partially) a spurious consequence of “child effects,” such as hyperactivity or a difficult temperament. Prior research, however, suggests that even after controlling for measures of child effects, the basic structure of the mediation model holds (Sampson and Laub, 1993, 1994). Moffitt’s (1993a) dual taxonomy of offending suggests that child effects and structural adversity interact to produce childhood antisocial behavior. Specifically,

she theorizes that subtle neuropsychological deficits produce a toddler with a “difficult temperament.” In the context of structural adversity, parents are ill equipped to socialize such an infant, and a series of failed parent child interactions leads to high levels of childhood antisocial behavior.

As noted above, the hypothesized interaction effects failed to materialize in the analyses presented here. While child effects (verbal intelligence, hyperactivity) were clearly present, they were not more salient in the context of adversity. Thus, the analyses presented here support the mediation model, but caution against the assumption that parenting efficacy and structural adversity are the sole causal factors. Indeed, in Sampson and Laub’s (1993) analysis of the mediation model, measures child effects (temper tantrums, problem behaviors) significantly predicted early delinquency, independent of structural adversity or parental efficacy.

The policy implications of this conclusion are twofold. First, the mediation model has relatively clear policy implications for intervention. Specifically, policies that seek to alleviate structural adversity (or provide support for parents in such a context) and build parenting efficacy seem warranted. The evidence of child effects suggests that some measures may successfully identify at-risk children. The weight of current empirical evidence, however, cautions that parenting and adversity are more potent predictors of childhood antisocial behavior and delinquency.

The second conceptual focus of this dissertation is the explanation of the stability of antisocial behavior. In other words, why does early antisocial behavior predict later antisocial behavior? Theorists have generally answered this question with one of two explanations. First, antisocial behavior may be stable because of some underlying

individual difference that is stable over time (Gottfredson and Hirschi, 1990). Second, early antisocial behavior may set off a chain of events (e.g., peer rejection, academic failure) that can ensnare an individual in the consequences of their early antisocial behavior.

The mediation and moderation models were designed to shed light on the processes that may foster stability at two developmental time periods. The findings from these analyses (as well as the sub-type analyses) suggest that the period from early childhood to adolescence is characterized by both stability and change. Specifically, the stability estimates were far from perfect ( $r = .20$ ), and more than half of those children who displayed high rates of childhood antisocial behavior were chronic delinquents. There was also some evidence of social causation, independent of prior antisocial disposition, and limited evidence of the mediating role of social variables. These findings therefore support theories that build both stability and change into their explanation (Sampson and Laub, 1993; Thornberry, 1996) and contradict a pure population heterogeneity explanations (Gottfredson and Hirschi, 1990).

From a policy perspective, this suggests that early antisocial behavior does not doom an individual to a life of crime and deviance. Put another way, the possibility exists that social influences may deflect individuals from an antisocial trajectory (Sampson and Laub, 1993). A corollary of this point is that intervention with offenders may reduce recidivism. Indeed, despite heavy criticism spanning twenty years, recent evidence suggests that rehabilitation may be an effective policy prescription (Andrews, Zinger, Hoge, Bonta, Gendreau, and Cullen, 1990).

The final conceptual area addressed in this dissertation is the debate over whether childhood antisocial behavior and delinquency are best captured through a general causal model or whether multiple models are necessary. In other words, do offenders differ in their causal pathways, or do they differ only in their relative exposure to a core set of risk factors? The analyses presented above tested a two-group model (AL versus LCP) of delinquency advocated by several researchers (Moffitt, 1993a, Patterson, 1993; Simons et al., 1994). Although some of the findings supported the qualitative distinction between offending groups (for example, the finding that AL and LCP offenders differed in verbal intelligence), the weight of the evidence was not supported a general causal process. Even where AL and LCP offenders differed, the AL group tended to resemble the LCP group more than the normal group.

#### *Directions for Future Research*

The findings in this dissertation also have implications for the direction of future research endeavors focusing on the development of antisocial behavior and delinquency. First, the analyses presented here call into question whether a representative sample is adequate to address many of the issues in life-course research, and particularly research questions focusing on developmental subtypes. Theoretical models that propose a chronic (e.g., LCP) type offender typically suggest that this type of offender is relatively rare. In the present sample, the LCP group contained only 54 of 1030 (6%) of the respondents. This fact limits the statistical power available to detect meaningful differences.

To be sure, "clinical samples" which ensure greater levels of "high-risk individuals" have their own limitations and biases. Perhaps the middle ground is the

selection of a probability sample based on the prevalence of one or more risk markers for antisocial behavior. For example, researchers involved in the Cambridge Study (Farrington, 1986b) drew their sample from a neighborhood strata designed to be “high risk.”

A second direction for future research is a focus on children who engage in high-rate childhood antisocial behavior, but largely refrain from delinquency. What factors cause this reformation? In the present research, few of the measures distinguished the childhood recovery group from the life-course persistent group. Future research with a high-risk sample might be able to uncover individual (e.g., cognitive ability, self-concept) or social (school performance, change in social circumstances) factors that explain this phenomenon.

A third recommendation for future research involves the measurement of both antisocial behavior and risk markers for deviance. With respect to the measurement of antisocial behavior, most analysts now recommend multiple source (e.g., parents, teachers, official agents) measures (Larzelere and Patterson, 1990; Moffitt, 1993b; Farrington, 1986a). Improvements in the measurement of biological risk factors have been slow to develop, but there is some evidence of progress. For example, the NLSY data collection procedure has recently evolved to include measures of childhood temperament, which offers the opportunity to more directly test “child effects” generally, and Moffitt’s interaction hypothesis specifically.

Finally, an area that has been mostly neglected by life-course research is the development of offending among females. In this dissertation, the LCP group was 23% female, and the AL group was 51% female. Most authors suggest (either implicitly or

explicitly) that the causal influences operate similarly across gender. Yet there is evidence that gender-specific causes of antisocial behavior and delinquency exist. For example, Caspi, Lynam, Moffitt, Silva (1993) found evidence that an interaction between an early onset of physical maturation and exposure to deviant peers is particularly salient predictor for female delinquency.

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Appendix 3.0. Items Included in the Measurement of Variables

Variable	Items in Measure
Adversity	
Maternal Criminality	1 = Above 75 <sup>th</sup> percentile  In the last year, have you ever... 1. Sold hard drugs such as cocaine, LSD or heroin 2. Used any drugs to get high or for kicks, other than marijuana 3. Intentionally damaged or destroyed property of others 4. Got in fight at school or work 5. Taken something without paying for it 6. Taken something worth under \$50 7. Taken something worth more than \$50 8. Used force to get money from someone 9. Hit or seriously threatened someone 10. Attacked someone with the idea of seriously hurting or killing them 11. Sold marijuana or hashish 12. Used marijuana or hashish 13. Tried to con someone 14. Taken a vehicle without the owner's permission 15. Broken into a building or vehicle to steal something 16. Knowingly sold or held stolen goods 17. Helped in a gambling operation like running numbers or books
Maternal Education	1 = less than high school degree
Father Absence	1 = father absent
Adolescent Mother	1 = mother less than 19 years of age at time of birth
Poverty Status	1 = in poverty
Family Size	1 = more than 3 children in household

Appendix 3.0. Items Included in the Measurement of Variables (continued)

Variable	Items in Measure
Neuropsychological risk	
Low Birth Weight	1 = less than five pounds, seven ounces
Maternal Smoking During Pregnancy	1 = Smoked at least one pack of cigarettes per day during pregnancy
Maternal Alcohol Use During Pregnancy	1 = Used alcohol at least three or four days per month during pregnancy
Verbal Intelligence	Standardized score from Peabody Picture Vocabulary Test
Hyperactivity	In the past three months, has your child... <ol style="list-style-type: none"> <li>1. Had difficulty concentrating or paying attention</li> <li>2. Been easily confused, or in a fog</li> <li>3. Been impulsive, or acted without thinking</li> <li>4. Been restless or overactive</li> <li>5. Had trouble with obsessions</li> </ol>
Mediation/Moderation	
Academic Achievement	Standardized score from Peabody Individual Achievement Test—math section
Peer Problems	In the past three months, has your child... <ol style="list-style-type: none"> <li>1. Had trouble getting along with other children</li> <li>2. Not been liked by other children</li> <li>3. Been withdrawn, or not involved with other children</li> </ol>
Neighborhood Problems	In your neighborhood, how much of a problem are the following: <ol style="list-style-type: none"> <li>1. People don't respect the rules or laws</li> <li>2. Crime and violence are a problem</li> <li>3. Abandon or run down buildings</li> <li>4. Too many unsupervised kids</li> <li>5. People don't care about things</li> <li>6. People can't find jobs</li> <li>7. Not enough police protection</li> </ol>

Appendix 3.0. Items Included in the Measurement of Variables (continued)

Variable	Items in Measure
Peer Pressure	Do you feel pressure from your friends to... 1. Try cigarettes 2. Try marijuana or other drugs 3. Drink alcohol 4. Skip school 5. Commit crimes
Religiousness	1. How important in your life is religion? 2. How often do you attend religious services?
Measures of "snares" School Drop Out	1 = Respondent reported dropping out of school for at least one month
Education Expectation	1 = Respondent expects to complete post-secondary education
Alcohol Problems	1 = Respondent reported at least one of the following;  During or after drinking in the past 12 months, have you... 1. Gotten into an argument or fight 2. Missed school or other obligations 3. Had problems with friends, family, or neighbors 4. Drank more than intended 5. Found it hard to stop drinking 6. Grades in school suffered 7. Stayed home or were late for work 8. Hurt chances for a better job or a raise 9. Neglected to fulfill obligations
Risky Sex	1 = respondent reported having unprotected sex

Appendix 3.0. Items Included in the Measurement of Variables (continued)

Variable	Items in Measure
<b>Control Variables</b>	
Age	Age in months
Race	1 = Nonwhite
Sex	1 = Male
<b>Childhood Antisocial Behavior</b>	In the past three months, has your child... <ol style="list-style-type: none"> <li>1. Cheated or told lies</li> <li>2. Bullied or been cruel or mean to others</li> <li>3. Not felt sorry after misbehaving</li> <li>4. Broken things deliberately</li> </ol>
<b>Wave 4 Delinquency</b>	In the past year, how often have you... <ol style="list-style-type: none"> <li>1. Hurt someone bad enough to need a doctor</li> <li>2. Damaged school property on purpose</li> <li>3. Taken something without paying for it</li> <li>4. Gotten drunk</li> </ol>
<b>Wave 6 and Wave 7 Delinquency</b>	In the past year, have you ever... <ol style="list-style-type: none"> <li>1. Intentionally damaged or destroyed property of others</li> <li>2. Got into a fight at school or work</li> <li>3. Taken something without paying for it</li> <li>4. Taken something worth under \$50</li> <li>5. Taken something worth more than \$50</li> <li>6. Used force to get money from someone</li> <li>7. Hit or seriously threatened someone</li> <li>8. Attacked someone with the idea of seriously hurting or killing them</li> <li>9. Tried to con someone</li> <li>10. Broken into a building or vehicle to steal something</li> <li>11. Taken a vehicle without the owner's permission</li> <li>12. Knowingly sold or held stolen goods</li> <li>13. Helped in a gambling operation like running numbers or books</li> </ol>

Appendix 3.0. Items Included in the Measurement of Variables (continued)

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Variable	Items in Measure
Dependent Variables Wave 6 and Wave 7 Violence Index	In the past year, have you... <ol style="list-style-type: none"><li>1. Got into a fight at school or work</li><li>2. Used force to get money from someone</li><li>3. Hit or seriously threatened someone</li><li>4. Attacked someone with the idea of seriously hurting or killing them</li><li>5. Hurt somebody bad enough to need a doctor</li></ol>

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