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# The Criminal Career
# Paradigm

ABSTRACT

Criminal careers have long occupied the imaginations of criminologists.
Since the 1986 publication of the National Academy of Sciences report on
criminal careers and career criminals, a variety of theoretical, empirical,
and policy issues have surfaced. Data on key criminal career dimensions of
prevalence, frequency, specialization, and desistance have raised theoretical
questions regarding the patterning of criminal activity over the life course.
Recent research has identified important methodological issues, including
the relationship between past and future criminal activity, and potential
explanations for this relationship: state dependence and persistent
heterogeneity. Advanced statistical techniques have been developed to
address these challenges. Criminal career research has identified important
policy issues such as individual prediction of offending frequency and
career duration, and has shifted the focus toward the interplay between
risk and protective factors.

Researchers have long been interested in the patterning of criminal ac-
tivity throughout the course of criminal careers. Von Scheel (1890,
p. 191) pointed out that "Ideal criminal statistics . . . would follow
carefully the evolution of criminal tendencies in a given population."
Kobner (1893, p. 670) noted that "correct statistics of offenders can be
developed only by a study of the total life history of individuals." Von
Mayr (1917, pp. 425–26) argued that a "deeper insight into the statis-
tics of criminality is made possible by the disclosure of developmental

regularities in which criminality develops in the course of a human life-time. To do this it is necessary to identify the offender and his offense in the population and to keep him under constant statistical control so that it is possible for each birth cohort entering punishable age and until all its members are dead, to study statistically its participation or nonparticipation in criminality and the intensity of such participation in its various forms." Soon after these statements appeared, original studies of career criminals emerged including notably Shaw's *The Jack-Roller* (1930) and Sutherland's *The Professional Thief* (1937). Although these and related works offered insightful observations about the most serious or most interesting criminals, they were largely uninformative about typical criminal careers.

Another line of research focused on the relationship between age and crime. In 1831, Quetelet recognized that age was closely related to the propensity for crime. Using data on crimes committed against persons and property in France from 1826 to 1829, Quetelet found that crimes peaked in the late teens through the mid-twenties (Quetelet [1831] 1984, pp. 54–57). Since Quetelet's findings, a number of researchers have pursued the relationship between age and crime, across cultures and historical periods, and for a number of different crime types (see Hirschi and Gottfredson 1983). Research on the relationship between age and crime has been one of the most studied issues within criminology (Greenberg 1977; Rowe and Tittle 1977; Tittle 1988; Steffensmeier et al. 1989; Britt 1992; Tittle and Grasmick 1997).

The relationship between age and crime raises the question of the degree to which the aggregate pattern displayed in the age/crime curve is similar to—or different from—the pattern of individual careers and whether conclusions about individuals can be validly drawn from aggregate data. For example, how far does the observed peak of the aggregate age/crime curve reflect changes within individuals as opposed to changes in the composition of offenders? In other words, is the peak in the age/crime curve a function of active offenders committing more crime or of more individuals actively offending during those peak years? Some evidence suggests that the aggregate peak age of offending primarily reflects variations in prevalence (Farrington 1986; but see Loeber and Snyder 1990).

Within individuals, to what extent is the slowing past the peak age a function of deceleration in continued criminal activity or stopping by some of the individuals? Across individuals, how much of the age/crime curve can be attributed to the arrival/initiation and departure/

termination of different individuals? What about the role of co-offending? How much of the continuation of offending by lone/solo offenders is attributable to identifying theirs as the key criminal careers of long duration, with their co-offenders serving merely as transients with shorter careers? How much of the age/crime curve for any particular crime type is a consequence of individuals persisting in offending, but switching from less serious crimes early in the career to more serious crimes as they get older?

These questions are central to theory, as well as policy, especially those policies that are geared toward incapacitative effects of criminal sanctions, as well as to changes in the criminal career (e.g., rehabilitation or criminalization patterns as a result of actions by the criminal justice system). For example, if crime commission and arrest rates differ significantly among offenders and over the career, the effect of sentence length on overall crime will depend on who is incarcerated and for how long (Petersilia 1980, p. 325). Addressing these and related issues requires knowledge about individual criminal careers, their initiation, their termination, and the dynamic changes between these end points.

A criminal career is the longitudinal sequence of crimes committed by an individual offender (Blumstein et al. 1986, p. 12). The criminal career approach partitions the aggregate rate of offending into two primary components: participation, or the distinction between those who commit crime and those who do not, and frequency, or the rate of activity of active offenders, commonly referred to by the Greek letter lambda ($\lambda$) (Blumstein et al. 1986, p. 12). Two other dimensions affecting aggregate crime rates are duration, or the length of an individual career, and seriousness, which includes both the offenses committed and patterns of switching among offenses (Blumstein et al. 1986, p. 13). To study these issues, a Panel on Research on Criminal Careers was convened by the National Academy of Sciences (NAS) at the request of the U.S. National Institute of Justice in 1983 and charged with evaluating the feasibility of predicting the future course of criminal careers, assessing the effects of prediction instruments in reducing crime through incapacitation, and reviewing the contribution of research on criminal careers to the development of fundamental knowledge about crime and criminals (Blumstein et al. 1986, p. x).

Since publication of the report, numerous theoretical, empirical, and policy issues have surfaced regarding the longitudinal patterning of criminal careers. One concerned the relevance (or lack thereof) of

criminal career research for criminology generally and public policy in particular. Michael Gottfredson and Travis Hirschi (1986, 1987, 1988) levied a series of critiques against the criminal career approach in which they claimed that attempts to identify career criminals and other types of offenders were doomed to failure. Perhaps the most important issue they raised concerns causality. Although the criminal career paradigm necessitates a longitudinal focus in order to study both the between- and within-individual patterning of criminal activity, Gottfredson and Hirschi questioned whether longitudinal research designs could actually resolve questions of causal order. They also argued that, since correlations with offending were relatively stable over the life course, cross-sectional designs were suitable for studying the causes of crime.

Gottfredson and Hirschi's challenge precipitated theoretical and methodological advances in the study of the longitudinal sequence of criminal careers. Ensuing research showed that, while the between-individual patterning of criminal careers was important, the within-individual differences in criminal activity over time that were not reflected in the aggregate age/crime curve were more important. Theoretical developments emerged claiming that the aggregate age/crime curve masked the offending trajectories of distinct groups of offenders who offend at different rates over the life course, and whose criminal activity is caused by unique factors. Empirical research has tended to confirm these and related theoretical expectations.

Research on criminal careers has generated a wealth of information regarding the longitudinal patterning of criminal activity. For example, researchers have been able to document and account for important empirical regularities such as the relationship between past and future criminal activity, isolate important life circumstances and events that lead to within-individual changes in criminal activity over time, and develop improved statistical techniques to study criminal careers in more detail. Still, much more research is needed. Little is known about how the development and progression of criminal careers varies across race and gender or about how individual criminal careers vary across neighborhood contexts. Similarly, researchers have identified only a small number of life circumstances that relate both positively and negatively to criminal activity, and they are only beginning to understand some of the methodological difficulties encountered in longitudinal research on criminal careers. Also, the relevance and use of criminal career research for incapacitation decisions remains unknown. As prison

populations have soared, few incarceration decisions are likely to have been based on sound empirical knowledge of the longitudinal patterning of criminal careers or of career duration estimates in particular.

This essay surveys background and recent developments associated with the criminal career paradigm. Section I introduces studies that have served as platforms for criminal career research and reviews the findings of some of the major cohort and longitudinal studies. Section II provides a brief review of the criminal career report published by the NAS in 1986. Section III identifies theoretical challenges and developments since the NAS report and discusses newly articulated criminal career features. Section IV outlines methodological issues that arise in criminal career research including issues relating to data, research designs, analytic techniques, and general analytic issues. Section V provides an overview of the empirical findings generated by criminal careers research, with an explicit concentration on the dimensions of criminal careers. Section VI presents a discussion of selected policy implications including the identification of career criminals and policies associated with sentence duration. Section VII offers a modest agenda for future theoretical, empirical, and methodological research.

## I. Sources of Knowledge

Many longitudinal studies throw light on criminal career issues, but a relatively small number of classic and contemporary studies are especially important. Table 1 presents a summary of the main features of each.

Several early longitudinal studies shaped the landscape of criminal career research: the Gluecks' Unraveling Juvenile Delinquency study, McCord's Cambridge/Somerville study, Wolfgang's Philadelphia Birth Cohort Studies, Farrington's Cambridge Study in Delinquent Development, Elliott's National Youth Survey, Le Blanc's Montreal adjudicated and adolescent samples of youth, and two Swedish studies, Project Metropolitan and the "Individual Development and Environment" research program. These projects differ in the samples used, the issues addressed, the data used, and the methodological approaches taken.

### A. The Gluecks' Unraveling Juvenile Delinquency (UJD) Study

The Gluecks compared the criminal activity of 500 nondelinquents with that of 500 boys officially designated as delinquent and selected from the Massachusetts correctional system. The delinquent boys were

TABLE 1

Sources of Knowledge

| Study | Sample | Measure of Crime |
|---|---|---|
| Early studies: | | |
| Gluecks | 500 delinquent and 500 nondelinquent males from Massachusetts | Official and self-, teacher-, and parent-report records |
| McCord | 506 boys from Cambridge and Somerville, Massachusetts | Official records |
| Philadelphia Birth Cohort Studies: | | |
| 1. 1945 cohort | 9,945 boys born in Philadelphia in 1945 and who lived in Philadelphia through age 17 | Official records |
| 2. 1958 cohort | 27,160 boys and girls born in Philadelphia in 1958 and who lived in Philadelphia through age 17 | Official records |
| Cambridge Study in Delinquent Development | 411 London males selected at ages 8–9 from registers of six state primary schools | Official and self-report records |
| National Youth Survey | 1,725 male and female adolescents aged 11–17 | Self-report records (official records are not publicly available) |
| Montreal Adjudicated Youths | 505 male and 150 female delinquents recruited in 1992 at an average age of 15 in 1974 and followed to age 23 | Official and self-report records |

364

| | | |
|---|---|---|
| Montreal Adolescent Sample | 3,070 Montreal adolescents age 14 in 1974 followed to age 40. A subsample of 458 boys was reinterviewed at 16, 30, and 40 years old | Self-report records |
| Project Metropolitan | 15,117 males and females born in the Stockholm metropolitan area in 1953 and still residing there in 1963 | Official records |
| Individual Development and Environment | 1,027 third-grade school children in Orebro, Sweden, in 1965 followed from the age of 10 to 30 | Official records |
| Contemporary studies: | | |
| Causes and correlates studies: | | |
| 1. Pittsburgh | 1,517 boys in Pittsburgh public schools, ages 7, 10, 13 | Official and self-report records |
| 2. Denver | 1,527 youths from high-risk Denver neighborhoods, ages 7–15 | Official and self-report records |
| 3. Rochester | 1,000 youths from Rochester public schools, age 12 | Official and self-report records |
| Dunedin Multidisciplinary Study | 1,037 youths of an unselected birth cohort from Dunedin, New Zealand, born in 1972–73 | Official and self-report records |
| Project on Human Development in Chicago Neighborhoods | 6,500 individuals in 80 communities in Chicago | Official and self-report records |

365

white males, aged ten to seventeen, who had recently been committed to either the Lyman School for Boys in Westboro, Massachusetts, or the Industrial School for Boys in Shirley, Massachusetts (Glueck and Glueck 1950, p. 27). The nondelinquents, also white males aged ten to seventeen, were chosen from Boston public schools. Their nondelinquent status was determined on the basis of official record checks and interviews with parents, teachers, local police, social workers, recreational leaders, and the boys themselves (Sampson and Laub 1993, p. 26). In general, the nondelinquents were well behaved.

One particularly interesting feature of the UJD study was its matching design. The two groups were matched, case by case, on age, nationality, neighborhood, and measured intelligence. Data on a number of characteristics were collected on both sets of boys including social, psychological, and biological characteristics, aspects of family life, school performance, work experience, and other life events, as well as delinquent and criminal behavior from self-, teacher-, and parent-reports and official records. The Gluecks and their research team followed up the UJD subjects from an average age of fourteen to ages twenty-five and thirty-two. Follow-up information included extensive criminal history record checks in a number of different states, items related to the subjects' living arrangements (including marriage, divorce, children, etc.), military experience, employment, and schooling history.

The Gluecks studied the correlates of onset, persistence, and desistance. A number of key findings emerged. First, they found a strong relationship between age and crime. In particular, they found that, as the sample of offenders aged, their individual crime rates declined. Second, they observed that an early age of onset was related to a lengthy and persistent criminal career. Third, the Gluecks found strong evidence in favor of the stability postulate; that is, that the best predictor of future antisocial behavior was past antisocial behavior. They observed that many of the juvenile delinquents went on to engage in criminal activity as adults. Finally, their analysis uncovered strong family influences. Those families with lax discipline combined with erratic/threatening punishment, poor supervision, and weak emotional ties between parent and child generated the highest probability of persistent delinquency.

Recently, Sampson and Laub (1993) recoded and reanalyzed the Glueck data using contemporary statistical and methodological techniques. They found patterns of both stability and change in criminal

behavior over the life course. For example, they found that, even after controlling for stable individual differences in offending propensity, life events (e.g., marriage) and, in particular, attachment to informal social control agents fostered cessation from criminal activity (Laub, Nagin, and Sampson 1998). Laub and Sampson (2001) are continuing to follow the Glueck men through late adulthood.

## B. McCord's Cambridge-Somerville Project

The Cambridge-Somerville Youth Study was designed to learn about the development of delinquency and to test the notion that children could be steered away from delinquency through guidance and prevention (McCord 1992, 2000, p. 240). The study's original investigator, Richard Cabot, selected high-poverty/high-crime sites in eastern Massachusetts for study. Police, scout leaders, shopkeepers, and social workers identified eligible candidates for inclusion in the project. Between 1935 and 1939, staff obtained relevant information from families, schools, and neighborhoods. From this information they were able to match pairs of boys similar in age, intelligence, family structure, religion, social environment, and delinquency-prone history. The selection committee flipped a coin to decide which member of the pair would receive treatment and which would be placed in the control group (McCord 2000, p. 240). The "treatment" administered by adult counselors included intensive individual help and guidance for continuing social, physical, intellectual, and spiritual growth. All subjects were male, their average age was approximately eleven at the outset, nearly all were white, and nearly all were from working-class backgrounds. By May 1939, 650 subjects were involved in the study, equally split between the experimental and control groups.

Initial data were collected in 1942, with follow-ups in 1955 and 1976. Early results indicated that the special work of the guidance counselor did no better than the usual forces in the community in preventing involvement in delinquency. In several respects, boys in the experimental group actually did worse (e.g., went to court more, committed more offenses). The first follow-up, undertaken in 1955, showed that nearly equal numbers of experimental- and control-group members had been convicted as adults. In the second follow-up (1976), McCord found that "none of the . . . measures confirmed hopes that treatment had improved the lives of those in the treatment group" (McCord 1978, p. 288). Recent analysis of the experimental group

members showed that they tended to die earlier and had more mental illness (Dishion, McCord, and Poulin 1999).

Still, the study produced four key findings, which have been observed in other criminal career studies. First, the earlier the age of onset, the greater the likelihood of continued offending in adulthood. Second, although most juvenile delinquents committed a crime as an adult, the majority of adult offenders had no history of offending as juveniles. Third, family factors were important predictors of offending (McCord 1978). In particular, McCord (1991) found that maternal behavior influenced juvenile delinquency and through those effects, adult criminality, and that paternal interaction with the family appeared to have a more direct influence on adult criminal behavior. Finally, McCord's research has also uncovered strong evidence that both alcoholism and criminality tend to run in families and that, in part, alcoholic and criminal parents tend to provide poor socializing environments. In particular, McCord (1999, p. 114) observed "that alcoholic and criminal men were disproportionately likely to be aggressive in their families and to have fathered sons whose mothers were disproportionately incompetent in their maternal roles."

## C.  Wolfgang's Philadelphia Birth Cohort Studies

Marvin Wolfgang and colleagues (1972) traced the delinquent careers of 9,945 males who were born in Philadelphia in 1945 and who lived in Philadelphia between ages ten and seventeen. Because of the structure of the data set, Wolfgang, Figlio, and Sellin "were able to use sophisticated stochastic models to examine some long-standing but untested assumptions concerning the dynamics of specialization in illegal behavior and developmental trends in the seriousness of that behavior" (Bursik 1989, p. 390). This study has been described as one of the seminal pieces of criminal career scholarship produced in the twentieth century (Morris 1972; Bursik 1989).

Several important findings emerged. First, 35 percent of the boys were involved with the police at least once. Second, a very small percentage of offenders (6 percent of the cohort, 18 percent of the delinquent subset) was responsible for 52 percent of all delinquency in the cohort through age seventeen. Third, the tendency to specialize in particular offenses was small. Finally, (early) age-at-onset was consistently related to persistent and serious criminality.

A second Philadelphia birth cohort study, conducted by Tracy, Wolfgang, and Figlio (1990), traced the criminal records of 27,160

boys and girls born in Philadelphia in 1958 and followed through age seventeen. Although the main results of the 1945 cohort were replicated, including that the prevalence of arrest up to age eighteen was about the same (35 percent) as in the 1945 cohort, and the substantive male findings (e.g., chronicity) from the 1945 cohort were replicated among females in the 1958 cohort, there were a few important exceptions. For example, the prevalence of police contacts of both whites and blacks was lower in the 1958 cohort than for the whites and blacks in the 1945 cohort. The aggregate prevalence was the same because there were more blacks in the 1958 cohort, and blacks had a higher prevalence of offending than whites. One reason why both groups had a lower total prevalence of offending was that there were many fewer minor arrests. A second difference was that the offense rate for the 1958 cohort (1,159 offenses per 1,000 subjects) was higher than the rate for the 1945 cohort (1,027 offenses per 1,000 subjects) (Tracy, Wolfgang, and Figlio 1990, p. 276). A third difference across the two cohorts was that the 1958 cohort evidenced more severe (violent) criminality. For example, the 1958 cohort rate exceeded the 1945 cohort by factors of 3:1 for homicide, 1.7:1 for rape, 5:1 for robbery, and almost 2:1 for aggravated assault and burglary (Tracy, Wolfgang, and Figlio 1990, p. 276).

Tracy and Kempf-Leonard (1996) collected criminal records up to age twenty-six for the 1958 cohort. Their analysis indicated that career continuity was more common than discontinuity. In other words, adult crime was more likely among former delinquents, while nondelinquents more often remained noncriminal as adults. Also, the key predictors of adult criminality included an early onset as well as being active in the juvenile period (prior to age seventeen). They also found that early imposition of probation was associated with a lower probability of continuation into adult offending for males, but this effect was insignificant for females. No form of juvenile incarceration seemed to inhibit adult offending. These results could be due to a selection effect in that judges were more likely to sentence "less serious" offenders to probation.

## D. Farrington's Cambridge Study in Delinquent Development

The Cambridge Study in Delinquent Development is a prospective longitudinal survey of the development of offending and antisocial behavior in 411 South London males born mainly between September 1952 and August 1954. The study was initiated in 1961 and for the

first twenty years was directed by Donald West. Since 1982, it has been directed by David Farrington. The males have been personally interviewed nine times (at ages eight, ten, fourteen, sixteen, eighteen, twenty-one, twenty-five, thirty-two, and forty-six), and their parents were interviewed annually between their ages of eight and fifteen. Peer ratings were obtained at ages eight and ten, and criminal records (and the criminal records of all their immediate relatives—brothers, fathers, mothers, sisters, and wives) have been searched up to age forty.

The conviction data from the Cambridge study have generated an impressive array of research reports and a number of key findings regarding the development of crime over the life course (Farrington 2002). First, excluding minor crimes such as common assault, traffic infractions, and drunkenness, the most common offenses were theft, burglary, and unauthorized taking of vehicles. Second, the annual prevalence of offending increased up to age seventeen and then decreased. Also, while the modal age for offending was seventeen, the mean age was twenty-one, reflecting the inherent individual skewness of the age-crime curve. Third, 40 percent of the males in the Cambridge study were convicted of criminal offenses up to age forty. Fourth, up to age forty, the mean age of onset (measured as the age at first conviction) was 18.6, while the mean age of desistance (measured as the age at last conviction) was 25.7. Fifth, the average number of offenses per active offender was 4.6 crimes. Sixth, for offenders with two or more offenses, the average duration of criminal careers from first to last recorded conviction was 10.4 years.

Other developmental aspects of criminal careers have also been examined with the Cambridge data. For example, Farrington, Lambert, and West (1998) studied the criminal careers of brothers and sisters of the study's subjects and reported prevalence estimates of 43.4 percent and 12.1 percent for brothers and sisters, respectively. Regarding specialization, Farrington found that most males convicted for a violent offense tended to be convicted for a nonviolent offense as well and that violent crimes occurred almost at random in criminal careers (Farrington 1991). The chronic offender effect also showed up in the Cambridge data. A small number of chronic offenders, usually coming from multiproblem families, accounted for substantial proportions of all official and self-reported offenses, and they were, to a considerable extent, predictable in advance (Farrington 2002). Finally, several childhood factors predicted criminality throughout the life course, in-

cluding impulsivity, low intelligence, family criminality, broken families, and poor parental supervision.

## E. Elliott's National Youth Survey

The National Youth Survey (NYS) is a prospective longitudinal study of a U.S. national probability sample concerning delinquency and drug use. The NYS sample was obtained through a multistage probability sampling of households in the United States. Originally, 7,998 households were randomly selected, and all 2,360 eligible youths aged eleven to seventeen living in the households were included. Seventy-three percent of those youths (1,725) agreed to participate, signed consent forms, and, along with one of their parents, completed first-wave interviews in 1977. The demographic characteristics of the sample are generally representative of eleven- to seventeen-year-olds in the United States (see Elliott, Huizinga, and Ageton 1985; Elliott, Huizinga, and Menard 1989). Nine waves of data are available on the panel, which was age twenty-seven to thirty-three when last interviewed in 1993. Both official and self-reported records of crime and delinquency are available for all respondents. In each wave of the NYS, respondents were asked a large number of questions about events and behavior that occurred during the preceding calendar year, including involvement in a variety of illegal acts. In addition, a number of questions were asked regarding key theoretical constructs from control, strain, and differential association theories.

Elliott (1994) has conducted the most elaborate analysis of the onset, developmental course, and termination of serious violent offenders in the NYS, where serious violent offending included aggravated assaults, robberies, and rapes that involved some injury or a weapon (Elliott 1994, p. 4). Regarding involvement in serious violent offending, Elliott found that at the peak age (seventeen), 36 percent of African-American males and 25 percent of the white males reported committing one or more serious violent offenses. Among females, nearly one African-American female in five and one white female in ten reported involvement in serious violent offending. The decline with age in serious violent offending is steeper for females, and the gender differential becomes greater over time. Regarding the onset of a serious, violent career, Elliott found that serious violent offending begins between ages twelve and twenty, with negligible risk of initiation after age twenty. African-American males exhibit an earlier age of onset for serious vio-

lent offending, and more African-American males become involved than white males.

Elliott studied the progression of offenses in the behavioral repertoire. In general, he found that minor forms of delinquency and alcohol use were added to the behavioral repertoire before serious forms of criminal theft and violence. Elliott suggested that the self-report data indicated that criminal behavior escalated over time in a criminal career and that serious violent offenders exhibited versatile offending patterns. Finally, Elliott examined continuity rates for serious violent offending after age twenty-one. Nearly twice as many African Americans compared to whites continued their violent careers into their twenties and thus were likely to have longer criminal careers.

## F. Le Blanc's Montreal Sample of Adjudicated Youths

Le Blanc and associates recruited a sample of 470 males adjudicated at the Montreal Juvenile Court over a two-year period (see Le Blanc and Fréchette 1989 for a detailed summary of the self-reported and official careers of these youths). They were interviewed at the average ages of fifteen, seventeen, twenty-two, thirty, and forty. Le Blanc and associates also recruited a representative sample of Montreal adolescents comprised of 3,100 boys and girls, of which a random subset of 458 boys was reinterviewed at ages sixteen, thirty, and forty. In 1992, they recruited a replication sample of 505 male and 150 female adjudicated youth from the Montreal Juvenile Court who were between thirteen and seventeen years of age and adjudicated for a criminal offense under the Young Offender Act or for problem behavior under the Youth Protection Act. All of the youths were sentenced to probation or placed in a correctional institution with a treatment philosophy. The sample includes almost all of the adolescents who were adjudicated in that court over two years. These individuals have been interviewed twice since (Le Blanc and Kaspy 1998).

Also, for these three samples, in addition to official records, a self-report card-sorting interview was administered to the youths in private settings. For a number of criminal and deviant behaviors, researchers collected information on the variety or number of different acts ever committed, the age at which various acts were first committed (including the onset age), the frequency with which the act was committed, and the last age at which the act was committed. A detailed summary of the offense histories of these adjudicated youths appears in Le Blanc and Fréchette (1989). The males, and a sample of male adolescents,

were later interviewed at age thirty-two. For all these samples, personality and social (family, school, work, leisure, attitudes, etc.) data were collected at each age.

## G. Swedish Studies

Project Metropolitan is a large-scale, longitudinal study that provides offending information for all individuals born in the Stockholm metropolitan area in 1953 and still residing there in 1963. It comprises 15,117 males and females. Data come from police-recorded criminality (i.e., those crimes reported to the police that have been cleared by connecting a suspect to the crime). A number of criminal career studies have been carried out with these data, including a study on the relationship between age and crime (Wikström 1990) and a study on gender and age differences in crime continuity (Andersson 1990).

The Project on Individual Development and Environment was initiated in 1965 by David Magnusson, with one of its primary purposes being an investigation of criminal activity over the life span. Subjects were 1,027 third-grade children (age ten) in Orebro, Sweden, in 1965, who have been followed with criminal records from the age of ten to thirty. The data cover a broad range of individual physiological and behavioral factors as well as structural and social factors. Outcome data were collected from official registers (including information on criminal offenses, mental health, employment, education, alcohol abuse, etc.). Several studies have used these data to analyze the relationship between age and crime (Stattin, Magnusson, and Reichel 1989) and patterns of stability and change in criminal activity (Stattin and Magnusson 1991).

## H. Causes and Correlates Studies

In 1986, the Office of Juvenile Justice and Delinquency Prevention (OJJDP) of the U.S. Department of Justice created the Program of Research on the Causes and Correlates of Delinquency by supporting three coordinated, prospective longitudinal research projects in Pittsburgh, Pennsylvania, Rochester, New York, and Denver, Colorado. The Pittsburgh study, which oversampled high-risk boys, consists of 1,517 boys (cohorts of first-, fourth-, and seventh-grade boys) in the public school system in Pittsburgh. The Rochester sample consists of 1,000 youth (73 percent boys) and represents the entire range of seventh- and eighth-grade students attending Rochester's public schools. The Denver sample consists of 1,527 youth (slightly more than 50 per-

cent boys) who represent the general population of youth residing in households in high-risk neighborhoods in Denver.

These studies represent a milestone in criminological research because they constitute the largest shared-measurement approach ever achieved in delinquency studies. As of 1997, the research teams had interviewed nearly 4,000 participants at regular intervals for nearly a decade, recording their lives in great detail (Kelley et al. 1997). The research teams continue to follow up participants across sites as the study subjects enter adulthood.

In general, the causes and correlates studies are designed to improve understanding of serious delinquency, violence, and drug use through the examination of how individual youth develop within the context of family, school, peers, and community (Kelley et al. 1997). The numbers are sufficient to study race, gender, and community-level differences in the determinants of criminal and antisocial behavior. Although each site has unique features, they share several common elements.

All three sites are longitudinal investigations that involve repeated contacts (at six- or twelve-month intervals) with and about the same individual in an effort to assess both the subject's involvement in antisocial and criminal activity and the correlates of such involvement. The causes and correlates studies entail a shared-measurement approach in that each of the three sites uses common core measures to collect data on a wide range of key variables including delinquent and criminal involvement, drug and alcohol use, family, peer, and community-level characteristics, educational experiences and, as the samples move into adulthood, marriage and employment. Importantly, besides detailed assessments of self-reported offending, researchers at each site are collecting juvenile justice and adult criminal records.

Thus far, a number of reports and publications have been produced that have examined key features of criminal career dimensions (see Huizinga, Loeber, and Thornberry 1993; Kelley et al. 1997; Loeber et al. 1998, 1999). Researchers have documented important information related to involvement in serious violence and the progression of criminal activity over the life course.

*I. The Dunedin Multidisciplinary Health and Human Development Study*
The Dunedin Study is a longitudinal investigation of the health, development, and behavior of a complete cohort of births between April 1, 1972, and March 31, 1973, in Dunedin, a provincial capital city of 120,000 on New Zealand's South Island (Silva and Stanton 1996).

Perinatal data were obtained at delivery, and when the children were later traced for follow-up at age three, 91 percent ($N = 1,037$) of the eligible births, 52 percent of whom were boys, participated in the assessment, forming the base sample for the longitudinal study (Moffitt et al. 2001). The sample turns thirty in 2002–3 and researchers continue to follow up sample members and most recently have included assessments of the subjects' partners, peers, and children.

The Dunedin data are designed for three specific types of studies (Moffitt et al. 2001, p. 10): childhood predictors of later health and behavior outcomes, developmental studies of continuity and change in health and behavior, and epidemiological studies of the prevalence and incidence of health problems, behavior problems, and associations among problem types. Although it was not originally initiated to examine antisocial and criminal activity, it has considerably advanced knowledge about offending.

Within the realm of criminal and antisocial behavior, researchers have collected a wealth of information including early forms of antisocial behavior, juvenile delinquency, and official records from the police and court systems. In addition, researchers have collected information on the correlates of antisocial and criminal activity including neuropsychological tests, peer associations, family and school experiences, and, most recently as the subjects entered adulthood, information related to partner violence.

Since 1975, over 600 publications have appeared. With regard to key dimensions of criminal careers, a number of studies have examined general issues related to the patterning of criminal activity, gender differences, and characteristics associated with—and determinants of—criminal and antisocial activity over the life course (see review in Moffitt et al. 2001).

*J. Project on Human Development in Chicago Neighborhoods*

The Project on Human Development in Chicago Neighborhoods (PHDCN) is a major, interdisciplinary study aimed at understanding the causes and pathways of juvenile delinquency, adult crime, substance abuse, and violence in Chicago neighborhoods (Earls 2001). Throughout its course, the project has followed approximately 6,500 individuals and eighty communities in the city of Chicago and includes equal numbers of males and females drawn from African-American, Latino, white, and mixed ethnic communities and from all social classes within each of these groups.

The project is unique in that it combines two studies into a single study. The first is an intensive investigation of Chicago's neighborhoods, including their social, economic, organizational, political, and cultural structures, and the dynamic changes that take place in these structures within and across neighborhoods. The second is a series of coordinated longitudinal studies including about 6,500 randomly selected children, adolescents, and young adults, in an effort to examine the changing circumstances of their lives, as well as the personal characteristics, that may lead them toward or away from a variety of antisocial behaviors. The project employs an accelerated longitudinal design that, unlike traditional longitudinal studies that follow a single group of people for a long period of time, begins with nine different age groups, from prenatal to age eighteen, and follows them for several years (Tonry, Ohlin, and Farrington 1991). The age groups are separated by three-year intervals, so three years after the data collection started, the overall age range was continuous. Information concerning human development will be available covering all ages, but with the additional complexity of linking across the groups.

In addition to a wealth of information related to neighborhoods, families, and individuals growing up in these contexts, researchers are collecting information on systematic social observations of face blocks across the neighborhoods as well as various sorts of antisocial and criminal activity from early childhood through adulthood for subjects. Most recently, the project has expanded to include two other studies, one on children's exposure to violence and its consequences, and a second on child care and its impact on early child development. A number of publications have appeared, and a considerable number are in process (Earls and Visher 1997; Sampson, Raudenbush, and Earls 1997).

These contemporary studies have paid significant attention to key criminal career dimensions, particularly in describing involvement in criminal activity. For example, data from the three causes and correlates studies have generated important new information on the prevalence and frequency of criminal activity among samples of inner-city boys and girls, and as these samples enter adulthood, researchers will be better able to describe and empirically assess the patterning and causes of specialization and desistance. Data from the Dunedin study have been used to describe the sample's involvement in delinquency, arrest, and conviction, as well as the causes of participation and frequency of offending through age twenty-six. The Dunedin data are es-

pecially useful because they also contain a rich array of data on other noncriminal antisocial behaviors including data from the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV). Finally, the PHDCN may prove to be the largest data collection effort designed to understand criminal activity using several levels of analysis. This study will allow for unique insight into the embeddedness of individuals within family and neighborhood contexts in an effort to document involvement in criminal activity from birth through the twenties.

## II. Models of Criminal Careers

Several of the early criminal career studies stimulated a major initiative by the NAS. In 1986, the NAS published the two-volume report *Criminal Careers and "Career Criminals"* that presented a systematic overview (Blumstein et al. 1986). The aim was to synthesize the research on criminal careers, evaluate the feasibility of predicting the future course of criminal careers, assess the potential of prediction instruments in reducing crime through incapacitation, and review the contribution of research on criminal careers to the development of basic knowledge about crime and criminals.

### A. Dimensions of a Criminal Career

The criminal career paradigm recognizes that individuals start their criminal activity at some age, engage in crime at some individual crime rate, commit a mixture of crimes, and eventually stop. Hence, the criminal career approach emphasizes the need to investigate issues related to why and when people start offending (onset), why—and how—they continue offending (persistence), why and if offending becomes more frequent or serious (escalation) or specialized, and why and when people stop offending (desistance). In sum, the criminal career approach provides a focus on both between- and within-individual changes in criminal activity over time.

1. *Definition of a Criminal Career.* At its most basic level, a criminal career is the "characterization of the longitudinal sequence of crimes committed by an individual offender" (Blumstein et al. 1986, p. 12). This definition helps to focus researchers' attention on entry into a career when or before the first crime is committed and dropout from the career when or after the last crime is committed. Importantly, the concept recognizes that, during a criminal career, offenders have a continuing propensity to commit crimes, they accumulate some number of arrests, and are sometimes convicted and less frequently incarcerated

(Blumstein, Cohen, and Hsieh 1982, p. 2). The study of criminal careers does not imply that offenders necessarily derive their livelihood exclusively or even predominantly from crime; instead, the concept is intended only as a means of structuring the longitudinal sequence of criminal events associated with an individual in a systematic way (Blumstein, Cohen, and Hsieh 1982, p. 5).

2. *Participation*. The criminal career approach partitions the aggregate crime rate into two primary components: "participation," the distinction between those who commit crime and those who do not; and "frequency," the rate of offending among active offenders (Blumstein et al. 1986, p. 12). Participation is measured by the fraction of a population ever committing at least one crime before some age or currently active during some particular observation period. In any period, active offenders include both new offenders whose first offense occurs during the observation period and persisting offenders who began criminal activity in an earlier period and continue to be active during the observation period. Importantly, the longer the average duration of offending, the greater the contribution of persisters to measured participation in successive observation periods.

Blumstein and colleagues noted that demographic differences in participation, as measured by arrest, were large, the most striking of which involved gender discrepancies. The authors concluded that about 15 percent of males were arrested for an index offense by age eighteen and about 25–35 percent were arrested for such an offense sometime in their lifetime. The cumulative prevalence of self-reported offenses is even more striking. For example, in the Cambridge study, Farrington (1989) found that 96 percent of the males had reported committing at least one of ten specified offenses (including burglary, theft, assault, vandalism, and drug abuse) up to age thirty-two. When participation is restricted to serious offenses, the demographic differences are much larger, and race takes on more importance. Regarding age, the panel concluded, about half of those ever arrested during their lifetimes were first arrested before age eighteen, which was true among both African Americans and whites. Blumstein and colleagues also reported that ineffective parenting, poor school performance, low measured IQ, drug use, and parental criminality were related to participation.

3. *Key Dimensions of Active Criminal Careers*. The criminal career paradigm encompasses several dimensions of active criminal careers including offending frequency, duration, crime-type mix and seriousness, and co-offending patterns. Although desistance is also a key dimension

of the criminal career, a recent review of this literature was published in *Crime and Justice* (Laub and Sampson 2001).

a. Offending Frequency. The offending rate for individual offenders, $\lambda$, reflects the frequency of offending by individuals who are actively engaged in crime (Blumstein et al. 1986, p. 55). Much criminal career research has been concerned with estimating the individual offending frequency of active offenders during their criminal careers (see Blumstein and Cohen 1979; Cohen 1986). According to Blumstein et al. (1986, p. 76), individual frequency rates for active offenders do not vary substantially with demographics (age, gender, and race). However, active offenders who begin criminal activity at young ages, use drugs heavily, and are unemployed for long periods of time generally commit crimes at higher rates than most other offenders. The distribution of individual offending frequencies is highly skewed, which ultimately leads to a focus on the "chronic" (i.e., high frequency [$\lambda$]) offender. The identification of chronic offenders, however, has been difficult (see Chaiken and Chaiken 1982; Blumstein, Farrington, and Moitra 1985; Greenwood and Turner 1987).

b. Duration—the Interval between Initiation and Termination. One aspect of the criminal career paradigm that has received a great deal of research attention is initiation, or the onset of antisocial and criminal activity (Farrington et al. 1990; Tremblay et al. 1994). A number of studies have reported higher recidivism rates among offenders who have records of early criminal activity as juveniles (Blumstein et al. 1986; Farrington et al. 1990). Although many researchers argue that individuals who begin offending early will desist later and thus have lengthy careers (Hamparian et al. 1978; Krohn et al. 2001), there has been much less research on the duration of criminal careers, primarily because of the difficulty involved in determining the true end of an individual's criminal career. It is more tenable, however, to measure a rate of desistance for an identified group of offenders. Based on their research, Blumstein, Cohen, and Hsieh (1982) concluded that most criminal careers are relatively short, averaging about five years for offenders who are active in Index offenses as young adults. Residual careers, or the length of time still remaining in careers, increase to an expected ten years for Index offenders still active in their thirties. Research on desistance, or the termination of a criminal career, has received even less atten-

tion because of measurement and operationalization difficulties (Laub and Sampson 2001).

c. Crime-Type Mix and Seriousness. The mix of different offense types among active offenders is another important criminal career dimension. Issues underlying the offense mix include specialization, or the tendency to repeat similar offense types over a criminal career; seriousness; and escalation, or the tendency for offenders to move to more serious offense types as offending continues. Blumstein and colleagues reported that offenders tend to engage in a diversity of crime types, with a somewhat greater tendency to repeat the same crime or to repeat within the group of property crimes or the group of violent crimes. In addition, there appeared to be some evidence of increasing seriousness, specialization, and escalation during criminal careers.

d. Co-offending Patterns. Another important criminal career feature is whether a person commits an offense alone or with others (see Reiss 1986a). Research tends to suggest that the incidence of co-offending is greatest for burglary and robbery and that juvenile offenders primarily commit their crimes with others, whereas adult offenders primarily commit their crimes alone (Reiss and Farrington 1991). Although the decline in co-offending may, at first glance, be attributed to co-offenders dropping out, it seems to occur because males change from co-offending in their teenage years to lone offending in their twenties. Recent efforts continue to assess the extent of co-offending (Sarnecki 2001; Warr 2002).

*B. Policy Issues*

The criminal career paradigm suggests three general orientations for crime control strategies: prevention, career modification, and incapacitation. Knowledge concerning the patterning of criminal careers is intimately related to these policy issues. Prevention strategies, including general deterrence, are intended to reduce the number of nonoffenders who become offenders. Career modification strategies, including individual deterrence and rehabilitation, are focused on persons already known to be criminals and seek to reduce the frequency or seriousness of their crimes. In addition, these strategies encourage the termination of ongoing criminal careers through mechanisms such as job training and drug treatment. Incapacitative strategies focus on the crimes reduced as a result of removing offenders from society during their criminal careers. Two types of incapacitation are general, or collective, and

selective, which focuses on the highest frequency offenders. These three crime control strategies are intimately related to specific laws, including habitual offender statutes, truth-in-sentencing laws, three-strikes laws, and mandatory minimum sentence laws.

1. *Crime Control Strategies.*   The criminal career paradigm has focused extensive attention on incapacitation. General or collective incapacitation strategies aim to reduce criminal activity as a consequence of increasing the total level of incarceration while selective incapacitation policies focus primarily on offenders who represent the greatest risk of future offending. The former approach is consistent with the equal treatment concerns of a just-deserts sentencing policy while the latter focuses as much on the offender as the offense. Importantly, the degree to which selective incapacitation policies are effective depends on the ability to distinguish high- and low-risk offenders and to identify them early enough before they are about to terminate criminal activity. Three related issues arise: the ability to classify individual offenders in terms of their projected criminal activity, the quality of the classification rules, and the legitimacy of basing punishment of an individual on the possibility of future crimes rather than only on the crimes already committed (and the consequent level of disparity that is considered acceptable).

Regarding collective incapacitation, Blumstein et al. (1986) suggest that achieving a 10 percent reduction in crime may require more than doubling the existing inmate population. However, under selective incapacitation policies, long prison terms would be reserved primarily for offenders identified as most likely to continue committing serious crimes at high rates. Blumstein et al. conclude that selective incapacitation policies could achieve 5–10 percent reductions in robbery with 10–20 percent increases in the population of robbers in prison, while much larger increases in prison populations are required for collective incapacitation policies.

2. *Relationship to Laws.*   Though not directly addressed in the report, both collective and selective incapacitation policies are directly influenced by laws and policies that govern criminal justice decisions regarding the punishment of offenders. For example, habitual offender statutes give special options to prosecutors for dealing with repeat offenders. Truth-in-sentencing laws are intended to increase incapacitation by requiring offenders, particularly violent offenders, to serve a substantial portion of their prison sentence, and parole eligibility and good-time credits are restricted or eliminated. Three-strikes laws pro-

vide that any person convicted of three, typically violent, felony of-
fenses must serve a lengthy prison term, usually a minimum term of
twenty-five-years to life. Mandatory-minimum sentence laws require a
specified sentence and prohibit offenders convicted of certain crimes
from being placed on probation, while other statutes prohibit certain
offenders from being considered for parole. Mandatory-minimum sen-
tence laws can also serve as sentencing enhancement measures, requir-
ing that offenders spend additional time in prison if they commit par-
ticular crimes in a particular manner (e.g., committing a felony with a
gun). The net effect of these laws is to increase prison populations by
incarcerating certain kinds of offenders or increasing the sentence
length of those offenders convicted for certain types of crimes.

## C.  The Report's Suggestions and Needs for Future Research

The criminal careers report was expansive in its review of the evi-
dence and in the identification of unanswered theoretical and policy
questions. The report outlined an agenda for future research that
called for improved measurement of the dimensions of criminal ca-
reers, measurement of their distributions over offenders, measurement
of the variation of the dimensions over the course of a criminal career,
and better identification of the factors that influence the criminal ca-
reer parameters. Many of these issues are best addressed, the report
claimed, through a longitudinal research design.

Blumstein et al. (1986) argued that the most important criminal ca-
reer dimension is individual frequency and, in particular, noted that
research should focus especially on the rate of $\lambda$ over time as offenders
age, variation in $\lambda$ with age for active offenders, the factors associated
with intermittent spurts of high-rate and low-rate offending, and dif-
ferences in $\lambda$ by crime type. In addition, the report concluded that fur-
ther research should assess the influence of various life events on an
individual's criminal career and the effects of interventions on career
development and should distinguish between developmental sequences
and heterogeneity across individuals in explaining apparent career evo-
lution (Blumstein et al. 1986, p. 199). These issues are best addressed
through a prospective, longitudinal research design, especially in light
of the inherently longitudinal and dynamic character of criminal ca-
reers. Individuals of different ages (i.e., several cohorts) should be stud-
ied. Such a project, the report noted, would provide for more detailed
measurement of the initiation and termination of individual criminal
careers, including a focus on the distinction among different kinds of

crimes and a better sequential ordering of life events and criminal be-
havior that would begin to suggest directions of causal influence
(Blumstein et al. 1986, p. 200).

### III. Theoretical Developments since the Criminal Career Report

In their recent review of the desistance literature, Laub and Sampson
(2001, p. 17) asserted that, while the criminal career approach repre-
sented a significant movement in criminology, "it appear[ed] to have
reached a point of stagnation . . . because of its narrow focus on mea-
surement and policy." In this section, we outline the various theoreti-
cal challenges and developments that were spurred as a result of the
criminal careers report. We believe that the research following the
publication of the criminal careers report led to important challenges
to the criminal career paradigm, identification and development of
other criminal career features, attention to the relationship between
past and future criminal activity (and the subsequent identification of
state dependence and persistent heterogeneity as two potential expla-
nations of this relationship), and development of theories that follow
from the criminal career paradigm.

### A. Challenge and Response to the Criminal Career Paradigm and Report

The criminal career paradigm—and its emerging policy implications—
was not embraced by the entire academic community. Michael Gott-
fredson and Travis Hirschi, in particular, launched a series of critiques.

1. *The Gottfredson and Hirschi Critique.* The basis of their critique
lies in their explication and interpretation of the aggregate age/crime
curve. Hirschi and Gottfredson (1983) contend that the shape of the
aggregate age/crime relationship is pretty much the same for all of-
fenders, in all times and places, and is largely unaffected by life events
that occur after childhood. They assert, then, that involvement in
crime (and other analogous behaviors) is sufficiently stable over the life
course to obviate the need to collect longitudinal data, which is a pre-
requisite for pursuing the criminal career paradigm. This is especially
the case in their denial of the need to distinguish prevalence and fre-
quency (because both reflect underlying propensity). They claim that
prevalence and frequency vary similarly with age. For the most part,
however, research fails to support their claim.

Gottfredson and Hirschi do not deny that some offenders offend at
a much higher rate than other offenders, but they argue that offenders

differ in degree and not kind; that is, offenders can be arrayed on a continuum of criminal propensity (which they term low self-control) with individuals at the higher end of the continuum evidencing higher criminal activity and vice versa. This is a key point because Gottfredson and Hirschi do not allow for the existence of qualitatively distinct groups of offenders.

Gottfredson and Hirschi are concerned with the proposed identification of the "career criminal" and the implied policy response of selective incapacitation. Their concern derives from the small number of chronic offenders and the limited ability of the criminal justice system to identify chronic offenders prospectively, before they reach their offending peak. In particular, Gottfredson and Hirschi argue that, by the time the criminal justice system is able to identify a career criminal, he tends no longer to be as active as he once was. That is, career criminals cannot be identified early enough in their careers to be useful for policy purposes. Thus, since Hirschi and Gottfredson believe that crime declines with age for everyone, they argue that the policy of selective incapacitation makes little sense because career criminals would likely not be committing crimes at high rates if they were free.

Gottfredson and Hirschi (1987) are also unfriendly to the prospect of longitudinal cohort data. Their critique is forceful and centers around five issues: the longitudinal cohort study is not justified on methodological grounds, such a design has taken criminological theory in unproductive directions, it has produced illusory substantive findings, it has promoted policy directions of "doubtful utility," and such research designs are very expensive and entail high opportunity costs (Gottfredson and Hirschi 1987, p. 581). They argue instead for more emphasis on cross-sectional studies, which they claim tend to provide similar substantive conclusions to those reached by longitudinal studies but at a much smaller cost. They conclude that neither the criminal career paradigm, its constructs (prevalence, $\lambda$, etc.), nor longitudinal research has much to offer criminology.

Gottfredson and Hirschi (1988) question whether the concept of a "career" is valuable to the study of crime. They claim that there is no empirical support for the use of the career concept and its related terminology (p. 39). Gottfredson and Hirschi go on to critique the participation/frequency distinction and, in so doing, employ data from the Richmond Youth Project, which collected, cross-sectionally, police records and self-report data on over 2,500 males and females. They conclude that the substantive conclusions about the causes and corre-

lates of crime do not depend on career distinctions. They show that as one moves from λ for any kind of offending to the smaller λ for serious offending, the correlations between demographic characteristics and criminal career offending dimensions become even smaller, largely as a result of decreasing sample size. In sum, Gottfredson and Hirschi claimed that the factors associated with different criminal career parameters are more similar than different.

2. *Blumstein and Colleagues' Response.*   Blumstein, Cohen, and Farrington (1988a) provided a response to the main critiques. They noted (1988a, p. 4) that the construct of a criminal career is not a theory of crime—instead it is a way of structuring and organizing knowledge about certain key features of individual offending for observation and measurement—and that the distinction between participation and frequency is important because it permits isolation of different causal relationships. However, they also suggest that the criminal career concept is useful for the development and assessment of theory as it may help researchers understand differences among offenders, especially with regard to their various criminal career parameters. Thus, unlike Gottfredson and Hirschi, who assume that as criminal propensity increases so too do participation, frequency, and career length, the criminal career paradigm suggests that the predictors and correlates of one criminal career parameter may differ from the predictors and correlates of another.

The key point of contention between Gottfredson and Hirschi and Blumstein et al. lies in their respective interpretations of the age/crime curve. For Gottfredson and Hirschi, the decline in the age/crime curve in early adulthood reflects decreasing offending frequency (λ) after the peak age. Blumstein, Cohen, and Farrington claim that the decline in the aggregate arrest rate after a teenage peak does not require that offending frequency (λ) follow a similar pattern. According to Blumstein, Cohen, and Farrington (1988a, p. 27), this is precisely where the distinction between participation and frequency becomes critical. The decline in the aggregate age/crime curve may be entirely attributable to the termination of criminal careers, and the average value of λ could stay constant (or increase or decrease with age) for those offenders who remain active after that peak. This ultimately is an empirical question, yet Blumstein, Cohen, and Farrington (1988a, p. 32) suggest that participation in offending, and not frequency as Gottfredson and Hirschi suggest, is the key dimension that varies with age.

Blumstein, Cohen, and Farrington (1988b, p. 57) suggest that Gott-

fredson and Hirschi misunderstand key criminal career evidence, "especially the evidence of a decline in offending with age, regarding which the distinction between participation and frequency is crucial." They claim that Gottfredson and Hirschi misinterpreted the concepts of individual crime rates, lambda ($\lambda$), and career duration and, as a result, miscalculated such estimates because of their failure to take into account the length of active criminal careers for individual offenders (Blumstein, Cohen, and Farrington 1988b, pp. 58–59, 62). In addition, they challenge Gottfredson and Hirschi's interpretation of declines in offending with age: "just *what* is declining . . . Are still-active offenders committing crimes at lower frequencies or are increasing numbers of offenders ending their careers and ceasing to commit crimes altogether? The former is a change in $\lambda$, and the latter is a change in *participation*, and measuring these changes with age is an empirical issue" (Blumstein, Cohen, and Farrington 1988b, p. 66; emphasis in original). In sum, they conclude that cross-sectional studies can study only between-subject differences, while longitudinal surveys allow for the analysis of both between- and within-subject changes, and it is this latter type of analysis that frames the criminal career focus on participation, frequency, and termination. Within-subject changes are also more relevant to issues of prevention and treatment of offending.

3. *What Is the Relevance of This Debate?*    The debate has relevance for policy issues. In Gottfredson and Hirschi's view, the most important distinction should be between offenders and nonoffenders (i.e., participation). The criminal career paradigm, by contrast, does not dispute a focus on participation, but also places emphasis on the frequency of active offenders. This focus on frequency reflects, not only an interest in systematic differences in offending frequencies among active offenders but also an interest in changes in offending frequency during active criminal careers. Both participation and frequency, according to the criminal career paradigm, are relevant for policy purposes since affecting both can generate payoffs in crime reduction. Blumstein, Cohen, and Farrington argue that longitudinal data are superior to cross-sectional data in testing causal hypotheses, because longitudinal data permit observation of the time ordering of events observed and provide better control of extraneous variables because each person acts as his/her own control.

## B. Other Criminal Career Features

The criminal career paradigm, and the ensuing sets of exchanges, resulted in the continued study of the different trajectories and dimen-

sions associated with criminal careers (Le Blanc and Fréchette 1989; Loeber and Le Blanc 1990; Le Blanc and Loeber 1998). Researchers continued in the criminal career tradition by identifying other criminal career dimensions, including activation, aggravation, and desistance.

1. *Activation.*    According to Le Blanc and Loeber, activation refers to "the way the development of criminal activities, once begun, is stimulated and the way its continuity, frequency, and diversity are assured" (1998, p. 123). There are three subprocesses of activation. The first is acceleration, which refers to an increase in the frequency of offending over time. The second is stabilization, which refers to a tendency toward continuity over time. The third is diversification, which refers to the propensity for individuals to become involved in a more diverse set of criminal activities over time. The timing of onset (i.e., onset age) is a central feature of activation, and research shows that an early age of onset predicts each of the three subprocesses of activation, regardless of whether onset is measured by self-reports or official records. While an early onset of offending is typically associated with a higher rate of offending, a diverse pattern of offending, and a longer criminal career (see Blumstein et al. 1986; Farrington et al. 1990), the conceptual interpretation linking early onset to other dimensions of criminal careers has not been fully resolved (Nagin and Farrington 1992*a*, 1992*b*).

Regarding acceleration, several studies have shown that individuals who exhibit an early onset age tend to commit crimes at a much higher rate than those with a later age of onset (see Cohen 1986; Loeber and Snyder 1990). Regarding stabilization, research tends to find that an early onset age is predictive of both chronic offending and a longer duration of offending (Le Blanc and Fréchette 1989). An early onset age is also predictive of diversification. For example, using self-report data Tolan (1987) found that early onset offenders averaged 3.2 types of offenses in a one-year recall period, compared with 2.3 offenses for late-onset offenders. However, using official records from the 1958 Philadelphia birth cohort through age twenty-six, Piquero et al. (1999) found that onset age was related to offending versatility, but the association vanished after controlling for age. These authors showed that there was a tendency for offenders to become more specialized in their offending over time, regardless of the age at which they initiated offending (see also Peterson and Braiker 1980; Cohen 1986).

2. *Aggravation.*    The second dynamic process added by Le Blanc and Loeber is aggravation. This process refers to the "existence of a *developmental sequence* of diverse forms of delinquent activities that *escalate* or increase in seriousness over time" (1998, p. 123; emphasis in

original). Some evidence indicates that offenders tend to progress to more serious offense types as offending continues over time (see Glueck and Glueck 1940; Wolfgang, Figlio, and Sellin 1972; Smith, Smith, and Noma 1984; Le Blanc and Fréchette 1989; Tracy, Wolfgang, and Figlio 1990), while others report mixed evidence in this regard (Blumstein et al. 1988), and still others fail to uncover escalation patterns (Datesman and Aickin 1984; Shelden, Horvath, and Tracy 1987).

Perhaps the most detailed investigation to date on escalation was conducted by Le Blanc and Fréchette (1989) using data from Montreal adjudicated youths. These authors summarized the escalation process into five developmental stages: emergence, exploration, explosion, conflagration, and outburst. In the emergence stage, between ages eight and ten, petty larceny takes shape as the key offense type. During the exploration stage (ages ten to twelve), offenses tend to become diversified and more aggravated and include shoplifting and vandalism. In the third stage, around age thirteen, there is a substantial increase in the variety and seriousness of offending, and new crimes are committed, including common theft, burglary, and personal larceny. Around age fifteen, during the conflagration stage, the variety and seriousness of offending increases and is complemented by drug trafficking, motor vehicle theft, and armed robbery. Finally, during adulthood, outburst occurs, and crimes become more serious and tend to include fraud and homicide. Le Blanc and Fréchette (1989) showed that, up to age twenty-five, 92 percent of their convicted delinquent sample moved through this particular developmental escalation sequence. Loeber et al. (1999) reached similar substantive conclusions regarding the escalation progression using data from three large-scale self-report studies from Pittsburgh, Denver, and Rochester.

3. *Desistance.* The third process identified by Le Blanc and Loeber (1998) is desistance, but their view of desistance is much broader than the usual exposition in the criminal careers report. According to Le Blanc and Loeber, desistance is a slowing down in the frequency of offending (deceleration), a reduction in the variety of offending (specialization), a reduction in the seriousness of offending (de-escalation), or reaching a plateau or ceiling in offense seriousness. The study of desistance has been hampered by both theoretical and measurement problems (see Laub and Sampson 2001). For example, questions have been raised regarding whether desistance is an event or a process (see Fagan 1989; Maruna 2001), can be studied while individuals are still

alive (i.e., the cutoff age problem; see Farrington 1979), and can be identified from short periods of nonoffending (Blumstein et al. 1986; Barnett, Blumstein, and Farrington 1987, 1989; Bushway et al. 2001). Still, these concerns have not deterred researchers from studying desistance (see Mulvey and Larosa 1986; Farrington and Hawkins 1991; Loeber et al. 1991; Laub, Nagin, and Sampson 1998; Warr 1998).

Le Blanc and Loeber (1998, p. 162) suggest that deceleration may occur in three ways: aging out of the criminal career in midlife, early desistance from offending in adolescence, and desistance from specific offense types in the middle of a delinquent career. Researchers have found that the rate of offending, $\lambda$, tends to decrease with age, and this especially takes place in the thirties and forties (see Blumstein et al. 1986; Piquero et al. 2001). In addition, researchers have identified some desistance from offending during adolescence (Le Blanc and Fréchette 1989). Finally, some research indicates that some offenders tend to drop minor offenses over their careers (Le Blanc and Fréchette 1989).

Regarding de-escalation, some limited evidence indicates that this occurs during adulthood (Robins 1966; Le Blanc, Côté, and Loeber 1991). For example, Blumstein and his colleagues (1988) found some de-escalation among Michigan offenders during adulthood. Le Blanc and Fréchette (1989) reported that 61 percent of the subjects in their delinquent sample reached their maximum level of seriousness in offending during adolescence; however, little research has examined desistance as reaching a ceiling, primarily because the ceiling is difficult to detect reliably. Finally, Le Blanc and Loeber's (1998) definition of specialization refers to desistance from a versatile pattern of criminal activity into a more homogenous pattern. Thus, specialization involves desistance from some kinds of offenses. Research has analyzed offending careers spanning the juvenile and adult years and suggests that specialization tends to increase with age (see Blumstein et al. 1986; Le Blanc and Fréchette 1989; Stattin, Magnusson, and Reichel 1989; Piquero et al. 1999).

## C. Issues of State Dependence and Persistent Heterogeneity

One of the key criminal career findings was the consistent relationship between past and future criminal activity. Although research consistently documented such a positive relationship, current theory has not agreed about the cause of the relationship. Aided by theoretical

and empirical research from other disciplines, two principal explanations have emerged: state dependence and persistent heterogeneity.

1. *Does Prior Behavior Reflect Differential Propensity, a True Causal Effect, or Both?* There has been intense debate about the interpretation and meaning of the correlated relationship between past and future offending. In criminology, the first acknowledgment of this issue and subsequent empirical application was achieved by Nagin and Paternoster (1991). These authors suggested that the positive relationship could reflect some combination of two processes: state dependence and persistent heterogeneity.

The state dependence argument suggests that the positive correlation between past and future criminal activity exists because the act of committing a crime transforms the offender's life circumstances in some way that increases the probability that future crimes will occur. For example, committing crimes can weaken one's involvement in a network of conventional relationships that could have provided some restraint on criminal activity. After the commission of a criminal act, future criminal acts may become more likely as a result of a closer affiliation with other offenders. In sum, the state dependence argument posits that criminal activity materially transforms conditions in the offender's life, thus increasing the probability of future offending. Theories such as Agnew's general strain theory (1992), Sutherland's differential association theory (1947), and Lemert's labeling theory (1951) attribute importance to the state dependence interpretation.

Persistent heterogeneity is the second interpretation. This explanation attributes the positive correlation to differences across persons in their propensity to commit crime. In this explanation, there is heterogeneity in the population that takes the form of a time-stable characteristic that affects the probability of criminal activity over the life course. Thus, individuals with the "highest" criminal propensity are likely to be involved in all sorts of antisocial, criminal, and deviant acts throughout the life course, and the rank-order differences between those with high criminal propensity and those with low criminal propensity tend to remain relatively stable. In sum, the persistent heterogeneity explanation attributes continuity in criminal activity over time to stable differences between individuals in factors that influence crime. Theories developed by Gottfredson and Hirschi (1990) and Wilson and Herrnstein (1985) subscribe to the persistent heterogeneity point of view.

These two explanations are not necessarily incompatible. For exam-

ple, there can be mixed explanations for the relationship between past and future criminal activity that allow for both stable individual differences in criminal propensity and for criminal activity to alter the risk of future crime (Nagin and Paternoster 2000). Thus, a mixed persistent-heterogeneity/state-dependence explanation would allow for both individual differences and life events to influence and alter patterns of criminal activity. Such a mixture would accommodate both continuity and change. Sampson and Laub's (1993, 1997) age-graded informal social control theory is an example of a theory that accommodates both persistent heterogeneity and state dependence.

A number of studies have examined the extent to which persistent heterogeneity and state dependence account for the relationship between past and future criminal activity. Nagin and Paternoster (1991) used data from high school students and found that prior criminal offending had an effect on subsequent offending after controlling for both observed and unobserved heterogeneity. Using the Cambridge study, Nagin and Farrington (1992a, 1992b) found substantially stronger effects for persistent heterogeneity than for state dependence, though the latter were still significant. In further analyses of the same data, Paternoster, Brame, and Farrington (2001) also concluded that persistent heterogeneity was more important. However, Paternoster and Brame (1997) found more evidence in favor of state dependence than persistent heterogeneity in data from the NYS. Nagin and Land (1993) and Land, McCall, and Nagin (1996) found both persistent-heterogeneity and state-dependence effects using official records from the Cambridge study and the Second Philadelphia birth cohort.

Nagin and Paternoster's (2000) recent review of the persistent-heterogeneity/state dependence literature yields the important conclusion that both persistent-heterogeneity and time-varying characteristics are important. Thus, despite important differences in criminal propensity, life events still play a causal role in shaping criminal activity over the life course. Importantly, these conclusions are derived from over a decade of research employing different samples (high school students, representative population samples, offender-based samples, etc.), different types of time-varying characteristics (marriage, employment, alcohol, drug use, etc.), and different measures of criminal activity (official records, self-reports).

A number of unresolved questions remain (see Nagin and Paternoster 2000, pp. 138–40). First, little is known about the distribution of and response to opportunities to desist. Second, there is little under-

standing of the causal processes that underlie desistance from crime. Third, more needs to be done to identify the effect of various events and experiences that lead persons into and out of crime. Fourth, little is known about the sources of the differential propensity to commit crime. Fifth, current research does not show conclusively whether criminal justice interventions have positive or negative effects.

2. *Do Interventions Have Positive Effects?*     Under the state-dependence argument, events external to the individual (i.e., association with delinquent peers, imposition of formal sanctions, etc.) are believed to exert a meaningful, causal effect on an individual's behavior. To the extent that the state-dependence argument is correct, then, interventions aimed at reducing the frequency, seriousness, or duration of offending could have a desirable effect; that is, interventions should work toward inhibiting continued criminal careers. However, as argued in labeling theory, interventions could also have undesirable effects.

Can good things happen to offenders that will cause them to settle down and turn away from their criminal patterns? This question has been taken up in several recent studies aimed at understanding how local life circumstances or life events, including crime, influence the subsequent patterning of criminal and noncriminal activity (e.g., Hagan and Palloni 1988; Ouimet and Le Blanc 1995). For example, using self-reported data from a sample of Nebraska prisoners, Horney, Osgood, and Marshall (1995) examined the extent to which changes in local life circumstances were related to changes in short-term criminal activity. They found that during months of drug use, offenders were more likely to be involved in property, assaultive, and drug-related crimes, whereas, during months of living with a wife, offenders were less likely to be involved in all sorts of crimes, particularly assaultive crimes.

Laub, Nagin, and Sampson (1998) used the Glueck data on 500 delinquent boys to study how "good marriages" were related to desistance from crime through age thirty-two. After controlling for persistent individual differences, Laub and his colleagues found that a "good marriage" rather than simply "being married" was associated with desistance.

Cernkovich and Giordano (2001) used longitudinal data from a household sample and an institutionalized sample to study stability and change in antisocial behavior. Their results indicated that prior delinquency was a stable predictor among individuals in both samples, but

social bonding effects were important only for the household sample and not for the institutionalized sample. Regarding the latter result, they argued that the institutionalized sample may simply have been unable to acquire or maintain social bonding mechanisms.

Using data on 524 California Youth Authority (CYA) parolees followed for seven consecutive years, Piquero et al. (2002) examined how changes in several life circumstances, including alcohol and drug use and stakes in conformity, were related to changes in both violent and nonviolent criminal activity. Piquero and his colleagues found that changes in these life circumstances were related to changes in criminal activity, even after controlling for persistent individual differences, and that some of the life circumstances were related to one type of crime more than another. For example, stakes in conformity and heroin dependency were related to nonviolent but not violent arrests. Piquero, MacDonald, and Parker (2002) further explored the interaction between race and local life circumstances among these CYA parolees and found that, although the effects of marriage and employment operated in similar ways for white and nonwhite parolees, nonwhite parolees who were involved in common-law relationships were more likely to continue their involvement in criminal activity, while similarly situated white parolees were not. These authors speculated that the common-law relationships were crime increasing because of the additional level of commitment and accountability necessary for a marriage.

Simons and his colleagues (2002) employed data from a longitudinal sample of Iowa adolescents to explore stability and change in criminal activity into early adulthood. They tested the idea of assortative mating as a potential explanatory factor and also explored gender differences in assortative mating. Their results indicated that, among males and females, adolescent delinquency and affiliation with delinquent peers predicted having an antisocial romantic partner as a young adult; in turn, involvement with an antisocial romantic partner was related to further adult criminal activity. Among females, the quality of romantic relationships also predicted crime, an effect that was not observed among males.

The overriding conclusion from these studies is that life events (interventions) can have a positive effect on offenders' lives, over and above persistent individual differences (i.e., criminal propensity). Other interventions, external to the individual, have also been examined for their ability to reduce criminal activity. Because a review of this literature is beyond the scope of this essay, readers are referred to

Sherman et al. (2002), Wilson and Petersilia (2001), and Tonry and Farrington (1995) for extensive reviews of crime prevention and intervention efforts generally and to Tremblay and Craig's (1995) review of developmental crime prevention in particular.

3. *Does Criminal Justice Intervention (i.e., Labeling) Do Harm?*   Labeling theory draws attention to the potentially negative consequences of being labeled a criminal. Labeling theory would view criminal justice intervention, especially serious criminal justice intervention, as doing more harm than good. For example, Lemert (1951) argues that societal reactions to primary deviance cause problems of adjustment that lead to additional, or secondary, deviance. Thus, as offenders move through the criminal justice process, or what Garfinkel (1965) refers to as the "status degradation ceremony," individuals are likely to incur negative prospects for employment and other prosocial outcomes later in life. Individual deterrence theory as well as rehabilitation efforts, by contrast, make the exact opposite prediction; namely, that criminal justice interventions do more good than harm. Under the deterrence argument, individuals are believed to be rational beings who avoid future criminal activity as a result of the swift, certain, and severe imposition of formal and informal sanctions. In sum, labeling theory posits that criminal justice intervention exacerbates future criminal activity, while deterrence or rehabilitation theory predicts that criminal justice interventions inhibit future criminality.

Unfortunately, very few studies have related criminal justice sentences to recidivism probabilities (though see Walker, Farrington, and Tucker 1981 for an exception). One key question is the impact of official processing as opposed to no official action. Farrington (1977) attempted to address this question with data from the Cambridge study. Youths who were first convicted between ages fourteen and eighteen were matched on self-reported delinquency at age fourteen with youths not convicted up to age eighteen, and a similar analysis was carried out between ages eighteen and twenty-one. Farrington found an increase in self-reported offending frequency after first convictions, thereby providing some support for the labeling theory argument.

Smith and Gartin (1989) used data from the 1949 Racine cohort, a longitudinal study of 2,099 residents of Racine, Wisconsin, born in 1949 and followed up to 1974, to examine two specific questions regarding the influence of arrest on future criminal activity. First, does arrest amplify or deter the future criminal activity of those arrested?

Second, does the influence of being arrested on future offending vary according to where arrest occurs in the sequence of police contacts? These scholars partitioned future offending into distinct components, including the rate of future offending, the duration of a criminally active period, and desistance from future offending. They found that, while being arrested affected specific parameters of criminal careers differently, the reduction in the future criminal activity of those offenders whom police arrested was lower than those who were contacted but not arrested (Smith and Gartin 1989, p. 102). In addition, among novice offenders, arrest was more likely to terminate their criminal careers while among more experienced offenders, arrest significantly reduced future rates of offending. Using the same data, Shannon (1980) found that severe sanctions, such as incarceration, led to increased future criminality. Thus, within the same data, Smith and Gartin find that arrest had some specific deterrent value but Shannon concluded that more severe sanctions backfired.

Smith and Paternoster (1990) used juvenile justice intake data from the Florida Department of Health and Rehabilitative Services to examine whether referring a case to juvenile court or diverting it affected a person's future delinquent or criminal behavior. To the extent that labeling theory is correct, referring the case would trigger a deviance-amplification process that ultimately results in increased criminal or delinquent activity. Smith and Paternoster raise the methodological point that a higher rate of offending among those referred to court could actually be a selection artifact. That is, since the diversion decision is discretionary, those juveniles referred to court may have more attributes that are related to future offending than those juveniles who are diverted from the system. Their initial analysis indicated that while referral to court had a significant, positive effect on recidivism, further analysis that recognized the potential heterogeneity in risk factors between referred and diverted cases revealed that the apparent labeling effect of court referral could be attributed instead to a selection artifact. In finding no support for the deviance amplification process, Smith and Paternoster (1990, p. 1128) cautioned researchers about potential selection artifact effects in nonexperimental data.

Although most studies have examined how criminal justice interventions lead to future criminal activity, Sampson and Laub have posited that criminal justice experiences could also lead to negative consequences in other aspects of offenders' lives, including employment, particularly job stability. Using the Glueck data, Sampson and Laub

(1993) found that length of juvenile incarceration had the largest over-all effect on later job stability, even after controlling for observed and unobserved persistent heterogeneity. In particular, compared to delin-quents with short incarceration histories, delinquent boys incarcerated for a longer period of time had trouble securing stable jobs as they entered young adulthood (Sampson and Laub 1997). Moreover, length of incarceration in both adolescence and young adulthood had a sig-nificant negative effect on job stability at ages twenty-five and thirty-two (Sampson and Laub 1993). Similar results regarding the destabiliz-ing effects of criminal justice intervention have been observed by other scholars (Nagin and Waldfogel 1995).

## D.  Theories Influenced by the Criminal Career Paradigm

The criminal career paradigm forced theorists to examine the extent to which they were able to account for the different criminal career dimensions (i.e., onset, persistence, frequency, desistance, etc.). As a result of the recognition of other criminal career features, and the im-portance of the relationship between past and future criminal activity, several life-course and developmental theories were developed that at-tempted to account for the patterning of criminal activity over time.

The life course has been defined as "pathways through the age-differentiated life span," where age differentiation "is manifested in ex-pectations and options that impinge on decision processes and the course of events that give shape to life stages, transitions, and turning points" (Sampson and Laub 1993, p. 8; see also Elder 1985). Within criminology, the life-course perspective can offer a comprehensive ap-proach to the study of criminal activity because it considers the multi-tude of influences that shape offending across different time periods and contexts (Thornberry 1997; Piquero and Mazerolle 2001). In par-ticular, two central concepts underlie the analysis of life-course dynam-ics, and of criminal activity more specifically.

The first is a trajectory, or a pathway of development over the life span such as in work life or criminal activity. Trajectories refer to long-term patterns of specific types of behavior. Second, and embedded within trajectories, are transitions, or specific life events (e.g., a first arrest) that evolve over shorter time spans. According to Elder (1985, p. 32), the interlocking nature of trajectories and transitions may gen-erate turning points or changes in the life course. According to Samp-son and Laub, "The long-term view embodied by the life-course focus

on trajectories implies a strong connection between childhood events and experiences in adulthood. However, the simultaneous shorter-term view also implies that transitions or turning points can modify life trajectories—they can 'redirect paths'" (1992, p. 66). As such, the life-course perspective recognizes the importance of both stability and change in human behavior.

Developmental criminology adopts this life-course view by acknowledging that changes in social behavior, such as delinquency and crime, are related to age in an orderly way (Patterson 1993; Thornberry 1997). Developmental criminology, which focuses on all sorts of antisocial and criminal activity over the life course, studies the temporal, within-individual changes in offending over time (Le Blanc and Loeber 1998, p. 117) and focuses on two primary areas of study. The first concerns the development and dynamics of offending over age, while the second concerns the identification of explanatory or causal factors that predate or co-occur with the behavioral development and have an effect on its course (Le Blanc and Loeber 1998, p. 117).

Developmental criminology departs from traditional criminological theory that, with one principal exception (labeling theory; see Sampson and Laub 1997), adopts a relatively nondevelopmental, or static, orientation. Thornberry (1997, pp. 2–5), for example, offers four reasons why static theories have led to a stagnation of knowledge. First, static perspectives neither identify nor offer explanations for all of the key criminal career dimensions. Most static theories, with the exception of Gottfredson and Hirschi and Wilson and Herrnstein, are basically state-dependence theories. Second, static theories fail to identify types of offenders based on developmental considerations. For example, some offenders may start early and continue offending for long periods while others start later and desist earlier. Third, static explanations do not focus attention on either precursors or consequences of criminal activity. For example, what factors lead to the initiation of criminal activity, and does continued criminal activity materially affect life outcomes in other noncrime domains such as school and work? Fourth, static perspectives do not integrate the noncrime developmental changes that occur over the life course as a way to understand changes in criminal activity during the same period. For example, how do transitions in work, school, family, and interpersonal relationships relate to changes in criminal activity? Developmental criminology attempts to overcome these limitations in an effort to provide a more complete

understanding of criminal activity over the life course and recognizes that there may be multiple paths to antisocial and criminal behavior (Huizinga, Esbensen, and Weiher 1991).

Within criminology, the last decade has witnessed the application of scholarly work from other disciplines that have adopted a life-course perspective to the study of criminal activity. These theories, and the ones also constructed by criminologists, take as their starting point two key facts: the relationship between age and crime and the relationship between prior and future criminal activity. These theories have also attempted to address the following observation: although antisocial behavior in children is one of the best predictors of antisocial behavior in adults, not all antisocial children become antisocial adults.

Moffitt's (1993) developmental taxonomy decomposes the aggregate age/crime curve into two distinct classes of offenders. The first group, designated "adolescence-limited," is hypothesized to engage in crimes solely during the adolescent period. The primary causal factors for this group include the maturity gap (i.e., adolescents are physically old enough to look like adults, but socially not allowed to act like adults) combined with the encouragement of peers. Moffitt anticipates that the crime repertoire of adolescence-limiteds would be restricted to mainly status- and property-oriented offenses that symbolize adult social status such as theft, smoking, vandalism, and drug use, but not violent acts. For the majority of adolescence-limiteds, their prosocial skills and attitudes allow them to recover from their delinquent experimentation and move away from their delinquent activities as they reach adulthood.

The second group of offenders in Moffitt's taxonomy, "life-course-persistent," is hypothesized to engage in antisocial activities and criminal acts throughout the life span. Composed of less than 10 percent of the population, the primary determinants of criminal activity for life-course-persistent offenders lie in the interaction between poor neuropsychological functioning and deficient home and socioeconomic environments. Unlike their adolescence-limited counterparts, life-course-persistent offenders continue their criminal involvement throughout most of their lives (i.e., they are unlikely to desist). In addition, the crime repertoire of life-course-persistent offenders is varied and includes interpersonal violence.

Thus, Moffitt's adolescence-limited offenders are likely to be influenced much more by state-dependence effects, since offending among adolescence-limited offenders depends largely on life circumstances

and environmental influences such as peers. Prior criminal acts are likely to affect causally current and future offending among adolescence-limited offenders because offending is likely to alienate further parents and conventional peers. Life-course-persistent offenders, after child socialization efforts have taken place, are likely to be a consequence of persistent heterogeneity. That is, life-course-persistent offenders are "bad apples" who exhibit significant deficits in early childhood socialization and are rarely likely to get back on track.

A good deal of empirical research has tended to support some of the key hypotheses arising from Moffitt's typology (Nagin and Land 1993; Moffitt, Lynam, and Silva 1994; Dean, Brame, and Piquero 1996; Moffitt et al. 1996; Bartusch et al. 1997; Kratzer and Hodgins 1999; Tibbetts and Piquero 1999; Moffitt and Caspi 2001; Piquero 2001; Piquero and Brezina 2001), while some studies have generated useful alterations to the theory (see Nagin, Farrington, and Moffitt 1995; D'Unger et al. 1998; Aguilar et al. 2000; Fergusson, Horwood, and Nagin 2000).

Much like Moffitt's typology, Patterson and Yoerger's (1999) theory is based on a two-group model of offending that is comprised of early- and late-onset offenders. According to their perspective, early-starting offenders become involved in criminal and antisocial behaviors as a function of failed early childhood socialization due to inept parenting practices that foster oppositional/defiant behavior. The failure of children to learn effective self- and social controls leads them to be involved in deviant peer groups, which, in turn, magnifies their offending intensity. Early-starting offenders tend to be aggressive and defiant in their interactions with others and come to be rejected by conventional peers. As a result of their social rejection, early-starting offenders tend to establish friendships with each other thereby forming deviant peer groups that engage in criminal activities. Early starters, then, are at high risk for chronic offending and continued criminal careers as adults.

Late-starting offenders, however, do not suffer from failed socialization efforts. Instead, the principal cause of offending for them is their close association and interaction with deviant peer models. As a result of the aid, encouragement, and support of the peer social context, late-starting youths experiment with delinquency during mid to late adolescence. However, since late-starting offenders do not suffer from inept parenting, nor are they failed socialization products, their social skills remain relatively intact, and they are likely to turn away from

criminal acts as adulthood approaches. Several empirical studies have tested Patterson's theory. For the most part, they confirm the key predictions regarding the effects of inept parenting, oppositional/defiant behavior, and deviant peers (see Simons et al. 1994, 1998; Patterson and Yoerger 1999).

Loeber and his colleagues (1998, 1999) have proposed a three-pathway model that integrates both predelinquent behavior problems and delinquent acts in attempting to describe which youths are at highest risk of becoming chronic offenders. The first pathway, the "overt pathway," begins with minor aggression, followed by physical fighting and then violence. The second pathway, the "covert pathway," consists of a sequence of minor, covert behaviors followed by property damage (such as vandalism) and then proceeds on to serious forms of delinquency. The third pathway, the "authority-conflict pathway," prior to age twelve consists of a sequence of stubborn behaviors, including defiance and authority avoidance (such as running away). According to Loeber, individuals' development can take place on more than one pathway, with some youths progressing on all three pathways. However, the most frequent offenders are overrepresented among those boys in multiple pathways, especially those displaying overt and covert behavior problems. In addition, Loeber's model also allows for specialization, for example, in covert acts only, as well as escalation along pathways.

A key assumption of Loeber's model is that behavior takes place in an orderly, not random, fashion. In other words, individuals progress through lower-order steps up through higher-order steps. The pathway model has been replicated in the youngest sample of the Pittsburgh study and applied better to boys who persisted compared to those who experimented in delinquency (Loeber et al. 1998). In addition, replications have been reported by Tolan and Gorman-Smith (1998) in samples from the NYS and the Chicago Youth Development Study (see also Elliott 1994). Finally, recent research on the pathway model in the three causes and correlates study sites (Denver, Pittsburgh, and Rochester) replicated it for steps 2 and higher in the overt and covert pathways only (Loeber et al. 1999; though see Nagin and Tremblay 1999).

Thus far, we have presented three specific developmental theories that allow for both static and dynamic effects. Another theory that was developed after the criminal careers report is Sampson and Laub's age-graded informal social control theory. Though technically a general,

nondevelopmental theory, the Sampson and Laub model allows for both static and dynamic effects on criminal activity over the life course.

For Sampson and Laub (1993), crime can be understood as a product of both persistent individual differences and local life events. Their thesis entails three key ideas. First, delinquency in childhood and adolescence can be explained by the structural context, which is mediated by informal family and school social controls. Second, they recognize that there is a substantial amount of continuity in antisocial behavior from childhood through adulthood in a variety of life domains. Third, they argue that variation in the quality of informal social bonds in adulthood to family and employment explains changes in criminality over the life course, despite early childhood persistent individual differences. Sampson and Laub's theory claims that, independent of persistent individual differences, informal social control mechanisms exert a causal effect on criminal activity and that the type of social control varies at different ages. Their theory incorporates both stability and change over the life course, and "change is a central part of [their] explanatory framework" (Sampson and Laub 1993, p. 17).

Several studies have examined Sampson and Laub's conception of stability and change and have found that both persistent individual differences (stability) and local life circumstances (change) are important for understanding criminal activity over the life course. These efforts have made use of different samples, different indicators of local life circumstances, different methodologies, and different periods of the life course (see Sampson and Laub 1993; Horney, Osgood, and Marshall 1995; Laub, Nagin, and Sampson 1998; Piquero et al. 2002). Moreover, these efforts have shown that the type and quality of local life circumstances may be more important than just the presence of a particular life circumstance. For example, Laub, Nagin, and Sampson (1998) found that the quality of marriage, as opposed to marriage per se, was associated with desistance from offending in early adulthood.

Recently, Sampson and Laub (1997) have extended their age-graded theory of informal social control to incorporate a developmental conceptualization of labeling theory. In particular, this account invokes a state-dependence argument in that it incorporates the causal role of prior delinquency in facilitating adult crime through a process of "cumulative disadvantage." According to Sampson and Laub, involvement in delinquent behavior has a "systematic attenuating effect on the social and institutional bonds linking adults to society (e.g., labor force attachment, marital cohesion)" (1997, p. 144). Thus, delinquency is in-

directly related to future criminal activity in that it can spark failure in school, incarceration, and weak bonds to the labor market, all of which are likely to lead to further adult crime. This cycle occurs because severe sanctions, which ultimately end up labeling offenders, limit the opportunities available to individuals to follow a conventional lifestyle. The cumulative continuity of disadvantage is the result of both persistent individual differences and the dynamic process where childhood antisocial behavior and adolescent delinquency foster adult crime through the weakening of adult social bonds (Sampson and Laub 1997, p. 145).

Cumulative disadvantage is believed to be linked to the four social control institutions of the family, school, peers, and state sanctions. For Sampson and Laub (1997), interactional continuity begins with the family. Child behaviors tend to influence parents just as much as parent behaviors influence children, and it is likely that a child's negative behavior will not only be punished by parents, but further actions may be influenced by parental labels placed on their children and their child's subsequent adoption of the label. The school also occupies a key place in Sampson and Laub's cumulative disadvantage theory. For example, teachers may react to a child's unruly behavior by retreating from a teacher-student relationship that is designed to foster intellectual and personal growth. To the extent that this rejection "undermines the attachment of the child to the school, and ultimately, the child's performance in the school," it may lead to further disruptive and delinquent behavior (Sampson and Laub 1997, p. 147). Another key aspect of their theory revolves around peers. Children who are rejected by their peers tend to be more aggressive and, for some children, peer rejection fosters association with deviant peers, many of whom share the same aggressive characteristics.

The final aspect of cumulative disadvantage for Sampson and Laub is the criminal justice and institutional reaction. Their argument here involves the negative structural consequences of criminal offending and the resulting official sanctions that limit noncriminal opportunities. According to Sampson and Laub, adolescent delinquency and its negative consequences (i.e., arrest, trial, incarceration, etc.) "increasingly 'mortgage' one's future, especially later life chances molded by schooling and employment" (1997, p. 147). Thus, the stigma associated with arrest and, especially, incarceration, tends to limit good job prospects and, as a result, job stability. Given that job stability is virtually a prerequisite for lasting interpersonal relationships, arrest and incarceration are likely to reduce an offender's marriage premium (see

Cohen 1999). In sum, Sampson and Laub claim that official (and se-vere) reactions to primary deviance tend to create problems of adjust-ment that are likely to foster additional crime in the form of secondary deviance.

In a preliminary test of this thesis, Sampson and Laub (1997) exam-ined the role of job stability at ages seventeen to twenty-five and twenty-five to thirty-two as an intervening link between incarceration and adult crime. After controlling for a number of theoretically rele-vant variables, including arrest frequency, alcohol use, and persistent unobserved heterogeneity, Sampson and Laub found that, compared to delinquents with a shorter incarceration history, boys who were in-carcerated for a longer period of time had greater difficulty securing stable jobs as they entered young adulthood.

The theories outlined in this section share a common theme in that they are designed to assess within-individual change in both criminal activity and the factors associated with criminal activity over the life course. Yet, they differ in important respects. Compared to the static general theories of crime that assume that there is a general cause and one pathway to crime for all offenders and that once this causal process has occurred change is highly unlikely (see Wilson and Herrnstein 1985; Gottfredson and Hirschi 1990), a dynamic general theory, such as the one postulated by Sampson and Laub, maintains the assumption of general causality but allows for the possibility that life circumstances can materially alter an individual's criminal trajectory above and be-yond persistent individual differences; that is, Sampson and Laub's model allows for both persistent heterogeneity and state-dependence effects. Developmental theories, such as those advanced by Moffitt, Patterson, and Loeber, are quite complex in that they assume that cau-sality is not general and that different causal processes explain different offender types. Moreover, this causal process may emphasize persistent heterogeneity as in Moffitt's life-course persisters and Patterson's early-starting offenders or a state-dependence effect as in the dynamic accounts found among Moffitt's adolescence-limited offenders and Patterson's late-start offenders. Empirical research has attempted to adjudicate between these theoretical models, and thus far the evidence tends to favor a middle-ground position, such as the one advanced by Sampson and Laub (see Paternoster et al. 1997). However, recent evi-dence tends to suggest that local life circumstances operate in some-what different ways across distinct offender groups (see Chung et al. 2002; Piquero, MacDonald, and Parker 2002).

## TABLE 2

### Classification Scheme

|  | General | Developmental |
|---|---|---|
| Static | Gottfredson and Hirschi | Moffitt's life-course-persistent offender |
|  | Wilson and Herrnstein | Patterson's early-starting offender |
| Dynamic | Sampson and Laub | Moffitt's adolescence-limited offender |
|  |  | Patterson's late-starting offender |

An important point concerns the relationship between static (persistent-heterogeneity)/dynamic (state-dependence) and general/developmental theories. Paternoster et al. (1997) presented a useful classification, reproduced here as table 2. As can be seen, developmental theories can be compared against purely static/general theories and can be viewed along a continuum of parsimony. For example, static/general theories are the most parsimonious in emphasizing a purely persistent heterogeneity explanation, followed by dynamic/general theories, which emphasize a combined persistent-heterogeneity/state-dependence explanation. These are followed by developmental/static theories and then the least parsimonious, dynamic/developmental theories, which emphasize a mixture of persistent-heterogeneity/state-dependent explanations across offender types. In sum, the sometimes competing explanations of persistent heterogeneity and state dependence are not necessarily incompatible; sometimes one is stronger, sometimes another, but they are not necessarily mutually inconsistent.

## IV. Methodological Issues

Both criminal career research and developmental theory focus on longitudinal data on criminal activity over the life course. Several key methodological issues relating to types of data, research designs, and analytic techniques must be confronted.

### A. Data

Because of the need to obtain a complete portrayal of criminal activity, especially activity that goes undetected by the criminal justice system, both self-report and official records are needed to study the longitudinal patterning of criminal activity. In this section, we discuss three issues related to the reliability of self-report and official data. Although both self-reports and official records are useful, each is vulnerable to

sources of error that may limit the accuracy of estimates of criminal career dimensions.

1. *Reliability.*   Self-report and official record data provide complementary information on the behavior of offenders. Use of both methodologies can serve as a check on one another as, oftentimes, self-report records document information not found in official records.

Self-report data can be distorted as a result of problems in the design of survey instruments, response errors, and analytical problems in inferring career dimensions from questionnaire responses (Hindelang, Hirschi, and Weis 1981; Blumstein et al. 1986; Weis 1986). First, response errors typically result from the saliency, frequency, and timing of criminal activity. For example, in many surveys, individuals are asked to provide a frequency count of the number of times they engaged in a particular act. For many individuals, especially high-rate offenders and those with a history of heavy drug and alcohol use, memory problems are likely to increase with longer recall periods and with greater intervals between the recall period and the survey date. Henry and colleagues (1994) investigated the use of recall questions, including those associated with delinquency/arrest. Their analysis concluded that recalling the precise number of events is difficult, especially when many events occur.

A second problem lies in respondent uncertainty about which events are to be counted as police contacts, arrests, or convictions, and to which crimes those events refer. This is likely magnified among high-rate offenders.

Third, respondents may misrepresent their involvement in criminal activity. They may lie about their involvement or noninvolvement in crime. Similarly, they may refuse to participate in a study or, once involved, may refuse to continue. The NYS, for example, had an original refusal rate of over 25 percent, and attrition increased over subsequent surveys. Misrepresentation of information, refusal of participation, and attrition or noncooperation are likely to be pronounced among the most serious offenders.

A fourth set of problems includes testing, period, and panel effects (Thornberry 1989). Testing effects refer to alterations in individuals' responses to a particular item or set of items caused by previously answering the same item or set of items. Panel effects refer to the observation that age-specific rates for crimes tend to change with age. Period effects can produce downward trends in age-specific rates for the majority of crimes that may or may not be indicative of a real decline.

Another potential threat to the reliability of self-reports is the changing content validity of items related to the age of the respondent. For example, people's interpretations of self-report items may change as they age, and thus changes in crime and delinquency over time may have more to do with the meaning of the questions to the respondents than with actual changes in behavior (Lauritsen 1998). Or within a cross-section of different-aged individuals, there may be changing content validity across different-aged survey respondents (Piquero, MacIntosh, and Hickman 2002). Despite these problems, self-report surveys have become one of the key pieces of data collected by researchers studying criminal careers (see Junger-Tas and Marshall 1999; Thornberry and Krohn 2000).

Official records are vulnerable to important but different errors. They are a reflection only of the "tip of the iceberg" with regard to criminal activity. Official records contain information only on offenses that come to the attention of officials. Many crimes are not reported to the police, much less solved. Two other associated problems are misclassification and nonrecording of events. Misclassification of events can occur as a result of differences among local agencies in classifying offenses (e.g., is a purse snatch a larceny or a robbery?). Relatedly, the criminal event that led to an initial arrest may end up being "redefined" on conviction. An individual arrested for rape may be convicted for a less serious offense such as a sexual assault. Nonrecording errors may also occur because the criminal event leading to formal detection may not meet reporting standards, such as the requirement for disposition data that may not be available (Blumstein et al. 1986, p. 99). Nonrecording can also vary across jurisdictions, for example, from large cities with ample resources compared to small, rural communities with few resources.

Self-reports and official records should not necessarily be viewed as in competition. Farrington (1989, p. 418) suggests that official and self-report records tend to produce "comparable and complementary results on such important topics as prevalence, continuity, versatility, and specialization in different types of offenses."

2. *Sampling.* Researchers want representative samples. However, due to resource constraints, complete populations and large representative samples are seldom possible. Two significant sampling issues involve selection bias that occurs through the arrest process and researchers' ability to obtain a sufficient number of cases of serious offending. Both issues involve trade-offs.

Selection bias occurs with the use of offender-based samples (i.e., those offenders who were arrested). Such offenders are not likely to be representative of all offenders; they are presumably the most serious, older, and possibly the most inept at avoiding detection (Blumstein et al. 1986, p. 102). Moreover, sampling arrestees involves potential errors of commission because some falsely arrested persons are wrongly included among active offenders. Similarly, selecting convicted offenders is more likely to involve errors of omission because sampling convicted offenders misses the active offenders who were not convicted. Thus, selection bias may occur at the arrest, conviction, and incarceration stages. This problem is particularly important for issues related to incapacitation. As Canela-Cacho, Blumstein, and Cohen suggest, "differential selection of offenders arising stochastically from variation in individual offending frequencies will result in measurement bias if one applies this biased estimate of offending frequency to *all offenders* and not just to those offenders processed through the same stage of the criminal justice system" (1997, p. 135; emphasis in original). Selection bias is a concern because of the heterogeneous distribution of offending frequencies observed in self-report surveys of inmates (Chaiken and Chaiken 1982; Spelman 1994; Canela-Cacho, Blumstein, and Cohen 1997).

Problems associated with researchers' ability to obtain a sufficient number of cases of serious offending are particularly relevant in self-report studies. In general population samples, arrests and crimes are relatively infrequent, and this is especially true for the more serious offense types. Cernkovich, Giordano, and Pugh (1985) concluded that high-rate offenders were often missing from general population (i.e., household) surveys. Those high-rate offenders who do show up in self-report studies may be more likely to drop out over time (Brame and Piquero, forthcoming). This nonrandom sample attrition may pose a problem for correctly estimating criminal career dimensions. Thus, the limited number of more serious offenders in self-report data will likely underestimate true offending offense rates. One potential correction is to oversample high-yield subpopulations (low-income neighborhoods) as in some of the causes and correlates studies.

It is possible to correct for biases arising from sampling processes. Such a correction involves reweighting the sample to reflect the differences in the probabilities of sample members. Thus, certain offender types who are underrepresented can be given greater weight while those who are overrepresented are given less weight. The best sample choice in any

study varies with the career dimension being measured. General population samples, which include both offenders and nonoffenders, are more appropriate for estimating participation rates. However, such samples are inefficient for estimating individual offending frequencies because of the small number of high-rate offenders found within them. Samples of arrestees or inmates are better suited for estimating frequency, but corrections are required to adjust for the overrepresentation of high-rate and more serious offenders (Blumstein et al. 1986, p. 104). One compromise is to study similar questions with both sets of samples (see Le Blanc and Fréchette 1989). Cernkovich and Giordano (2001) recently used both household and institutionalized samples to study patterns of stability and change in criminal offending over time.

3. *Street Time.*   Researchers develop estimates of individuals' offending over some period of time, typically over a six- or twelve-month period. However, during these periods, individuals may not be "free" to commit criminal acts. The calculation of "time at risk," "street time," or "free time," then, is crucial to estimating individual offending rates since offenders cannot commit crimes on the street while incarcerated (Weis 1986, p. 34), though they can clearly engage in crime while serving their jail or prison terms.

Estimating an individual's offending frequency without taking exposure time into consideration assumes that he is completely free to commit crimes. Under this assumption, an individual's true rate of offending is likely to be miscalculated because some offenders are not completely free. Researchers have recognized the importance of this problem and have implemented controls for street time (see Visher 1986; Barnett, Blumstein, and Farrington 1987, 1989; Hurrell 1993; Horney, Osgood, and Marshall 1995), but many self-report studies do not. The importance of this issue was recently demonstrated by Piquero et al. (2001) in their study of the recidivism patterns of serious offenders paroled from the CYA. They found that conclusions regarding persistence and desistance were contingent on knowledge of exposure time. Without controlling for street time, they found that 92 percent of their sample desisted. With controls for exposure time, only 72 percent desisted. In sum, variations in exposure time can affect measurements of criminal career dimensions and need to be considered in criminal career research (Blumstein et al. 1986, p. 106).

## B. Research Design

Research on criminal careers examines individuals' variations in criminal activity over the life course. Because the paradigm devotes at-

tention to ages at initiation and termination, and all points between, criminal career research is best carried out through longitudinal studies. Still, all criminal career research has not been carried out using longitudinal data. In this section, we discuss three different types of research designs that have been employed to study criminal activity, including longitudinal designs, accelerated longitudinal designs, and cross-sectional designs.

1. *Longitudinal Studies.* Longitudinal studies permit observations of criminal activity over an extended period. There are two principal types: cohort and panel studies. Cohort studies examine more specific samples (e.g., birth cohorts) as they change over time. Panel studies are similar except that the same set of people are interviewed at two or more time periods.

Longitudinal research can be carried out in several ways. One of the most obvious is to identify a cohort at birth and follow it prospectively for a long period. Two key problems are the costs associated with following people over long periods and the time required to study certain questions (e.g., desistance). Unfortunately, researchers age at the same rate as participants.

Another type of longitudinal design is retrospective. This approach avoids the long delay associated with the prospective design. In a retrospective design, the researcher defines a cohort, such as all persons born in 1970, and then retrospectively collects various pieces of information, such as offending histories. This approach, however, introduces potentially serious problems with recall errors.

Though useful for the study of within- and between-individual changes in criminal activity over time, prospective longitudinal designs suffer from limitations including costs; history, period, panel, and testing effects; and sample attrition. One problem is that age effects are confounded with historical effects. For example, significant social and historical events could influence the criminal activity of members of one cohort at a particular time as opposed to another cohort during another particular time (i.e., growing up during the depression, compared with during the Second World War or the Vietnam War). Sample attrition from a variety of causes including death, refusal to participate, and moving to unknown addresses, can seriously under- or overestimate criminal career dimensions. The extent to which sample attrition occurs nonrandomly is a concern. If high-rate offenders are more likely to drop out, then estimates concerning the relationship between age and crime in longitudinal designs may be biased (Brame and Piquero, forthcoming). Finally, on a practical level, human life expec-

tancies and stakes make multidecade, longitudinal projects difficult to sustain and complete.

2. *Accelerated Longitudinal Design.*   One way to overcome problems associated with typical longitudinal designs is by drawing multiple cohorts and obtaining longitudinal data on them. The researcher identifies a cross-sectional sample of the population (thus representing multiple cohorts) and then collects longitudinal data, either prospectively or retrospectively. In such a design, several cohorts born in different years could be selected and each followed for about six years. For example, four cohorts could be followed from birth to age six, six to twelve, twelve to eighteen, and eighteen to twenty-four (see Farrington, Ohlin, and Wilson 1986, p. 18). The emphasis is on linking results from different cohorts to build up a more complete picture of the development of criminal careers from birth to young adulthood. This approach shortens the time until research results are obtained and enables investigators to distinguish between the effects of aging and the effects of a historical period. In addition, accelerated longitudinal designs also present an unusual opportunity to examine period effects since successive cohorts will reach specific ages (e.g., age twelve) in different years and their life experiences can be compared. Still, accelerated longitudinal designs present some difficulties. For example, researchers may encounter difficulty in achieving sampling-criteria consistency across cohorts, and statistical problems may arise in amalgamating data from successive cohorts.

The PHDCN uses an accelerated longitudinal design. This study started with nine different age groups, from prenatal to age eighteen, and is following each group for several years. The age groups are separated by three-year intervals; three years after the data collection started, the overall age range would be continuous. Researchers hoped to examine several aspects of development, including criminal activity, from birth to age twenty-six. Approximately 6,500 individuals are being studied.

3. *Cross-Sectional Designs.*   Cross-sectional designs are based on observations at a single time and are best suited to examine between-individual differences. In the criminal career domain, cross-sectional studies are designed to provide a glimpse of the criminal activity of sample members at one time. Although the aim is to understand causal processes that occur over time, ability to do so is compromised because the observations are made at only one time. Thus, cross-sectional designs cannot study within-individual variation over time, but research-

ers can link cohorts by age, thereby constituting an extreme example of the accelerated longitudinal design.

## C. Analytic Techniques

The use of longitudinal data raises a number of analytical questions. Because data are collected on the same persons repeatedly, assessing stability and change in criminal activity becomes somewhat complicated. For example, what is the best way to study change over time? What is the best way to model the unobserved heterogeneity in the offending population? What is the best approach for handling multiple observations of the same person over time? In this section, we describe the three main techniques that have been applied to the within- and between-individual analysis of criminal activity over the life course.

1. *Random- and Fixed-Effects Models.*    One way to control for persistent unobserved individual differences is with random-effects models. These models decompose the error term into two components, a random error component and an individual-specific, time-constant component that reflects time-stable differences across individuals (i.e., unobserved persistent heterogeneity). This model recognizes that some unmeasured elements will not be truly random but will instead be fixed for a given individual over time. Thus, random-effects models take care of persistent individual differences by decomposing the error term; however, these models presume that this unobserved heterogeneity is normally distributed in the population.

Fixed-effects models model unobserved heterogeneity as a time-constant intercept term that captures all individual effects that are constant over time. Unlike the random-effects model, the fixed-effects model does not conceptualize unobserved heterogeneity as part of the error term. The fixed-effects model incorporates unobserved heterogeneity by using a constant term for each individual to absorb all individual-specific effects. Because the fixed-effects model "sweeps up" all potential sources of heterogeneity by introducing dummy variables to account for the effects of all omitted variables that are specific to each individual but are constant over time, omitted variable bias is not a problem (Hsiao 1986). In addition, because a separate intercept is estimated for each individual, unlike in the random-effects model, no assumption about the distributional form of individual heterogeneity is needed in the fixed-effects model. Still, the fixed-effects model is limited because the estimation of a separate intercept for each individual uses many degrees of freedom.

2. *Clusters of Individual Trajectories.*   In view of the distributional assumptions made by random-effects models, Nagin and Land (1993) developed an alternative modeling strategy, the semiparametric mixed Poisson model (SPM), which makes no parametric assumptions about the distribution of persistent unobserved heterogeneity (see also Land, McCall, and Nagin 1996; Land and Nagin 1996). Although the SPM is still a random-effects model, it no longer restricts the mixing distribution (i.e., the distribution of individual heterogeneity in the population) to be normal, as is the case with random-effects models. Instead, the SPM assumes that the distribution of unobserved persistent heterogeneity is discrete rather than continuous, and thus the mixing distribution is viewed as multinomial (i.e., a categorical variable). Each category within the multinomial mixture can be viewed as a point of support (i.e., grouping) for the distribution of individual heterogeneity. Essentially, the SPM estimates a separate intercept, or point of support, for as many distinct groups as can be identified in the data. Thus, each individual has some nonzero probability of being assigned to each discrete group and is assigned to the group to which he has the highest probability of belonging. This is an important feature of the SPM because the SPM helps isolate the sorts of offender typologies or groups that current developmental theories of crime argue exist in the offending population. This cannot be accomplished with modeling approaches that treat unobserved heterogeneity in a continuous fashion.

The SPM has two additional features that make it appealing. First, it takes into consideration periods of nonoffending, or intermittency. Researchers have made note of the importance of controlling for periods of nonoffending throughout the criminal career, and empirical research has shown that models that control for periods of intermittency tend to provide a better fit to the data than models that do not control for such periods. Second, the SPM makes use of several different types of estimators, including the Poisson, the zero-inflated Poisson, the Bernoulli, and the censored normal. The censored normal model is useful for psychometric scale data, the Poisson and the zero-inflated Poisson model for count data, and the Bernoulli model for dichotomous data. By allowing for the use of different types of estimators, the outcome data under investigation can be more appropriately modeled.

Still, the SPM has some weaknesses. For example, since the SPM assumes that unobserved individual heterogeneity (i.e., the mixing distribution) is drawn from a discrete (multinomial) probability distribu-

tion, there will likely be model misspecification bias if unobserved individual differences are actually drawn from a continuous distribution. Latent curve modeling recently adopted the conventional assumption of a continuous distribution of growth curves to accommodate the group-based approach (Muthen and Muthen 2000). Second, the identification of parameter estimates under the SPM is difficult with small periods of observations and where the prevalence of observations is small. Third, classification of individuals to distinct trajectories will never be perfect (see Roeder, Lynch, and Nagin 1999).

3. *Hierarchical Linear Models.* Hierarchical linear models (HLM) are a generalization of multiple regression models for nested or repeated-measures data and in many ways allow for more complex random effects such as growth curve approaches, which provide for individual differences in levels of propensity to offend and in trajectories of change over time (Osgood and Rowe 1994, p. 541). Hierarchical linear models separate between-person and within-person models, and the latter are determined first. In HLM, the individual-level parameters from the within-person model serve as dependent variables for the between-person model, leading to a separate equation for each parameter (Horney, Osgood, and Marshall 1995, p. 661). Estimates of within-person change are derived by transforming key independent variables to deviations from each individual's mean calculated across the entire period of observations. Then, by including the individual means for the key independent variables as explanatory variables in the equation for overall individual differences, HLM models reflect the effects of between-person differences in average independent variables as well as providing estimates that reflect the effects of within-person change. As can be seen, HLM models differ from SPM models in that they apply continuous distributions to unobserved individual heterogeneity and therefore neither assume nor estimate discrete groups of offenders. To the extent that individual heterogeneity is continuous, HLM models will likely not suffer from model misspecification bias; however, if individual heterogeneity is discrete, then HLM models will suffer this sort of bias. In addition, current HLM models assume that errors for particular observations are normally distributed, which may or may not be true.

There are thus several different analytic techniques that researchers can employ when studying the longitudinal sequence of criminal activity. For example, growth curve modeling, whether hierarchical or latent variable, is designed to identify average developmental tendencies,

to calibrate variability about the average, and to explain that variability in terms of the covariates of interest. The SPM is designed to identify distinctive developmental trajectories within the population, to calibrate the probability of population members following each trajectory, and to relate those probabilities to covariates of interest (Nagin 1999, p. 153). The former set of approaches implies that people come in all shades of criminality while the latter implies qualitative differences between offenders and nonoffenders (Osgood and Rowe 1994, p. 531). Raudenbush (2001) suggests that the type of question being studied should guide the type of model used. For example, if the question is centered on what is the typical pattern of growth within the population and how this growth varies across members, then hierarchical and latent curve modeling may be more useful. However, if the concern is with phenomena that do not generally grow or change monotonically over time and do not vary regularly over the population, then techniques such as the SPM are likely to be more useful because they are designed to identify clusters of trajectories and to calibrate how individual characteristics affect cluster membership. Other techniques for the identification of trajectories such as ad hoc classifications, cluster analysis, growth curves, and so forth, have recently been reviewed elsewhere (Le Blanc, forthcoming).

## D. Analytic Issues

The study of criminal careers has also led to the recognition of difficult questions that have been the source of operationalization, measurement, and empirical application concerns: first, sorting out the state dependence/persistent heterogeneity effect and, second, defining, operationalizing, and measuring desistance.

1. *Sorting Out the State-Dependence/Persistent-Heterogeneity Effect.* The positive correlation between past and future criminal activity is a key finding. Although all researchers recognize the importance of this relationship, determining the process responsible for it, some combination of state dependence and persistent heterogeneity, has been difficult. Evidence for persistent heterogeneity would consist of an observed relationship between a time-stable individual characteristic measured early in life and subsequent criminal activity, while evidence for state dependence would consist of a relationship between a time-varying individual characteristic and criminal activity net of time-stable differences in criminal propensity (Nagin and Paternoster 2000, p. 129). Because of data and measurement limitations, the disentan-

gling of persistent heterogeneity and state dependence requires that researchers control for unmeasured persistent heterogeneity (Bushway, Brame, and Paternoster 1999).

One problem with isolating a persistent-heterogeneity effect is that researchers are unlikely to agree on its distribution. Even after controlling for many different indicators of observed persistent heterogeneity, there is likely to be a sizeable amount of unmeasured, unobserved persistent heterogeneity that needs to be taken into consideration. To accomplish this, researchers have employed statistical techniques that incorporate unobserved sources of persistent heterogeneity. It is important to control for such unobserved sources since omitting them is likely to lead to biased estimates of observed time-varying factors. The effect of not controlling is an overinflated effect of time-varying variables that may overstate the state-dependence effect.

Although analytic techniques exist for estimating unobserved persistent heterogeneity, researchers have not come to agreement as to which best performs this task. Bushway, Brame, and Paternoster (1999) assessed issues related to stability (persistent individual heterogeneity) and change (state dependence) by applying three different analytic techniques (random-effects probit model, the SPM, and the fixed-effects logit model) to criminal history data from the 1958 Philadelphia birth cohort. Four key findings emerged. First, all three methods converged on the finding that there was a strong positive relationship between prior and future criminal activity even after stable unobserved individual differences were controlled. Second, the state-dependence effect, though still important, was lessened with controls for persistent unobserved heterogeneity. Third, controlling for time trends was found to be important. In particular, analysis with the random-effects model showed that time trend controls allowed for the identification of greater levels of heterogeneity in crime proneness and yielded attenuated estimates of the effect of prior criminal activity on future criminal activity. Fourth, increasing levels of positive skew (i.e., nonnormality) in the distribution of crime proneness was associated with an overestimation of the effect of prior criminal activity on future criminal activity (Bushway, Brame, and Paternoster 1999, p. 53).

2. *Defining, Operationalizing, and Measuring Desistance.*    Desistance is the least studied criminal career dimension (Loeber and Le Blanc 1990, p. 407). Laub and Sampson (2001) noted three particular reasons: conceptual, definitional, and measurement. Regarding conceptualization, Laub and Sampson (2001, p. 5) argue that there is little theo-

retical conceptualization about crime cessation, the various reasons for desistance, and the mechanisms underlying the desistance process. They note that the underlying conceptual difficulty stems from the issue of stability and change over the life course. There is no agreed on definition of desistance (Bushway et al. 2001), and this leads Laub and Sampson to raise their second concern, that desistance definitions are vague. For example, Warr (1998) employed a one-year crime-free period as desistance, while Farrington and Hawkins (1991) defined desistance as having no convictions between ages twenty-one and thirty-two following a conviction before age twenty-one. Loeber and his colleagues (1991) defined desistance as refraining from offending for a period of less than a year. Laub and Sampson point out, however, that simply because an offender desists from criminal activity, it does not necessarily follow that he has stopped engaging in other sorts of deviant acts. For example, Nagin, Farrington, and Moffitt (1995) found that although some offenders desisted from crime according to official conviction records, self-reported data indicated continued deviance and involvement in drugs and alcohol. Similar discrepant effects were reported by Le Blanc and Fréchette (1989) in their Canadian study comparing official and self-report records.

The larger measurement issue deals with the length of follow-up and censoring. For example, findings regarding desistance may reflect the cutoff of observations at a specific age (Laub and Sampson 2001, p. 9), and some researchers have even suggested that desistance is only definite when study subjects have died (Blumstein, Cohen, and Hsieh 1982; Farrington 1994). Thus, if researchers studying desistence ceased observation of study subjects at age thirty, there is no guarantee that the subjects have truly desisted; there may even be a temporary lull followed by continued criminal activity in later years, that is, intermittency (see Frazier 1976; Barnett, Blumstein, and Farrington 1989; Nagin and Land 1993; Piquero, forthcoming). Laub and Sampson (2001, p. 11) suggest that researchers distinguish termination of offending (the time at which criminal activity stops) from desistance (the causal process that supports the termination of offending and maintains the continued state of nonoffending). The former is the outcome to be explained by the latter processual cause. This is consistent with the view that desistance is both an event and a process (see Fagan 1989; Maruna 2001). In sum, it is an important process that needs to be measured and understood.

Bushway and his colleagues (2001) proposed an empirical framework

for studying desistance as a developmental process. Instead of focusing on offending itself, these authors focus on changes in the offending rate. In particular, the Bushway et al. approach, which makes use of Nagin and Land's (1993) SPM, models the process by which criminality, defined as the propensity to offend, changes with age. Their approach allows researchers to trace patterns of individual offending behavior across age and to explore the developmental dynamics that generate stability or change. Thus, since age is incorporated into the dependent variable (i.e., measured as changes in offending behavior over time/age), any causal factor by definition is studied in the context of age.

### V. Empirical Findings of Criminal Career Dimensions

Several new research efforts, longitudinal studies, and explanatory paradigms have been initiated since the mid-1980s to focus on the key dimensions of criminal careers. In this section, we survey findings from empirical research on the key dimensions of criminal careers, the latest round of longitudinal studies that were initiated after publication of the criminal careers report, and new questions and criminal career issues raised by the risk/protective factor paradigm.

### A. Overview of Findings

We concentrate on five key subjects: participation in criminal careers; the dimensions of criminal careers and their covariates, including frequency, duration, and termination, crime-type mix and seriousness, co-offending, and specialization/crime-type switching; the extent to which the causes of one dimension are similar to—or different from— the causes of another dimension; chronic offenders; and the relevance of criminal career research to understanding incapacitation.

1. *Participation in Criminal Careers: Ever-Prevalence Estimates.* Estimates of ever-participation in criminal activity vary across reporting method (they tend to be much higher with self-report than with official records that are a filtered subset of self-reports), the crimes in which participation is being measured (there is more participation in less serious criminal activity), the level of threshold of involvement (police contact, arrest, conviction), and the characteristics and representativeness of the sample (high school students, college students, general population, offender-based, etc.). In general, ever-participation estimates are fairly common across data sets and consistent with most criminological findings.

There is a relatively high rate of participation among males in criminal activity (Elliott, Huizinga, and Morse 1987, p. 502). Blumstein et al. (1986) reported that about 15 percent of urban males are arrested for an Index offense by age eighteen, and 25–45 percent of urban males are arrested for a nontraffic offense by age eighteen. Visher and Roth's (1986) overview of several longitudinal studies employing police and court records indicates a lifetime prevalence estimate of 40–50 percent, with slightly higher rates for blacks and much lower rates among females (see, e.g., Robins 1966; Christensen 1967; Blumstein and Graddy 1982; Shannon 1982). Visher and Roth's (1986) overview of cumulative criminal participation rates in cross-sectional samples of high-school-age youths indicates differences in participation across crime types. For example, although many studies report consistent estimates of burglary participation of between 15 and 20 percent for males, and much lower estimates for females (around 3–4 percent), estimates for theft vary much more widely.

Several studies provide in-depth information on participation based on official record-based police contact/arrest data. Using the 1945 Philadelphia birth cohort, Wolfgang, Figlio, and Sellin (1972) observed a "by-age-eighteen-prevalence" of police contacts of 34.9 percent for the entire sample, with rates of 28.6 percent for whites and 50.2 percent for blacks. Using police contact data for the 1958 Philadelphia birth cohort, Tracy, Wolfgang, and Figlio (1990) reported a "by-age-eighteen-prevalence" of 32.8 percent for the entire sample, with rates of 22.7 percent for whites and 41.8 percent for blacks. In a 1970 Puerto Rico birth cohort study, Nevares, Wolfgang, and Tracy (1990) found that the arrest prevalence of delinquency by age seventeen was 6.8 percent for the full sample, with rates of 11.3 percent for males and 2.3 percent for females. Wikström (1990) reports that nearly one-fifth (19 percent) of subjects in Project Metropolitan in Sweden had a police record for a crime by age twenty-five. Polk et al. (1981) used data from police and juvenile court records for over 1,000 Oregon male high school sophomores in 1964 and observed a prevalence estimate of 25 percent, with comparable estimates reported among other high-school-aged youths (see Hirschi 1969; Hindelang, Hirschi, and Weis 1981; Elliott and Huizinga 1984). Some Scandinavian studies, however, report smaller prevalence estimates (see Guttridge et al. 1983; Mednick, Gabrielli, and Hutchings 1984).

Studies based on conviction records provide similar estimates. For example, McCord (1978) obtained a conviction prevalence estimate of

27.5 percent for over 500 males born in 1925–34 in Massachusetts and followed until 1978. Results from the Cambridge study indicated that by age forty, 40 percent of the London males were convicted of a criminal offense (Farrington 2002).

Several studies have used self-report data to obtain prevalence estimates. For example, using self-report data from the NYS, Elliott (1994) reported that the ever-prevalence (to age twenty-seven) of serious, violent offending was 30 percent. Self-report data from the three causes and correlates studies indicate that, by age sixteen at all three sites, approximately 40 percent of males reported committing one or more serious violent acts, while for females, the corresponding rates were 32 and 16 percent, respectively, in Rochester and Denver (Kelley et al. 1997). Using self-report data from the Cambridge study, Farrington (2002) found that up to age thirty-two, 96 percent of males admitted committing at least one crime that could have led to a conviction. For Canadian males, Le Blanc and Fréchette (1989, p. 60) found that 97 percent of adolescents self-reported at least one criminal infraction during their adolescence.

2. *Gender and Participation.*   Regardless of the source of data, crime type, level of involvement, or measure of participation, male criminal participation in serious crime at any age is always greater than female participation (Blumstein et al. 1986, p. 40; see also Lanctôt and Le Blanc [2002] for a detailed review of gender differences), and this is especially so for serious violence (Weiner 1989, p. 67). In both the 1958 Philadelphia birth cohort and the three Racine, Wisconsin, cohorts, ratios of male to female participation were small for broad (and less serious) categories but larger for Index offenses and specific crime types. Although males in the 1958 Philadelphia birth cohort had a 32.8 percent prevalence estimate, the comparable estimate among females was 14.1 percent, and it was twice as high among black (18.5 percent) as among white (9.2 percent) females. In the three Racine cohorts, Shannon (1982) reported prevalence estimates, derived from police contacts for nontraffic and status offenses, of 41 percent, 47.3 percent, and 44.1 percent among males in the 1942, 1949, and 1955 cohorts. Female prevalence estimates were 8.7 percent, 15.1 percent, and 22.2 percent, respectively. Hamparian et al. (1978) found gender ratios in arrest prevalence as high as 6:1. Male prevalence estimates of 29 percent and 28 percent were obtained by Ouston (1984) and Miller et al. (1974) in two separate British birth cohort studies using police and juvenile court records, respectively, with female prevalence estimates of

6 percent and 5.6 percent, respectively. Also using police records, Wik-ström (1990) reported ever-prevalence rates in Project Metropolitan of 31 percent for males and 6 percent for females by age twenty-five. Using official record data for the Dunedin cohort through age twenty-one, Moffitt et al. (2001) found that males (20 percent) were twice as likely as females (10 percent) to have had a contact with police as juveniles, and males were significantly more likely than females to have been convicted of a crime (20 percent to 8 percent). Further, 8 percent of males were convicted for a violent offense whereas only 2 percent of females were. The sexes were more similar—yet still significantly different—to one another on convictions for drug/alcohol offenses with 5 percent of males and 2 percent of females being convicted for such an offense. Piquero's (2000) analysis of the Philadelphia National Collaborative Perinatal Project data indicated that 31 percent of males incurred a police contact by age eighteen while the comparable figure for females was 14 percent. Piquero and Buka (2002), using the Providence National Collaborative Perinatal Project data, found that 19 percent of males had a court contact by age eighteen while the comparable estimate among females was 5 percent.

The relationship between gender and participation has also been assessed via self-report records. For example, Elliott (1994) examined self-reported participation estimates for serious, violent offending using the first eight waves of the NYS. Focusing on gender differences, Elliott reported that the peak age in prevalence for serious, violent offending was earlier for females, the decline was steeper among females, and the gender differential became greater at older ages. At age twelve, the male to female differential was 2:1; by age eighteen it had increased to 3:1; and by age twenty-one it had increased to 4:1. Thus, at each age, males were more likely than females to be involved in serious, violent offending. The ever-prevalence (to age twenty-seven) of serious, violent offending was 42 percent for males and 16 percent for females.

Puzzanchera (2000) analyzed self-reported delinquency data from several thousand twelve-year-old youths participating in the National Longitudinal Survey of Youth (NLSY) 1997 and found that only 2 percent had ever been arrested; however, 22 percent of the sample reported smoking cigarettes, 21 percent reported drinking alcohol, 24 percent reported destroying property, and 14 percent reported engaging in assaultive behaviors. Males (24 percent) were somewhat more likely to drink alcohol than females (19 percent), and much more likely

to carry a handgun (13 percent compared to 2 percent) and destroy property (31 percent compared to 16 percent).

Kelley et al. (1997) used self-reported data on serious violence from the causes and correlates studies to examine gender differences in cumulative prevalence. They found that 39 percent of Denver males, 41 percent of Pittsburgh males, 40 percent of Rochester males, 16 percent of Denver females, and 32 percent of Rochester females reported committing at least one serious violent act by age sixteen.

This pattern of findings regarding gender differences in participation is not observed when examining a selected population of female prisoners. In a study of self-reported crime rates of prisoners in Colorado, English (1993) found that women and men had similar participation rates in the crimes of drug dealing, assault, robbery, motor vehicle theft, and fraud, though they differed in participation in forgery, theft, and burglary. Women were significantly more likely than men to report involvement in forgery and theft.

3. *Race and Participation.*   Researchers have tended to rely on official-record estimates, and most of the studies report relatively large black/white ratios and strong associations between race and participation, particularly as the seriousness of criminal activity increases. In their synthesis of the literature using official records, Visher and Roth (1986) reported that the average black/white participation ratio was 1.8:1 for all nontraffic offenses, but 3.2:1 for Index offenses. These estimates were similar whether using a "by-age-eighteen" or "lifetime" measure. In the Philadelphia birth cohort studies, the prevalence of delinquency was 50.2 percent for nonwhites and 28.6 percent for whites in the 1945 cohort, and 41.8 percent for nonwhites and 22.7 percent for whites in the 1958 cohort (Tracy, Wolfgang, and Figlio 1990, p. 39). Moreover, black/white ratios tended to increase as the level of seriousness increased: in the 1958 cohort, the black/white ratio was 3.2:1 for offenses with injury, but only 1.8:1 for nontraffic offenses. When the 1958 Philadelphia birth cohort was followed up to age twenty-six, Kempf-Leonard, Tracy, and Howell (2001) found that more black (17.4 percent) than white (9.1 percent) subjects participated in crime as adults, as measured by municipal court data, and this was the case for subjects who were delinquent prior to age eighteen as well as for those without a juvenile record. In sum, official record studies report male race differentials (nonwhite:white) of 4:1 during the adolescent years (Wolfgang, Figlio, and Sellin 1972; Hamparian et al. 1978), and those differentials tend to continue into the adult years (Kempf-Leonard, Tracy, and Howell 2001).

Although self-report comparisons of race prevalence tended to in-
dicate that the estimated ratio of black/white participation is only
slightly above 1:1 for minor delinquent acts and self-reported serious
property offenses, analysis confined to more serious offenses suggests
that the black/white ratio is larger, especially at younger ages (Blum-
stein et al. 1986, p. 41). Elliott (1994) recently performed the most
systematic race comparison of self-report prevalence in the NYS and
uncovered a number of important race findings. First, by age eighteen,
nearly 40 percent of black males compared to 30 percent of white
males became involved in serious violence. By age twenty-seven, the
ratio is quite similar—48 percent for black males and 38 percent for
white males. Second, the male black-to-white ratio in ever-prevalence
was about 5:4, a small but statistically significant difference. Third,
blacks (male and female) exhibited a higher prevalence of serious vio-
lent offending than whites throughout adolescence and early adult-
hood, and the discrepancy was most pronounced in the late teenage
years. The maximum black-to-white differential was 3:2 for males, and
2:1 for females. During the early to mid-twenties, the prevalence of
serious violence among white and black males in the NYS was similar;
however, by age twenty-seven, the male black-to-white differential was
3:2. Among black females, however, their age-specific prevalence in
serious violence was higher at every age from thirteen to twenty-seven
compared to white females. Moreover, between ages twenty-four and
twenty-seven, the annual prevalence of serious violence among white
males declined, while it increased for black males from ages twenty-
five to twenty-seven by nearly 50 percent (Elliott 1994, p. 7).

Kelley et al. (1997) also presented self-reported prevalence data by
race/ethnicity across the three causes and correlates study sites. They
found differences in serious violence prevalence rates across ethnic
groups. In particular, a greater proportion of minority groups were in-
volved in serious violence. With the exception of eighteen-year-olds in
Rochester, prevalence rates were higher among minority groups than
among whites at each age and site, and this difference was substantial
during adolescence.

4. *Age and Participation.*    The relationship between age and partici-
pation covers two issues. The first concerns the probability of commit-
ting an offense at a given age, while the second concerns the probabil-
ity of initiating a criminal career at a given age. In general, both
self-report and official records indicate that, although a small fraction
of youth begins criminal careers at any given age, a concentration of

initiations among youth under age eighteen is evident. In their synthesis of the literature, Blumstein et al. (1986, p. 42) report that, for both blacks and whites, about half of those ever arrested during their lifetimes were first arrested before age eighteen. According to self-report records, few males commit their first criminal offense after age seventeen (Elliott, Huizinga, and Menard 1989). With official records, initiation rates tend to increase around the beginning of adolescence and peak around ages fourteen to eighteen and fall thereafter; however, self-reported participation rates peak somewhat earlier, around ages thirteen to sixteen (see Elliott et al. 1983). The age differences occur because teenagers are active in crime for some time before they experience their first police contact, arrest, or conviction. With self-report data, age-specific participation in "serious violence" (measured as involvement in three or more aggravated assaults, sexual assaults, gang fights, and strong-arm robberies of students or others) ranged between 7 percent and 8 percent from ages twelve to seventeen, with male rates higher by a factor of about two. Further, data from seven different longitudinal studies show that nearly one-fifth of children aged seven to twelve reported that they had committed at least one or more "street offenses" (i.e., bicycle theft, purse-snatching, physical fights, etc.) (Espiritu et al. 2001). Data from the three causes and correlates studies indicate that the self-reported prevalence of serious violence peaks in the mid to late teens for males, but somewhat earlier for females, with initiation in serious violence occurring relatively early (around age thirteen) (Kelley et al. 1997). In the 1970 Puerto Rico birth cohort study, age at onset measured from arrest records was observed to be highest at age sixteen for both males and females (Nevares, Wolfgang, and Tracy 1990). In the 1945 and 1958 Philadelphia cohort studies, age of onset peaked at sixteen and fifteen, respectively. Weiner (1989) concluded that most initiation of serious violence in official records occurred between ages eighteen and twenty-four but that participation in violence declines in early adulthood after reaching its peak in the late teens or early twenties.

In one of the most comprehensive analyses of the prevalence of criminal activity at different ages, Stattin, Magnusson, and Reichel (1989) followed a representative sample of Swedish males and females from ages ten to thirty and uncovered several key findings. First, the peak age at first conviction among males was age sixteen to seventeen (31.1 percent of registered males were convicted at this age), with age of first conviction peaking at age fifteen. Very few males were con-

victed for their first offense after age twenty-six. Moreover, the peak participation ages for the Swedish males were fifteen to seventeen. Second, the peak age at first conviction among females was twenty-one to twenty-three (32.8 percent of registered females were convicted at this age). Unlike their male counterparts, the Swedish females were more likely to accumulate convictions in early adulthood. By age thirty, 37.7 percent of the Swedish males and 9 percent of the Swedish females were registered for a criminal offense, and these estimates would be higher if common drunkenness and disorderly conduct were included. Using data from Project Metropolitan through age twenty-five, Wikström (1985) found that peak violence initiation ages, measured in police records, occurred during late adolescence and young adulthood (ages sixteen to twenty), with the two highest initiation ages of seventeen and nineteen. In particular, the peak age for both crimes and offenders was seventeen and nineteen, respectively, with slightly different peaks across offense types.

Farrington's (2002) analysis of the criminal histories of the Cambridge study males through age forty revealed three key findings regarding age and participation. First, up to age forty, 40 percent of the study males were convicted of a criminal offense. Second, up to age forty, the mean age of onset (first conviction) was 18.6. Third, with self-report records, the cumulative prevalence of offending up to age thirty-two was 96 percent. In an interesting comparison of the Cambridge study boys with 310 boys born seven years later and living in the same small area of South London at age fourteen, Farrington and Maughan (1999) found that the average age of onset and the cumulative prevalence of convictions were almost identical in the two samples up to age thirty-three. Finally, in a comparison of the Cambridge study males to lower class males in Project Metropolitan in Sweden, Farrington and Wikström (1994) found that the cumulative prevalence curves were remarkably similar, as were the age of onset curves.

Until recently, very few researchers have presented general hazard rates for age of initiation (Elliott, Huizinga, and Morse 1987; Weiner 1989; Farrington et al. 1990). Using the first eight waves of the NYS, Elliott (1994) examined age of onset by calculating the hazard rate for self-reported serious violence through age twenty-seven. Elliott found that although the hazard rate was very low through age eleven (<0.5 percent), it increased sharply to 5.1 percent at age sixteen and then declined sharply to 1.0 percent or less for ages twenty-one to twenty-seven. Over half of all violent offenders in the NYS initiated their vio-

lence between ages fourteen and seventeen, with the risk of initiation being close to zero after age twenty. Compared to white males, black males in the NYS had a substantially higher hazard rate for serious violence between ages thirteen and sixteen, and had an earlier age of onset (age fifteen compared to age sixteen for whites). In addition, the age-specific cumulative prevalence for black males was higher than for white males at every age from twelve to twenty-seven; by age twenty-seven, the cumulative prevalence of serious violence for black males in the NYS was almost 50 percent. Finally, male hazard rates tracked the hazard rates for the full sample indicating that the male rates were driving much of the sample's overall rates (Elliott, Huizinga, and Morse 1987).

Farrington et al. (1990) calculated hazard rates for the onset of criminal conviction in the Cambridge study through age thirty-two and found age fourteen to be the peak age of conviction onset, whereas data from the Philadelphia birth cohort study indicate that arrest onset peaked at age sixteen and was earlier for nonwhites compared to whites. Other researchers using police records have found age fourteen to be the peak for onset of criminal activity (see Patterson, Crosby, and Vuchinich 1992; Tibbetts and Piquero 1999). Onset rates may also vary by crime type. For example, in the Cambridge study, the onset rate for shoplifting peaked at ages thirteen to fourteen while the onset rate for assault peaked at ages seventeen to nineteen. Le Blanc and Fréchette (1989) also found that onset rates varied by crime type, with less serious offenses having an earlier peak compared to more serious offenses.

5. *Gender and Age Participation.* Few studies have provided data on gender comparisons regarding age and crime generally and age of onset in particular. Piper (1983) found that males and females in the 1958 Philadelphia birth cohort initiated their overall delinquent careers at approximately the same ages (seven in ten of those who initiated careers in each gender group initiated before age fifteen). Elliott, Huizinga, and Morse (1987) found that male hazard rates peaked at ages sixteen through eighteen and then declined, while female hazard rates peaked earlier (thirteen to fifteen) and decreased considerably from ages sixteen to twenty-one. Moreover, the ratio of the male-to-female peak hazard rates was 4.5:1 (for males, 6.8 percent at age seventeen, and for females, 1.5 percent at age fourteen). Piquero and Chung (2001) found no gender differences in onset age with police contact data through age seventeen from the Philadelphia Perinatal Project.

Police arrest data from Project Metropolitan have also been used to study the relationship between gender and age participation in criminal activity. Wikström (1990) found that the participation rate for males (31 percent) was higher than for females (6 percent) by age twenty-five. Interestingly, while the male crime rate was highest at ages fifteen to seventeen years, the female crime rate was highest at ages twenty-two to twenty-four. The main difference in the patterning of male and female offending rates seemed to be that there was no difference in the offending rate at the oldest ages for females as there was for males (Wikström 1990, p. 72). The increase in recidivist offenders was faster for females than males. There were five times more female recidivist offenders at age twenty-five compared to age fourteen. The corresponding male figure was only 2.5 times more (Wikström 1990, p. 74). Andersson (1990) also used these data to study continuity in criminal activity from age fifteen to thirty and reported that the age-based transition probabilities for females conformed to a first-order Markov chain (i.e., the original matrices could be viewed as estimates from a single "parent" matrix); however, this was not the case for males.

Moffitt et al. (2001) examined Dunedin males' and females' age at first arrest, first conviction, first DSM-IV conduct disorder diagnosis, and first self-reported delinquency. Across all four measures, these authors found that at every age, more males than females had begun antisocial behavior; however, estimates of the age at which antisocial behavior began was dependent on the source of the data. For example, by age fifteen, only 1 percent of girls had an onset as measured by conviction, but 8 percent had an onset as measured by arrest, 12 percent had an onset as measured by diagnosis, and 72 percent had an onset as measured by self-reports; among males, the comparable estimates were 4, 15, 23, and 80 percent (Moffitt et al. 2001, p. 82). These results corroborate earlier suggestions that official data records an "onset" at a later period than other measures, primarily self-reports (see Loeber and Le Blanc 1990; OJJDP 1998). By age eighteen, almost all of the Dunedin subjects had engaged in some form of illegal behavior. In fact, only 9 percent of males and 14 percent of females remained abstinent by age eighteen, with very few new "onset" cases between ages eighteen and twenty-one (Moffitt et al. 2001, p. 85).

The Dunedin data also provide some information on age of onset across gender. For example, among those convicted by age twenty-one, the 103 boys were first convicted at a mean age of 17.7 years, and the

thirty-eight girls were first convicted at a mean age of 17.9 years. And among the 101 boys who were first arrested prior to age seventeen, they were arrested at a mean of 13.5 years while the forty-nine girls who were first arrested prior to age seventeen were arrested at a mean of 13.7 years. Comparable age similarities were observed for conduct disorder and self-reported delinquency.

Espiritu et al. (2001) provided estimates on the epidemiology of self-reported delinquency for male and female child delinquents (under age twelve) in the Pittsburgh and Denver sites of the causes and correlates studies. A number of important findings emerged. First, ever-prevalence estimates for "any aggression/minor violence" were upward of 75 percent by age twelve for males and females in both studies, and many of these children reported an "onset" of such behavior prior to age nine. Second, although a higher percentage of Denver males (32 percent) relative to Denver females (23 percent) reported initiating "any aggression/minor violence" prior to age seven, the percentage initiating in several types of delinquency including "any aggression/minor violence" at ages seven to eight, nine to ten, and eleven to twelve was virtually identical across gender; however, at ages eleven to twelve, 7 percent of Denver males compared to 1 percent of Denver females reported "serious violence" initiation. Third, when examining the prevalence of combinations of delinquency and drug use at ages seven to twelve years, they found that although one-third of both the Denver and Pittsburgh children reported no involvement in minor violence, property offenses, or drug use, 13 percent in Denver and 6 percent in Pittsburgh reported involvement in all three delinquency combinations. Fourth, estimates from the Denver study indicated that males reported a higher ever-prevalence for injury-related violence, but females reported a higher ever-prevalence for "aggression/without hurt." Fifth, although males tended to report a higher ever-prevalence associated with most property-oriented offenses, males and females in the Denver study tended to report very similar ever-prevalence estimates for status/drug use offenses. Finally, the prevalence of police contacts for delinquent behaviors increased between ages seven to twelve years, regardless of the type of delinquency, in a similar fashion for males and females. For example, at ages eleven and twelve, the prevalence of a police contact for any delinquency was 10.9 percent for Denver males, 8.5 percent for Denver females, and 6.9 percent for Pittsburgh males.

When ever-participation is measured without regard for offense se-

riousness, participation estimates across demographic subgroups are similar; however, as more serious offenses are considered, the demographic differences get considerably larger and are likely influenced by the low base rate of participation in serious offenses. This is especially the case when comparisons are made between official and self-report records. For the most part, gender and race differentials (higher for males and nonwhites) are substantially higher in official record studies (Elliott 1994, p. 7). With official records, it seems reasonable to conclude that "by-age-eighteen-prevalence" for nontraffic offenses approaches 33 percent, while for Index offenses the comparable estimate is about 20 percent. When studying lifetime prevalence, the comparable estimates approach 60 percent and 25 percent, respectively (Visher and Roth 1986, p. 248). With self-report records, participation rates vary by crime type but across all domains tend to favor more male than female participation.

Regardless of whether official or self-report records are used to study prevalence, three main conclusions emerge. First, male participation rates are typically higher than those for females, and especially so for the more serious offenses. Second, black participation rates are typically higher than those for whites, especially when participation is examined via official records as opposed to self-reports (Hindelang, Hirschi, and Weis 1981). In self-reports, blacks have also been found to report continuing their violent offending at higher rates than whites (Elliott 1994). Third, there is a strong relationship between age and participation. In particular, the probability of initiating a criminal career at a given age is highest in the range thirteen to eighteen, on the lower end for self-report estimates and on the higher end for arrest and conviction records. Also, evidence on the probability of committing an offense at a given age is mixed, with some research indicating a consistent increase through the mid-teens to a peak at age nineteen and then subsequent decline (see Bachman, O'Malley, and Johnston 1978), while other research indicates a decline in self-reported participation through the teens (Elliott et al. 1983; Thornberry 1989; Lauritsen 1998). Studying demographic differences in prevalence remains controversial. For example, Hindelang, Hirschi, and Weis (1981) argued that there is a race difference in the validity of self-reported delinquency measures, which leads to a serious underestimation of black males' prevalence and frequency rates (but see Huizinga and Elliott 1986). A detailed summary of the ever-prevalence results may be found in table 3.

## TABLE 3
### Estimates of "Ever" Prevalence

| Study | Overall Prevalence (percent) | Sex (percent) | | Race (percent) | | Measure of Crime |
|---|---|---|---|---|---|---|
| | | Male | Female | White | African-American | |
| Wolfgang et al. (1972) | 34.9 | | | 28.7 | 50.2 | Recorded police contacts |
| Miller et al. (1974) | | 28 | 5.6 | | | Juvenile court records |
| McCord (1978) | 27.5 | | | | | Convictions |
| Polk et al. (1981) | 25 | | | | | Police and juvenile court records |
| Shannon (1982): | | | | | | Police records |
| 1942 cohort | | 41 | 8.7 | | | |
| 1949 cohort | | 47.3 | 15.1 | | | |
| 1955 cohort | | 44 | 22.2 | | | |
| Ouston (1984) | | 29 | 6 | | | Police and juvenile court records |
| Stattin et al. (1989) | | 37.7 | 9 | | | Convictions |
| Tracy et al. (1990) | 32.8 | 32.8 | 14.1 | 22.7 | 41.8 | Recorded police contacts |
| Nevares et al. (1990) | 6.8 | 11.3 | 2.3 | | | Arrests |
| Wikström (1990) | 19 | | | | | Recorded police records |
| Elliott (1994) | 30 | 42 | 16 | | | Self-reports |
| Kelley et al. (1997): | 40 | | | | | Self-reports |
| Denver | | 39 | 16 | | | |
| Pittsburgh | | 41 | | | | |
| Rochester | | 40 | 32 | | | |
| Piquero (2000) | 22.29 | 31 | 14 | | | Recorded police contacts |
| Puzzanchera (2000) | 21 | | | | | Self-reports |
| Moffitt et al. (2001) | | 20 | 10 | | | Recorded police contacts |
| Moffitt et al. (2001) | | 20 | 8 | | | Convictions |
| Farrington (2002) | 40 | | | | | Convictions |
| Farrington (2002) | 96 | | | | | Self-reports |
| Piquero and Buka (2002) | 11.99 | 19.2 | 4.8 | 10.8 | 15.7 | Juvenile court referrals and police records |

6. *"Current" Annual Prevalence.* Estimates of "current" annual prevalence rates are usually based on self-reports of criminal activity within the past year. For example, in the NYS, Elliott et al. (1983) report current theft participation rates of 2.2 percent for eleven- to seventeen-year-olds, and 3.1 percent for fifteen- to twenty-one-year-olds, with slightly higher estimates among blacks than whites, and much higher for males compared to females. For breaking and entering, participation rates were 4.1 percent for the eleven to seventeen age group, and 2.4 percent for the fifteen to twenty-one age group. Finally, for assault, participation rates were 6.1 percent for the eleven to seventeen age group, and 4.6 percent for the fifteen to twenty-one age group. Once again, male rates exceed those of females, and for the most part, black rates are higher than white rates. Using self-reported data from the first five waves of the NYS, Elliott, Huizinga, and Morse (1987, p. 484) found that the annual prevalence of serious violent offending increased from age twelve to a peak at age sixteen and then declined through age twenty-one; the hazard, however, peaked at age seventeen, and by age twenty-one, the risk of onset was very low (0.4 percent). Across gender, the annual male prevalence increased to a peak of 7.8 percent at age sixteen and then began a slow decline to 3.1 percent at age twenty-one while the annual female prevalence increased to a peak of 2.8 percent at age fourteen and then began a sharp decline to 0.3 percent at age twenty-one.

The Monitoring the Future Study (MTF) (Johnston, Bachman, and O'Malley 1994) database is valuable for tracking current participation rates, especially for drug use. The MTF is a self-reported, cross-sectional survey of over 2,000 United States high school seniors performed each year. Osgood and his colleagues (1989) analyzed time trends covering the period 1975–85 with a sample of over 3,000 high school seniors and age trends covering ages seventeen to twenty-three for samples of 300–1,200 per year. These authors found that self-report (and comparison arrest) measures revealed substantial declines in illegal behavior throughout the age period covered. With the exception of arrest indices of assault, both methods showed declines from ages seventeen through twenty-three for almost all offenses examined (Osgood et al. 1989, p. 410). Although age trends in illegal behavior were consistent across offenses, time trend results indicated otherwise. For example, time trends in assault rates exhibited an increase from 1975 to 1985, while time trends in theft decreased from 1975 to 1985. Time trend analyses for other offenses, such as robbery, joyriding/car

theft, and arson, were more erratic with no single peak or monotonic trend (Osgood et al. 1989, p. 405).

More recent MTF data, which includes past-year prevalence for a number of delinquent acts, spans the years 1988–2000. Between 1988 and 2000, the self-reported prevalence of theft under fifty dollars ranged between 31 and 34 percent. For serious assault, prevalence rates ranged between 11.4 percent and 14.6 percent. Between 1993 and 2000, the prevalence rate for arrest ranged around 10 percent. Male prevalence was higher than female prevalence for most delinquent/ criminal acts. In 2000, the male assault prevalence rate was 21.1 percent (compared to 4.4 percent for females), 38.7 percent for theft (23.8 percent for females), and 13.1 percent for arrest (5.2 percent for females), a trend that was evident across all the years of observation.

Across race, prevalence rates were more similar than different among whites and blacks for most crime types, with only a few minor exceptions. For example, in 2000, the assault prevalence rate for whites was 3 percent higher than for blacks. For theft, the prevalence rate was about 5 percent higher for blacks compared to whites. Finally, in 2000, the white arrest prevalence was slightly over 2 percent higher than for blacks, though the two groups experienced very similar arrest prevalence rates across the years of observation.

Several other databases on elementary and high school students have also captured prevalence estimates. The PRIDE Surveys (2000) indicate that the prevalence of students reporting "trouble with the police" varied from 19 percent for students in grades six to eight to 26 percent for students in grades nine to twelve. The 1999 Youth Risk Behavior Surveillance system indicated high prevalence in a number of delinquent activities engaged in by high school students (Kann et al. 2000). For example, 17.3 percent of high school students reported carrying a weapon to school during the past thirty days, while 4.9 percent reported carrying a gun to school. Males overwhelmingly had a higher prevalence for both of these acts. Along race/ethnic lines, however, prevalence rates were highest for blacks, followed by Hispanics and whites. Over one-third of high school students (35.7 percent) reported being in a physical fight during the past twelve months, with males and blacks exhibiting the highest prevalence among the subgroups. Finally, in the thirty days preceding the survey, 33.1 percent of the high school students reported riding with a driver who had been drinking alcohol, and although males and Hispanics exhibited the highest prevalence, these rates were quite comparable across subgroups.

A similar Centers for Disease Control survey (U.S. Department of Health and Human Services, Centers for Disease Control and Prevention 2000) also asked high school students about their current and lifetime use of drugs and alcohol. Self-reported prevalence estimates from 1999 indicate that lifetime marijuana use was 47.2 percent while current (i.e., past thirty days) marijuana use was 26.7 percent. Lifetime (50 percent) and current (31.5 percent) alcohol prevalence were only slightly higher. Much smaller prevalence estimates were reported for cocaine and steroid use. A complete description of the prevalence of drug and alcohol use is beyond the scope of this essay. Interested readers should consult Johnston, O'Malley, and Bachman (2000), as well as the annual National Household Survey on Drug Abuse, which tracks prevalence of drug and alcohol use.

Using data from a male adolescent and a male delinquent sample from Canada, Le Blanc and Fréchette (1989) calculated annual participation by age in any self-reported offense and found that, among adolescents, annual participation ranged from 80 percent at age eleven to 90 percent at age nineteen, while, among delinquents, annual participation was constant (100 percent) between the ages of thirteen and nineteen. Loeber and his colleagues (1998) calculated self-reported prevalence rates of serious delinquency (including car theft, breaking and entering, strong-arming, attacking to seriously hurt or kill, forced sex, or selling drugs) for white and black boys between ages six and sixteen in the Pittsburgh site of the causes and correlates study. At age six, whites and blacks did not differ; however, while both groups evidenced an increase in prevalence between ages seven and sixteen, the prevalence rate among blacks was higher than among whites such that at age sixteen, over 25 percent of blacks reported participating in serious delinquency, while the comparable estimate among whites was almost 20 percent. Estimates of age of onset of serious delinquency show that between ages six and eight, blacks and whites report similar cumulative percentages of committing serious delinquency; however, between ages nine and fifteen, the two groups begin to differ. Compared to whites, blacks had a steeper age of onset curve. By age fifteen, 51.4 percent of blacks had engaged in serious delinquency compared to 28.1 percent of whites.

Kelley et al. (1997) compared the self-reported prevalence of serious violence (aggravated assault, rape, robbery, and gang fights) across the three sites (Pittsburgh, Denver, and Rochester) of the causes and correlates study. Several important findings emerge (see table 4). First, in

## TABLE 4

Current, Annual Prevalence (Percentage) for Serious Violence from
Causes and Correlates Studies

| | Denver | | Rochester | | Pittsburgh |
|---|---|---|---|---|---|
| Age | Males | Females | Males | Females | Males |
| 10 | 2 | 1 | | | 7 |
| 11 | 5 | 2 | | | 11 |
| 12 | 8 | 3 | 19 | 15 | 8 |
| 13 | 10 | 6 | 16 | 18 | 17 |
| 14 | 12 | 7 | 22 | 18 | 17 |
| 15 | 15 | 7 | 19 | 13 | 15 |
| 16 | 18 | 5 | 17 | 6 | 13 |
| 17 | 18 | 4 | 17 | 4 | 17 |
| 18 | 19 | 3 | 20 | 7 | |
| 19 | 21 | 1 | | | |

SOURCE.—Kelley et al. (1997), table 1, p. 7.

Denver, between the ages of ten and nineteen, the prevalence of seri-
ous violence increased for males (reaching 21 percent at age nineteen)
but declined for females after an age-fifteen peak of over 5 percent.
Between ages twelve and eighteen in Rochester, the prevalence of seri-
ous violence peaked at age fourteen for both males (22 percent) and
females (18 percent). After age fifteen, however, female participation
declined while male participation remained fairly constant through age
eighteen. In Pittsburgh, participation in serious violence was fairly
constant from ages thirteen to seventeen (around 16–17 percent).
When Kelly et al. (1997) examined the prevalence of serious violence
across race/ethnicity, they found that a greater proportion of minority
group members was involved in serious violence. With one exception
(eighteen-year-olds in Rochester), prevalence rates were higher among
minority groups at each age and site. In sum, unlike the decline evi-
denced by females in serious violence participation, males' participa-
tion remained constant in the late teens across all three sites.

  Puzzanchera (2000) used the age-twelve sample of the NLSY 1997
and distinguished between lifetime and recent involvement in various
behaviors. In general, more than half of the twelve-year-olds who re-
ported ever committing a specific delinquent act said they had commit-
ted the act within the past year. Nine percent of all twelve-year-olds
reported that they had engaged in assaultive behaviors in the past year,

while 5 percent reported that they had carried a handgun in the past year. Interestingly, although there were similar proportions of males and females reporting recent participation in several delinquent behaviors, a pattern that was also the case among white and nonwhite youth, there were some interesting subgroup differences. For example, in the past year, males were significantly more likely than females to report that they had carried a handgun (9 percent vs. 1 percent) and engaged in assaultive behaviors (12 percent vs. 6 percent). In the past year, nonwhite youth were more likely than white youth to report having stolen something worth more than fifty dollars (4 percent vs. 2 percent), while white youth were significantly more likely than nonwhite youth to report that they had carried a handgun (6 percent vs. 2 percent).

Until recently, there has been very little self-report research describing current participation rates. In general, annual prevalence is rather low, especially for robbery (1–8 percent), assault (1–9 percent), and burglary (3–7 percent) (see review in Visher and Roth 1986, table A-4). Male prevalence is higher than female prevalence, though females do engage in delinquent acts, especially serious violence, at rates that are likely to surprise some observers. Race differences in prevalence also exist across some crime types, with minorities' participation in serious violence higher than whites (Elliott 1994; Kelley et al. 1997). Finally, age and current participation are related, with peaking and stabilization of participation in the late teens observed for males and early peaking and declining participation levels observed for most females.

## B. Dimensions of Active Criminal Careers and Their Covariates

Several researchers have presented estimates across key criminal career dimensions, as well as the covariates of such dimensions. In this section, we focus on five dimensions: offending frequency ($\lambda$), duration/termination rates, crime-type mix and seriousness, co-offending patterns, and specialization/crime-type switching.

1. *Estimates of $\lambda$.*   The offense rate for individuals reflects the frequency of offending by individuals who actively engage in crime (i.e., active offenders) (Blumstein et al. 1986, p. 55). Complications in estimating individual frequencies include undercounting total arrests and undercounting low-rate active offenders. Individual frequency estimates can be obtained in two ways: by adjusting estimates of mean individual arrest frequencies for active adult offenders ($\mu$) and then dividing by arrest probability following a crime to infer $\lambda$, or by surveying samples of offenders to obtain self-reports of their offending frequen-

cies (Blumstein et al. 1986, p. 59). Weiner (1989, p. 67) points out that annual violent arrest rates tend to be modest but annual violent offense rates are higher. Most individuals tend to engage in violence at low annual rates.

Blumstein and Cohen (1979) estimated individual frequencies ($\lambda$) from Washington, D.C., arrest records. Although they were able to follow cohorts of offenders for only four to seven years, they found that $\lambda$ increased with age for burglary, narcotics, and a residual category that included "all other" offenses; rates were trendless for robbery, aggravated assault, larceny, auto theft, and weapons offenses; and, for most crime types, the rates were independent of the number of prior arrests in an individual's record. They also reported that individual offending frequencies (estimated from arrest histories for adult arrestees) varied from 1.72 assaults per year free for offenders who committed aggravated assault to 10.88 larcenies per year free for those who committed any larceny. Finally, they estimated that offenders committed between nine and seventeen Index offenses per year while free.

Two surveys of sentenced prisoners, known as the Rand Inmate Surveys, provide estimates of individual crime rates for active adult male offenders (Peterson and Braiker 1980; Chaiken and Chaiken 1982). Researchers collected self-reports of offenses committed during an observation period prior to the start of the current incarceration for about 2,500 prisoners. Mean individual frequencies from the first survey (resident prisoners in 1976) indicated that offenders committed an average of 115 drug deals and 14.2 burglaries per person per year free. The second inmate survey (incoming prisoners in California, Michigan, and Texas in 1978) indicated that offenders committed between 14.9 (Texas) and 50.3 (Michigan) burglaries per year and between 4.8 (Texas) and 21.8 (California) robberies per year. Another smaller group of offenders reported committing crimes much more frequently. The most active 10 percent of the inmates reported committing about 600 of the seven survey crimes in the two-year period prior to their incarceration, more than ten crimes per week (Visher 2000, p. 603). Chaiken and Chaiken (1982) classified some inmates into a "violent predator" group who committed an average of 70 robberies, 144 burglaries, and 229 thefts in one year.

Elliott and colleagues' (1983) analysis of self-report data of active offenders in the NYS revealed somewhat similar numbers, an average of 8.4 robberies and 7.1 larcenies per year (see Blumstein et al. 1986, p. 66; Visher 1986). Le Blanc and Fréchette's (1989) analysis of two

Canadian samples yielded important differences across official and self-reported estimates of frequency. First, offense frequencies were much higher in self-reports than in official records. Second, the delinquent sample experienced three times the number of convictions as the adolescent sample, a ratio that did not differ much from age twelve through the twenties. Third, when the annual crime frequencies are calculated by age, the number of crimes of the adolescent and delinquent samples were similar, with the adolescents showing a general annual average of 2.55 while the delinquents showed a general annual average of 3.24.

Blumstein et al. summarized variation in $\lambda$ by gender, age, and race. Regarding gender, they found little variation in frequency across males and females (i.e., the ratios are generally 2:1 or less) for most crimes (Blumstein et al. 1986, pp. 67–68). Thus, if active in a crime type, females commit crimes at rates similar to those of males (for an exception see Wikström 1990). Regarding age, Blumstein et al. (1986) reported little change with age in offense-specific frequency rates for active offenders, but when all offense types are combined, there tended to be an increase during the juvenile years and a decrease during the adult years. In comparing age-specific violent rates, Weiner (1989) noted that although age-specific violent juvenile arrest rates tend to rise and fall as adolescence runs its course, age-specific violent offense rates exhibited greater stability. In the Rand surveys, there appeared to be some evidence of general stability of $\lambda$ over age (Peterson and Braiker 1980; Chaiken and Chaiken 1982). The number of active crime types declined with age in the Rand survey, but crime-specific frequencies tended to be stable (Peterson and Braiker 1980). Unfortunately, much prior research did not examine age-specific rates past the early twenties. Recent research, however, has indicated that among active offenders, offense-specific frequency rates vary with age (see Nagin and Land 1993; Piquero et al. 2001).

Regarding race, Blumstein et al. (1986) report that, across a number of different data sets, the ratio of black/white arrest frequencies for adult offenders who are active in a crime type are very close to 1:1 for most offenses. This conclusion has been drawn in a number of different samples (i.e., offenders, general population) and with both self-report and official records. Blumstein et al. (1986) suggest, then, that the substantial race differences in criminal activity stem from differences across the races in participation, not frequency. At any given time, there are comparatively more active black participants in crime than

there are white participants, but blacks and whites who are active are similar in offending frequency.

Cohen (1986) concluded that mean $\lambda$'s for violent crime are lower than for property crime. She observed that active violent offenders in the community committed an average of two to four serious assaults per year while active property offenders committed five to ten crimes per year. Prisoners, a more select population, report higher annual averages. For example, on average, they report fifteen to twenty robberies per year and forty-five to fifty burglaries. In part, this high average results from the skewed distribution of $\lambda$ within the offending population, with the highest decile committing over 100 crimes per year. Although Wolfgang and colleagues (1972) did not report estimates of frequencies for active offenders in the 1945 Philadelphia birth cohort, Cohen (1986) used their data to examine this issue and found that active (i.e., ever-arrested) offenders among Philadelphia juveniles experienced an average of .84 total arrests per year.

Visher (1986) reanalyzed the Rand Inmate Surveys data to reestimate annual individual offending frequencies ($\lambda$). Her reanalysis brought forth several insights. First, she noted that half of the offenders reported committing no more than five crimes a year, but a small group reported committing several hundred crimes per year. Similar results were obtained with a sample of New Orleans inmates (Miranne and Geerken 1991). Second, the estimates of $\lambda$ for robbery and burglary were sensitive to choices in computation and in particular, the interpretation of ambiguous survey responses, the treatment of missing data, and the computation of respondents' street time. Third, because some offenders reported almost no offending prior to incarceration and others reported a significant amount, the high estimates have a particularly strong influence on the mean value of $\lambda$. Fourth, many offenders have intensive short-term criminal offending patterns while others offend more or less intermittently. Fifth, $\lambda$ varied across the three states in the study (California, Texas, and Michigan), thus raising questions about whether $\lambda$ varies meaningfully across jurisdictions or whether the difference results from differences in case processing and sanctioning across states. Finally, Visher questioned the validity of estimating $\lambda$ for offenders who had been incarcerated for several months prior to their current arrest. Since these individuals may have been especially active in the short period during which they were on the street, generalizing that rate of offending to an entire year may overestimate the annual rate. Rolph and Chaiken (1987) proposed a model that al-

lowed for offender switching between a "quiescent" state and an "active" state from time to time. After taking into account the length of the measurement period, they found lower $\lambda$'s than the original estimates produced in the second Rand survey. In any event, Visher confirmed the main conclusion from the Rand survey, that there was an extreme skew in the distribution of $\lambda$ even in a sample of serious criminals in prison.

Loeber and Snyder (1990) used juvenile court data from a large sample of juvenile offenders in Maricopa County (Phoenix), Arizona, to study how the rate of offending varied between ages eight and seventeen. Although $\lambda$ varied substantially as a function of age, increasing monotonically, $\lambda$ was not related to the age at first offense. That is, $\lambda$ was observed to be constant at each individual age level regardless of the age at which offending began or desisted (Loeber and Snyder 1990). Since the absolute magnitude of $\lambda$ among active juvenile offenders at any age was independent of how long offenders were involved in criminal activity, Loeber and Snyder (1990, p. 105) concluded that, "the only information needed to predict the average $\lambda$ for active juvenile offenders at any age is age."

Using police records from Project Metropolitan, Wikström (1990) calculated age-specific values of $\lambda$ for several crime types through age twenty-five. Four key findings emerged. First, $\lambda$ peaked at age fifteen (5.6 crimes per offender) for total crimes, but there was variation across crime types with $\lambda$ peaking at fifteen for stealing (5.3 crimes per offender), twenty-one for fraud (3.3 crimes per offender), and twenty-three for violent crime (1.6 crimes per offender). Second, recidivist offenders had a higher $\lambda$ than first-time offenders. Third, males had $\lambda$'s twice as high as females (9.1 compared to 4.5 crimes per offender). Finally, male $\lambda$'s peaked at ages fifteen to seventeen, while female $\lambda$'s peaked at ages twenty-two to twenty-four, implying that there is little decrease in the offender rate at the oldest ages for females as compared to males. In sum, Project Metropolitan data indicate that $\lambda$ varies with age and is not invariant across gender.

English and Mande (1992) examined the extent to which self-reported crime frequencies among prisoners were a function of how such information was collected. These researchers examined five different methods for eliciting $\lambda$ from prisoners: a confidential, written questionnaire; an anonymous—but not confidential—questionnaire; a shortened version of the self-administered questionnaire; an automated

version of the questionnaire in which the inmates enter their answers directly into laptop computers; and administering the questionnaire in two different locations in the prison setting, one more and one less "neutral." In addition, these authors administered surveys to female prisoners.

A number of key findings emerged. First, there were few differences in self-reported crime participation rates across the methods explored, though blacks tended to report higher participation rates using the anonymous version of the survey than when using the other modes. Second, crime frequency estimates remained fairly stable across the different methods of survey administration with no differences found across race or age; however, the anonymous version led to much higher crime frequencies than the other methods. Third, the familiar skewed offending rates that others have found for male prisoners also characterized female prisoners. This skewed, female offending pattern has also been observed with official records in two longitudinal data sets in Philadelphia (Piquero 2000) and Providence (Piquero and Buka 2002). More women reported committing only one type of crime, while men reported more involvement in several different crimes. Fourth, participation rates changed when the definition of the crime was changed. When criminal activity was related to smaller compared to larger increments of time (i.e., weekly vs. monthly), higher frequencies were observed. Fifth, demographic comparisons of self-reported and official record data yielded complementary information; the demographic factors found to be associated with official records were the same as those found for self-report records. English (1993) reported that once active in crime, women and men committed burglary, robbery, motor vehicle theft, fraud, and drug dealing at similar rates. Moreover, with regard to drug dealing, more than 15 percent of the women, compared with only 4 percent of the men, reported more than twenty-five drug deals per day (English 1993, p. 374). Sixth, women reported higher frequencies for theft and forgery while men reported higher frequencies with assault. Finally, the lack of data on female self-reports of λ makes English and Mande's results particularly important and highlights some similarities to the pattern for males. They found that female participation rates varied by race, with blacks participating more in burglary, robbery/assault, and drug dealing than whites, and whites participating more in forgery/fraud. The frequency pattern was similar to that for male prisoners: a large percentage (almost 40 per-

cent) of the sample reported fewer than five offenses during the observation period, while almost 20 percent reported 200-plus offenses during the observation period.

Barnett, Blumstein, and Farrington (1987, 1989) designed and tested a probabilistic model of criminal careers. Their initial analysis suggested that criminal careers in the Cambridge study (through age twenty-five) could be modeled with parameters reflecting constant individual rates of offending and constant rates of career termination. They found, however, that the offending population had to be divided into two groups: "frequents" and "occasionals" (Barnett, Blumstein, and Farrington 1987). They found that "frequents," comprising 43 percent of the sample, had an annual conviction rate of 1.14 convictions per year (constant with age) while the "occasionals," comprising 57 percent of the sample, had an annual conviction rate of .41. In a follow-up prospective test, Barnett, Blumstein, and Farrington (1989) applied their 1987 model to the Cambridge study males with five additional years of data (through age thirty). Although their original model accurately predicted the number of recidivist convictions and the time intervals between recidivist convictions, the predictions for the frequents were hampered by a few intermittent offenders who, although temporarily stopping their careers, later reinitiated offending after a long gap.

Horney and Marshall (1991) refined the Rand methodology to achieve more precise estimates of $\lambda$ with a sample of Nebraska prisoners. They used individual interviews that included a detailed calendar system with month-by-month reporting of criminal activity. This allowed them to look at variability of offending within individuals over relatively short periods of time. Focusing on those offenders who reported committing more than ten of any particular target crimes during the three-year reference period, Horney and Marshall (1991) found considerable variability; that is, offenders reported periods of inactivity and low, medium, and high rates of activity. There was considerable variability in individual offenders' values of $\lambda$ over the observation period. Patterns of activity varied considerably by crime type. While burglars were unlikely to be active during all months, drug dealers had the highest proportion of active months as well as the highest proportion of months offending at high rates (Horney and Marshall 1991, p. 491). Horney and Marshall suggest that $\lambda$ estimates in the original Rand Inmate Surveys were overinflated, and especially for crimes with the greatest time variability in offending frequencies.

TABLE 5

Mean Offending Rate for Serious Violence from Causes and
Correlates Studies

| Age | Denver | | Rochester | | Pittsburgh |
| | Males | Females | Males | Females | Males |
|---|---|---|---|---|---|
| 10 | 1.6 | · · · | | | 2.6 |
| 11 | 3.5 | · · · | | | 3.3 |
| 12 | 3.3 | 3.3 | 4.0 | · · · | 2.8 |
| 13 | 10.1 | 1.5 | 6.9 | 2.7 | 3.3 |
| 14 | 10.4 | 2.4 | 7.2 | 5.5 | 4.1 |
| 15 | 7.7 | 2.3 | 5.7 | 5.4 | 4.9 |
| 16 | 11.8 | 2.1 | 5.3 | 4.5 | 6.7 |
| 17 | 10.9 | 1.4 | 3.7 | · · · | 8.6 |
| 18 | 12.0 | 1.0 | 5.8 | · · · | |
| 19 | 8.7 | · · · | | | |

SOURCE.—Kelley et al. (1997), table 1, p. 7.

Kelley et al. (1997) examined serious violence offending rates in the
three causes and correlates studies (Pittsburgh, Denver, and Rochester)
by calculating the number of self-reported serious violent acts commit-
ted within the annual reporting period (see table 5). Generally, active
male offenders committed more serious violence than active female of-
fenders. Between ages ten and nineteen, annual offense rates tended to
increase steadily and continue throughout much of the adolescent pe-
riod, but for Denver and Rochester females, the number of offenses
peaked around ages fourteen to fifteen. For example, eighteen per 100
Rochester females committed ninety-nine serious, violent offenses at
age fourteen, while seven per 100 Denver females committed seven-
teen serious violent offenses at age fourteen. There were also im-
portant differences across sites. For example, in Denver, active male
offenders engaged in many more criminal acts than their female
counterparts such that, by age eighteen, active males averaged twelve
serious violent crimes while active females averaged one serious violent
act. Moreover, Denver males exhibited the largest annual offense rate
of all active offenders across all three sites: at age eighteen, nineteen
per 100 Denver boys committed an estimated total of 228 offenses.
In Rochester, however, the differences between boys and girls were
much smaller, especially in the mid-teens. Among Pittsburgh males,
increases in violent offending were observed throughout the teenage

years. For example, at age seventeen, seventeen per 100 Pittsburgh boys committed an estimated total of 146 offenses.

Canela-Cacho, Blumstein, and Cohen (1997) used data from the Rand Second Inmate Surveys to develop an approach for estimating the values of mean λ for diverse offender populations. Treating the self-reported estimates of λ for prisoners as a filtered sample (i.e., all inmates have gone through the criminal justice system) and a three-component mixed exponential for all sorts of offenders (i.e., free, in prison, etc.), they found important differences in offending rates between inmates and free offenders, between robbery and burglary, and across the three states in the analysis. Free active offenders averaged one to three robberies and two to four burglaries per year, while inmates had λ values ten to fifty times higher. Moreover, different levels of offending were observed across states, with the lowest mean λ of just two to three robberies or burglaries annually by individual offenders in Texas, six to seven robberies or burglaries in California, and fifteen robberies and ten burglaries in Michigan. These differences resulted from differences in imprisonment levels and differences in the overall levels of criminality within the total offender population. These results are important because they suggest that a highly heterogeneous offending frequency in the total population of offenders can combine with relatively low imprisonment levels to lead to substantial selectivity of high-λ offenders among inmates and correspondingly low mean value of λ among those offenders who remain free (Canela-Cacho, Blumstein, and Cohen 1997, p. 133). We return to the relevance of this issue for incapacitation decisions in greater detail when we discuss the need for prediction alleviated by "stochastic selectivity."

Lattimore and her colleagues (forthcoming) studied the characteristics of arrest frequency among paroled youthful offenders from the CYA. Using negative binomials to examine the relationship between several characteristics and the frequency of offending, they found that individual and geographic characteristics were important predictors of both the average arrest frequency and its variation among the offenders in a three-year follow-up.

Contrary to the observed relationships between participation and demographic characteristics, research based on official records tends to indicate that there is not a strong relationship between offending frequency and demographic characteristics, though some recent self-report data on serious violence tends to indicate otherwise (Elliott 1994; Kelley et al. 1997). In general, active offenders who begin crimi-

nal activity at an early age, use alcohol and drugs heavily, and have extensive prior records commit crime at higher rates than other offenders.

Spelman (1994) summarized current knowledge on offending frequencies. First, there are different values for the average offense frequencies across studies because researchers provide different definitions and operationalizations of the offense rate. Second, most of the variation in offense rates can be attributed to differences in the populations sampled and especially where in the criminal justice system they are sampled. Third, the average offender commits around eight crimes per year, while offenders who are incarcerated at some point in their lives commit thirty to fifty crimes per year, and the average member of an incoming prison cohort commits between sixty and 100 crimes per year. Fourth, criminals do not commit crimes all the time; in other words, there is evidence that many offenders spend long periods of time in which they commit no crimes. Fifth, the distribution of offending frequencies is highly skewed, with a few offenders committing crimes at much higher than average rates.

2. *Estimates of Duration/Termination.* The two most common approaches for studying career termination have been through providing estimates of termination probabilities after each arrest and estimating the time between the first and last crimes committed. Regarding termination probabilities, Blumstein et al. (1986, p. 89) calculated persistence probabilities for six different data sets and found that after each subsequent event (i.e., police contact, arrest, conviction, etc.), the persistence probability increases, reaching a plateau of .7 to .9 by the fourth event across all data sets. Farrington, Lambert, and West (1998) used conviction data to calculate recidivism probabilities for Cambridge study males through age thirty-two and found that after the third offense the recidivism probability ranged from .79 to .91 through the tenth offense. The same substantive conclusion was reached when they examined the recidivism probabilities of the subjects' brothers.

Blumstein, Farrington, and Moitra (1985) pose a model of population heterogeneity in which some members are "innocents" (i.e., refrain from offending), some are "desisters" (i.e., with relatively low persistence probabilities), and others are "persisters" (i.e., with relatively high persistence probabilities). By partitioning the sample into these three groups, Blumstein and colleagues are able to account for the rise in the observed aggregate recidivism probabilities by studying the changing composition of offenders at each stage of involvement;

with most desisters stopping early, only smaller numbers of high-recidivism persisters are left. The key assumption is that each offender has a constant desistance probability after the commission of each offense. Their analysis, applied to several different longitudinal studies, indicated a very high prevalence of official involvement in criminal activity, a high, stable recidivism rate through about the sixth involvement, and a higher but stable recidivism rate for subsequent involvements. After the first few involvements, recidivism probabilities stabilized at a high level (about 80–90 percent). By characterizing offenders' careers as a series of recidivism events, their model permits some few persisters to drop out early and some few desisters to accumulate a large number of offenses. Blumstein, Farrington, and Moitra (1985, p. 216) suggest, then, that the persister/desister characterization "encourages thinking about populations of offenders in terms of probabilistic expectations rather than in terms of retrospective characterizations" as is the case with arbitrary retrospective designations of some as "chronic" offenders. When these authors applied their model to the Cambridge study data, they found that persisters were distinguished from desisters by several "risk factors" observed at ages eight to ten including troublesomeness as assessed by peers and teachers, criminal parents, low nonverbal IQ, poor parental child-rearing practices, and so on.

Barnett and Lofaso (1985) attempted to predict future arrest rates in the Philadelphia birth cohort at a specified arrest number. Two important findings emerge. First, only past arrest rates were systematically related to future rates. Second, problems arose as a result of truncation of the arrest record at the eighteenth birthday. After assuming that arrests occurred probabilistically according to a Poisson process, Barnett and Lofaso calculated the probability of no arrest occurring between the last juvenile arrest and the eighteenth birthday, given that the offender was continuing his criminal career. They could not reject the hypothesis that all apparent desistance was false. In other words, almost all offenders were likely also to have had a subsequent adult arrest after their eighteenth birthday.

Barnett, Blumstein, and Farrington (1987) built on the work of Blumstein, Farrington, and Moitra (1985) and Barnett and Lofaso (1985) by avoiding the implication that all desistance is true (as in Blumstein, Farrington, and Moitra) or that all desistance is false (as in the case in Barnett and Lofaso). Barnett et al. developed a model that includes a conviction rate and a desistance probability. In addition,

they found it necessary to postulate two populations of offenders, one with a high conviction rate and another with a low conviction rate. Using data from the Cambridge study through age twenty-five, they found that a model explicitly incorporating individual rates of conviction and a parameter characterizing the termination process, along with two separate parameters to reflect offender heterogeneity (i.e., "occasional" and "frequent" offenders), fit the data well. Barnett, Blumstein, and Farrington (1989) then engaged in a prospective test of their model using an additional five years of conviction data collected on the Cambridge subjects (through age thirty). Their results indicated that the original model accurately predicted the number of recidivist convictions, as well as the time interval between recidivistic convictions. However, the predictions for the "frequents" were hampered by a few "intermittent" offenders who reinitiated offending after a long, crime-free period.

A number of studies have attempted to derive estimates of career duration, typically measured as career length in years (see table 6). Three major studies conducted in the 1970s estimated career lengths to be between five and fifteen years (Greenberg 1975; Shinnar and Shinnar 1975; Greene 1977). Shinnar and Shinnar (1975) estimated career length with partial career information based on aggregate data on the time between first and current adult arrests of five years for all offenders and ten years for recidivists reported for a sample of offenders from FBI files. Shinnar and Shinnar had no information on juvenile offending periods, nor the age of first offending. Under several assumptions regarding estimates of the average number of Index arrests per year per offender, Greenberg (1975) approximated active Index career lengths to be about five years. His estimates, however, rest on the steady-state assumption of stationarity in the processes generating an active criminal population. Greene (1977) applied a life-table approach to the age distribution of arrestees in a single year in Washington, D.C., and assumed that all arrestees were criminally active at age eighteen. He estimated the mean adult career length for Index offenses to be twelve years. Greene's estimates, however, assumed that all active offenders were equally likely to have at least one arrest in a year, that all offenders began their adult criminal careers at age eighteen, and that the size of the offender population at each age is constant over time.

Building on Greene's work, Blumstein, Cohen, and Hsieh (1982) conducted the most detailed study of criminal career duration and used

TABLE 6

Career Length Estimates

| Study | Career Length Estimate (Years) | Sex | | Race | | Measure of Crime |
|---|---|---|---|---|---|---|
| | | Male | Female | White | Nonwhite | |
| Shinnar and Shinnar (1975) | 5–10 | | | | | Arrests |
| Greenberg (1975) | 5 | | | | | Arrests |
| Greene (1977) | 12 | | | | | Arrests |
| Blumstein et al. (1982) | 5 | | | | | Arrests |
| | 4.2 (property) | | | | | |
| | 7.0 (personal) | | | | | |
| Elliott et al. (1987)* | 1.58 | | | | | Self-reports |
| Le Blanc and Fréchette (1989) | 1.46 (personal) | | | | | |
| | 3.47 (burglary) | | | | | |
| | 3.56 (petty larceny) | | | | | Self-reports |
| Spelman (1994) | 6–7 | | | | | Self-reports |
| | 7–10 (property) | | | | | |
| | 7–9 (personal) | | | | | |
| Tarling (1993) | | 7.4 | 4.9 | | | |
| British Home Office (1995) | | 9.7 | 5.6 | | | Official records |
| Farrington et al. (1998) | 10 | | | | | Convictions |
| Piquero et al. (2002) | 17.27 | | | 16.7 | 17.7 | Police contacts and arrests |

* The Elliott et al. study measured career length as the maximum number of consecutive years an individual was classified as a serious, violent offender.

data on arrests rather than on arrestees to estimate career lengths. Although the Blumstein, Cohen, and Hsieh (1982) approach has been credited with requiring fewer assumptions about the distribution of career lengths and the underlying system producing this distribution (Spelman 1994, p. 132), like all career-length studies, the Blumstein, Cohen, and Hseih (1982) approach makes several assumptions (e.g., age eighteen as the beginning of the adult criminal career, the probability of at least one arrest in a year does not vary with age, etc.). Their analysis yielded five key insights. First, the average criminal commits crimes over about a five-year career, with mean career lengths of 4.2 and 7.0 for property and personal offenders, respectively. Second, in comparing career lengths for a seven-year period (1970–76), they found that the mean career lengths were fairly stable over time.

Third, they found that the dropout rate appeared to vary over the course of a career, first falling ("break-in" failures), then leveling off, and then rising with "burn-out" in the later years. The criminal career can be construed as three distinct phases (Blumstein, Cohen, and Hsieh 1982, p. 38). In the first phase, the "break-in" period in the early years of the career, dropout rates decrease, and the mean residual career length (i.e., the expected time still remaining in a career) increases. This surprising result—residual career length increasing as the offender stays active—is a consequence of the changing composition of the offender population; through their twenties, the more committed offenders persist, the less committed drop out, and so the residual average career length of the remaining group increases as a result. This initial phase lasts for the first ten to twelve years of the career. In the second "stable" period, beginning around age thirty for eighteen-year-old starters, there are likely to be stable residual career lengths. During this second phase, the dropout rate is at its minimum, and the expected time remaining in the career is longest (i.e., about ten additional years regardless of the prior duration of careers). Thus, regardless of the number of years a person has been active in a career, the expected time remaining is similar. Then, in the final "burn-out" period, around age forty-one, which is characterized by increasing dropout rates, the expected time remaining in a career gets shorter.

Fourth, career length was associated with onset age such that younger starters tended to have longer careers. The only exception to this was the finding that for offenders with more than seven years already in a career, older starters exhibited longer remaining careers.

Finally, careers tended to vary somewhat across crime types, with

property offenders exhibiting the shortest careers (about four to five years) among eighteen-year-old starters, though the careers for those who do remain active as adult property offenders in their thirties can be expected to last for another ten years (Blumstein et al. 1986, p. 94). The longest careers are found for murder and aggravated assault, which averaged about ten years among eighteen-year-old starters (Blumstein, Cohen, and Hsieh 1982, p. 66). In sum, persistent offenders who begin their adult careers at age eighteen or earlier and who are still active in their thirties are most likely to be persistent offenders and are likely to continue to commit crimes for about another ten years (Visher 2000, p. 608).

Elliott, Huizinga, and Morse (1987) studied career lengths with the first five waves of the NYS. Unlike other researchers who define career length as the period of time from the first through the last year of offending, these authors defined career length as the maximum number of consecutive years the individual was classified as a serious violent offender measured via self-reports. Elliott, Huizinga, and Morse found that the mean length of violent careers over the five-year period was rather short (1.58 years), with most serious violent offenders having a career length of one year. Still, about 4 percent have a career length of five years. Using a Canadian sample, Le Blanc and Fréchette (1989) found that career length was longer when assessed via self-reports than via official records. Career duration varied by crime type with crimes of personal attack having the shortest mean duration (1.46 years) and crimes of burglary (3.47 years) and petty larceny (3.56) having the longest mean durations.

Spelman (1994) studied career lengths with data from the three-state Rand Inmate Surveys. He made several assumptions about criminal careers and developed estimates of total career lengths from seven to ten years for property offenders and seven to nine years for personal offenders, with some slight variations across states. Spelman identified the average career length in the Rand data to be about 8.5 years. However, when he took the dropout process among adult offenders into consideration, he revised his estimates of the average career length to be about six or seven years (Spelman 1994, p. 140). Spelman (1994, p. 156) shows that young and inexperienced offenders, those in the first five years of their career, are more likely than older offenders to drop out each year, but after five years the rate of dropout levels off, rising only after the twentieth year as an active offender.

Tarling (1993) examined career durations with official records from males and females born in 1953 and followed until age thirty-one, and found that, excluding one-time offenders, the average duration was 7.4 years for males and 4.9 years for females. Later analysis of the same data through age forty found that the average duration increased for males and females to 9.7 and 5.6 years, respectively (Home Office Statistical Bulletin 1995). Similar estimates of career duration have been made in London and Stockholm (Farrington and Wikström 1994).

Farrington, Lambert, and West (1998) examined the duration of criminal careers in the Cambridge study using conviction data to age forty. Defining the duration of a criminal career as the time interval between the first and last conviction, and excluding one-time offenders, the average duration of criminal careers was ten years. Fifteen males (9.1 percent) had career durations exceeding twenty years. Farrington, Lambert, and West also collected data on the siblings and wives of the study subjects and found that brothers of study subjects had similar career durations, but the criminal careers of sisters and wives were shorter, averaging about eight years. The career duration for study subjects' fathers and mothers averaged sixteen and fifteen years, respectively, at least in part because they had more time to accumulate convictions. Finally, Farrington, Lambert, and West compared career duration to the age of onset for study subjects. Average career duration decreased significantly with increasing age of onset for study subjects and for their mothers and fathers. Those study subjects who experienced onset between ages ten and thirteen incurred 8.77 offenses and had a career duration of 11.58 years. Those individuals experiencing onset between ages twenty-one to thirty incurred 1.79 offenses and had a career duration of 2.33 years. Similar conclusions were reached regarding the relationship between onset age and career duration when brothers, fathers, mothers, sisters, and wives' criminal careers were examined (Farrington, Lambert, and West 1998, p. 102). When Farrington (2001) extended the analysis to include conviction records of one-time offenders, he found that the average duration of criminal careers, defined as the time between the first conviction and the last, was 7.1 years. Excluding one-time offenders whose duration was zero, the average duration of criminal careers in the Cambridge study was 10.4 years.

Piquero, Brame, and Lynam (2002) studied the length of criminal careers using data from a sample of serious offenders paroled from

CYA institutions in the 1970s. Defining career length as the time between the age of last arrest less the age at first police contact, average career length was 17.27 years, with little difference between white (16.7 years) and nonwhite parolees (17.7 years).

Because much research on career length has been descriptive, there is almost no research predicting career duration. Smith and Gartin (1989) used data from the Racine cohorts to study the effect of arrest on the duration of a criminal career. Defining career duration as the time between an individual's first and last police contact, they found that for the sample of offenders who remained criminally active after a $k$th contact, an arrest appeared to extend the duration of their criminal career. In addition, age was negatively associated with career duration. Elliott, Huizinga, and Morse (1987) used the first five waves of the NYS to examine the extent to which career length varied by gender, race, class, residence, and age, and found that career length did not vary much across these factors, with the exception that career lengths varied by place of residence, with urban youths reporting somewhat longer careers.

Piquero, Brame, and Lynam (2002) used data from a sample of parolees from the CYA to examine the correlates of career length. Several key findings emerged. First, individuals with low cognitive abilities and reared in disadvantaged environments during childhood tended to have the longest careers. Second, when this risk contrast was compared for white and nonwhite parolees, it was more important for nonwhites. The data showed three sets of findings across race. First, among parolees experiencing little risk in the risk contrast (i.e., no cognitive deficits and no disadvantaged environments), career duration was identical among white and nonwhite parolees (almost seventeen years). Second, among nonwhites only, the risk contrast was related to career length with nonwhite parolees experiencing cognitive deficits and disadvantaged environments exhibiting the longest career lengths (almost nineteen years). Third, among white parolees, the risk contrast was not related to career length; career lengths varied between sixteen and seventeen years regardless of the level of the risk contrast.

Since many data sets used to study termination/persistence probabilities and career length duration are right-hand censored (i.e., the observations are cut off at a particular age), estimates regarding the duration of careers are biased downward (Blumstein, Cohen, and Hsieh 1982; Greenberg 1991). In other words, attributing the absence of further events near the end of the observation period to desistance rather

than to the time between events in a still-active career will lead to overestimates of desistance, or "false desistance" (Blumstein et al. 1986, p. 91). This raises the question of how many years of non-offending have to be observed to conclude that someone has desisted (Laub and Sampson 2001; Maruna 2001).

Bushway et al. (2001) recognized the difficulties in studying termination generally and desistance in particular and outlined an empirical framework for studying desistance as a process. Instead of focusing on offending itself, these authors argued for a focus on changes in the offending rate over time. In particular, Bushway et al. (2001, p. 496) argued that it made more sense to describe, operationalize, and study desistance as a process in which criminality (i.e., the propensity to offend) changes over time. They define desistance as "the process of reduction in the rate of offending (understood conceptually as an estimate of criminality) from a nonzero level to a stable rate empirically indistinguishable from zero" (Bushway et al. 2001, p. 500). Recently, Bushway, Thornberry, and Krohn (forthcoming) compared the Bushway et al. (2001) approach with a more traditional approach of defining a desister as someone who has been observed to refrain from offending for a certain period of time. Using self-report data from the Rochester site of the causes and correlates study, these authors found that the two approaches identified different people as desisters.

The idea of desistance is a key feature of the criminal career paradigm. Since the publication of the NAS report in 1986, several desistance studies, both theoretical and empirical, have appeared (e.g., Uggen and Piliavin 1998; Kruttschnitt, Uggen, and Shelton 2000). To avoid duplication, we refer readers to a detailed review of this literature in *Crime and Justice* (Laub and Sampson 2001).

3. *Crime-Type Mix.* The study of crime-type mix involves studying seriousness (the tendency to commit serious crimes throughout one's criminal career), escalation (the tendency to move toward more serious crimes as one's career progresses), specialization (the tendency to repeat the same offense type on successive crimes), and crime-type switching (the tendency to switch types of crimes and/or crime categories on successive crimes).

Most research on offense seriousness and escalation has been carried out with official records. With data from the 1945 Philadelphia birth cohort through age seventeen, Wolfgang, Figlio, and Sellin (1972) found that although each subsequent offense tended to be somewhat more serious than the preceding offense, observed increases in seri-

ousness scores were small. They interpreted these results as indicative of relatively stable delinquency careers. Analysis of successive transitions by Cohen (1986), however, found increases in switches to more serious offense types and decreases in switches to less serious offense types on later transitions with the Philadelphia cohort. In addition, Cohen (1986, p. 402) reported some escalation in seriousness for Philadelphia juveniles, especially for nonwhite offenders. Smith and Smith (1984) also reported evidence consistent with escalation in seriousness on successive arrests for juveniles. Data from Rojek and Erickson for juveniles in Pima County, Arizona, indicated that "there is no evidence that the probability distributions of the five types of offenses shift in any way toward more serious offenses" (1982, p. 17; see also Bursik 1980). However, reanalysis by Cohen (1986, pp. 397–98) indicated that switches from juvenile status offenses to more serious crimes on later transitions were common, a finding not corroborated in another study of status offenders (Shelden, Horvath, and Tracy 1987).

Data examining adult-only periods or combining juvenile and adult periods tend to show that average seriousness declines on successive arrests, indicating patterns of de-escalation (see Hamparian et al. 1978; Shannon 1982; Cohen 1986, p. 403). Thus, during the juvenile years, the seriousness of arrests increases somewhat throughout adolescence, while during the adult years, seriousness tends to be stable early on followed by de-escalation. Although involvement in serious offending as a juvenile is predictive of continued offending into adulthood, more so for males than females (Stattin and Magnusson 1991; Tracy and Kemp-Leonard 1996), among juveniles who remain active into adulthood, their seriousness scores tend to increase and then stabilize (Rand 1987; Visher 2000).

There have been several comprehensive examinations of escalation. Datesman and Aickin (1984) used self-report data from a sample of deinstitutionalized juvenile offenders from Delaware and found less specialization than appears from official records and that females tended to be more specialized than males. White females tended to be more specialized in status offenses than any other race/gender combination group. Little evidence was found for escalation as most of the youths did not return to court after their first referral for status offenses. Shelden, Horvath, and Tracy (1987) found that the majority of juvenile court referrals (whose first referral was a status offense) did not become serious delinquents, although male status offenders were more likely than females to escalate.

Blumstein et al. (1988) studied criminal records of Michigan offenders and found that average seriousness was stable over the careers of African-American offenders with ten arrests for serious crimes, whereas similar white offenders exhibited an increase in seriousness over successive arrests. Only a small group of offenders, however, were likely to engage in increasingly serious behavior over their careers.

Tracy, Wolfgang, and Figlio (1990, p. 173) studied escalation with both Philadelphia birth cohorts and found, generally, that when an offense was repeated, the severity was greater than that of the former offense. In addition, they found that escalation patterns did not vary across race, although injury offenses were repeated in both cohorts with substantial increases in severity.

In a test of Loeber and Hay's pathways model, Loeber et al. (1999) employed self-report data from the three causes and correlates studies (Pittsburgh, Denver, and Rochester) to examine how seriousness increases over time within a career. Their analysis at each site indicated that cumulative age of onset curves for steps in the pathways followed the expected pattern with the less serious forms of problem behavior and delinquency occurring first and the more serious forms occurring later. In addition, Loeber et al. (1999, p. 260) found that the proportion of participants who advanced to a next step in a pathway was consistent with expectations and that across the sites the fit of participants in the pathways for steps two and higher in the overt and covert pathways was consistent with the model.

Diverse methodological techniques (Wolfgang et al. 1972; Farrington, Snyder, and Finnegan 1988; Britt 1996; Paternoster et al. 1998; Piquero et al. 1999) have been employed to investigate specialization, or the tendency to repeat the same offense type on successive crimes (see review in Cohen 1986; Tracy and Kempf-Leonard 1996). In the 1945 Philadelphia birth cohort, Wolfgang, Figlio, and Sellin (1972) found that there appeared to be no evidence of specialization although offenders were most likely to have a subsequent involvement for a non-Index crime, especially theft. Similar results were obtained in the Puerto Rico birth cohort study (Nevares, Wolfgang, and Tracy 1990) and in the 1958 Philadelphia birth cohort study. In the 1958 cohort, however, specialization was slightly more evident among recidivists and became more pronounced as the number of offenses increased (Tracy, Wolfgang, and Figlio 1990, p. 173). Self-report data from the Rand studies suggest that, although there is some evidence of property specialization (Spelman 1994), incarcerated offenders tend to report

much more generality than specialty (Petersilia, Greenwood, and Lavin 1978; Peterson and Braiker 1980; Chaiken and Chaiken 1982).

Bursik's (1980) study of serious juvenile offenders in Cook County, Illinois, provided evidence of specialization. Rojek and Erickson (1982) examined specialization among juvenile offenders in Pima County, Arizona, and found evidence of specialization for property offenses and a status offense (running away), but not for other offense types. Smith and Smith (1984) studied specialization with a sample of male juveniles and found some evidence of specialization, especially among those delinquents who began their careers with a robbery offense. Farrington, Snyder, and Finnegan (1988) developed the "forward specialization coefficient" (FSC) to quantify specialization among juvenile delinquents. This ranged from zero for no specialization to one for perfect specialization. Their analysis indicated that there was a small but significant degree of specialization in the midst of a great deal of versatility. Stander et al. (1989) used conviction data from a 10 percent sample survey of 698 adult males (aged twenty-one or above) under sentence in the twenty-one prisons in the southeast region of England in 1972 to study offense specialization. Three findings emerged. First, consistent with a Markov chain hypothesis (i.e., knowledge of an offender's past history of offense types adds nothing to the prediction that could be made on the basis of the present offense type), the probability of switching from one offense to another remained constant over successive convictions. At the same time, and contrary to the Markov hypothesis, the past history of offense types helped in predicting future offense types, offering some support for specialization. Second, sex offenders were the most specialized. Third, the most persistent offenders became increasingly specialized in fraud.

Some scholars have investigated specialization in violence. Using a binomial model applied to official record data, Farrington (1989), Piquero (2000), and Piquero and Buka (2002) reported little evidence of specialization in violence in the Cambridge study, or the Philadelphia and Providence perinatal cohorts, respectively, and that the commission of a violent offense in a criminal career is a function of offending frequency: frequent offenders are more likely to accumulate a violent offense in their career. Farrington (1991) tested the hypothesis that violent offenses occur at random in criminal careers and failed to reject the hypothesis. Similar results have been obtained by Capaldi and Patterson (1996) with self-report data from the Oregon Youth Study.

Two main conclusions can be drawn from the specialization litera-

ture. First, in general, the next offense type is proportional to its prevalence with some bias toward repeating. Second, although there is some evidence of specialization (Stander et al. 1989), most criminal careers are marked by versatile offending patterns (Chaiken and Chaiken 1982; Klein 1984; Cohen 1986; Stattin, Magnusson, and Reichel 1989; Lattimore, Visher, and Linster 1994).

At the same time, there is some evidence that specialization patterns may vary across demographic subgroups. Regarding age, important differences in specialization are observed between adults and juveniles. Across several studies, specialization appears to be stronger in magnitude and to be found in all offense types for adult than for juvenile offenders (Cohen 1986; though see Bursik 1980).

Two studies have examined how age at onset relates to specialization. Rojek and Erickson (1982) computed matrices of transition probabilities by onset age and concluded that none of the age-specific matrices differed from each other (though see Cohen 1986). Piquero et al. (1999) applied two different analytic techniques (the FSC and the diversity index) to data from the 1958 Philadelphia birth cohort for arrests through age twenty-six and found that, although there was an inverse relationship between onset age and offense specialization, when age was controlled by examining common offending periods for different onset age groups, the relationship vanished. It appears, then, that versatility differences between onset age groups have more to do with the effects of age itself than with onset age. In sum, although there is some limited evidence of specialization in the juvenile years for status-oriented offenses, specialization is more sporadic among juvenile offenders (Cohen 1986) but tends to increase as a career progresses (Blumstein et al. 1986). Specialization among adult offenders tends to be stronger for drugs, fraud, and auto theft (Blumstein et al. 1988).

Only a handful of studies have examined gender differences in specialization. Rojek and Erickson (1982) found that, although specialization was less frequent for female juvenile offenders, gender differences in offense switching were observed with female offenders being more likely than males to desist or to move to a runaway offense. Using official records from Maricopa County, Arizona, Farrington, Snyder, and Finnegan (1988) found that males tended to specialize in the more serious offenses, and females tended to be runaway specialists. Mazerolle et al. (2000) used official record data from the 1958 Philadelphia birth cohort and failed to find substantive differences in offending diversity between males and females across five offense transitions. In addition,

when interrelationships between gender, onset age, and specialization were examined, differences in levels of offending diversity were found between males and females, differentiated by onset age criteria, a result that was corroborated when the authors substituted "persistence" for onset age. Piquero and Buka (2002) used court referral data from the Providence perinatal cohort to study specialization in violence and failed to find evidence of any gender differences. Soothill, Francis, and Fligelstone (2002) applied latent class analysis to conviction data from the 1953 and 1958 British birth cohorts to study offense specialization generally and across gender in particular. They found a different cluster solution (i.e., a different number of offense groups) across gender, with females' offending being less diverse than males' offending. As in previous research, there was an increasing tendency toward specialization with age, especially for males. While a shoplifting cluster emerged for both sexes, a cluster titled "marginal lifestyle with versatile offending" was the most common cluster across gender. Most crime switching was toward noncrime; that is, there was little tendency to switch to the same crime.

With regard to race, Wolfgang, Figlio, and Sellin (1972) found that although white offenders tend to be more specialized than nonwhite offenders, nonwhites exhibited a greater tendency to switch to violent offense types. Bursik (1980) found that both whites and nonwhites engaged in specialized offending, with nonwhite juveniles more likely than white juveniles to move to violent offenses. Rojek and Erickson (1982), however, failed to find evidence of race differences in offense switching. Using arrest records, Blumstein et al. (1988) found some evidence of specialization in each crime type among Michigan offenders; however, specialization was not uniformly strong across all crime types. For example, drugs were a highly specialized crime type among whites and blacks, but fraud was more specialized among white offenders while auto theft was more specialized among black offenders. Blumstein et al. (1988) concluded that levels of specialization were generally similar for active white and black offenders for most crime types. Tracy, Wolfgang, and Figlio (1990) examined specialization across race in both the 1945 and 1958 Philadelphia birth cohorts and found, in general, that there were no race effects with regard to specialization. However, when Tracy, Wolfgang, and Figlio removed desisters and concentrated on recidivists, they found race effects. In particular, the white "chronics" (i.e., those with more than four arrests) in the 1945 cohort repeated theft offenses, while white chronics

in the 1958 cohort appeared to specialize in theft and combination offenses. Nonwhite chronics in the 1945 cohort showed evidence of repeating more offense types than their white counterparts in either cohort, and strong evidence of specialization was observed for injury offenses among nonwhite offenders in the 1958 cohort (Tracy, Wolfgang, and Figlio 1990, p. 173). The evidence for specialization was stronger in both cohorts as the number of recidivist offenses increased. Piquero and Buka (2002), however, failed to find evidence of specialization in violence with court referral data through age seventeen among white and nonwhite members of the Providence perinatal cohort.

Directly related to the specialization issue is the switching that occurs across clusters of crime types. Clusters represent natural groupings of offense types (violence, property, other), and research tends to indicate that adult offenders display a stronger tendency to switch among offense types within a cluster and a weaker tendency to switch to offense types outside a cluster, but the strong partitioning is not as sharp among juveniles (Blumstein et al. 1986; Cohen 1986). Among juveniles, there appears to be a tendency to switch between violent and property offenses. Rojek and Erickson (1982) found a sharp partition between traditional crime categories and juvenile status offenses. Interestingly, the tendency for offense types to cluster varies somewhat by race, with a stronger partition between violent and property offenses evident among black than among white offenders.

Blumstein et al. (1988) engaged in the most comprehensive analysis of crime-type switching with arrest data from Michigan offenders. Using four categories (violent, robbery, property, and drugs), they found that black offenders were more likely than white offenders to switch to violence or robbery and less likely to switch to offenses involving drugs. Rates of switching to property offenses were similar for whites and blacks (Blumstein et al. 1988, p. 331).

Le Blanc and Fréchette (1989) used data from two Canadian samples to study issues related to offense variety and changes in the crime mix. Regarding variety, they found that in both adolescent and delinquent samples, their offending behavior was more heterogeneous than homogeneous. Several important findings emerged concerning changes in the crime mix. First, burglary was a common criminal act engaged in by most delinquents. Second, when the degree of diversity increased, automobile theft increased. Third, crime severity increased throughout the juvenile period with a more serious crime mix in late adolescence

as offenders moved away from crimes of theft and on to more personal crimes such as armed robbery. Fourth, as age increased, there was a tendency for more specialized offending patterns.

The empirical literature on crime-type switching and offense clusters suggests that violent and property offenses form distinct clusters and that adult offenders and incarcerated juveniles are more likely to commit offenses within a cluster than to switch to offenses outside a cluster (Cohen 1986; Visher 2000). Drug offenders, however, do not tend to switch to either violent or property offenses (Cohen 1986; Blumstein et al. 1988). There is also some evidence of increasing specialization with age.

4. *Co-offending Patterns.*     Criminal activity, especially adolescent delinquency, is a group phenomenon (Cohen 1955; Zimring 1981; Tremblay 1993). Unfortunately, little empirical work has been completed on this, and little information exists regarding the group criminal behavior of youths in transition to adult status or of adult offenders at different ages (Reiss 1986*a*).

Reiss and Farrington (1991) used the Cambridge data to examine patterns of co-offending, and their results yielded five key findings. First, while most juvenile and young adult offenses were committed with others, the incidence of co-offending declined steadily with age. Males changed from co-offending to lone offending in their twenties, a finding that provides indirect support for Moffitt's contention that peers are important during adolescence but become less of a factor in adulthood. Second, burglary, robbery, and theft from vehicles were particularly likely to involve co-offenders, which raises the possibility that co-offending matters more for some crimes than others. Third, there was some consistency in co-offending from one offense to the next. Fourth, co-offenders tended to be similar in age, gender, and race, and typically lived close to the locations of the offenses. Fifth, about one-third of the most persistent offenders continually offended with less criminally experienced co-offenders, perhaps indicating that these persistent offenders repeatedly recruited others, a finding also consistent with Moffitt's prediction that persistent offenders recruit others into criminal activities.

Warr (1996) used self-report data from the National Survey of Youth to study organization and instigation in delinquent groups and offered four key findings. First, although delinquent groups were small and transitory, offenders belonged to multiple groups. Second, groups appeared to be more specialized in offending than did individuals.

Third, most delinquent groups had an older, more experienced leader. Fourth, roles within delinquent groups changed over time contingent on the situational interaction of both group and individual characteristics.

In the Swedish Borlänge study, a project that studied all juveniles suspected of offenses in the Borlänge police district between 1975 and 1977, Sarnecki (1990) found that 45 percent of all youths suspected of offenses at some stage during the six-year study period could be linked together in a single large network that accounted for the majority of all offenses. Network membership was important for youths' introduction to—and continued involvement in—delinquency. Further, Sarnecki found a large overlap between the juveniles' circle of friends and their circle of co-offenders.

Recently, Sarnecki (2001) completed the most comprehensive study of delinquent networks. Using data from all individuals aged twenty or less who were suspected of one or more offenses in Stockholm during 1991–95, Sarnecki examined official records to assess the extent and role of co-offending. A number of important findings emerged. First, 60 percent of the individuals had a co-offender at some point. Second, the more active delinquents tended to have the most co-offenders. Third, like Warr, Sarnecki observed that much co-offending was transient and short-lived. Fourth, burglary and shoplifting were the most common co-offending crimes. Fifth, most co-offending and co-offenders tended to be of the same age. However, there were some important gender differences in co-offending. Males tended to co-offend primarily with other males; this was the case for over 94 percent of the offenses among males between ages ten and twenty-one. Among females, however, the proportion of girls choosing other females was lower than the proportion of boys choosing other males as co-offenders (Sarnecki 2001, p. 65). Interestingly, and consistently with Warr's (1996) observations, the older girls chose males as co-offenders much more often than did younger girls. Moreover, the male co-offenders chosen by girls were on average considerably older than the girls were themselves (p. 65). When a girl was suspected of co-offending with a male, the age difference was almost four years, while the age difference between female co-offenders and male co-offenders was one and 1.2 years, respectively. Sixth, co-offenders tended to live close to offenders, though the distance between co-offenders' places of residence increased with age (p. 65).

Conway and McCord (2002) conducted the first co-offending study

designed to track patterns of violent criminal behavior over an eighteen-year period (1976–94) among a random sample of 400 urban offenders and their accomplices in Philadelphia. The distinctive aspect of this research was its use of court records. Conway and McCord argued that self-report records may overestimate the role that peers play in criminal activity. Using crime data collected from Philadelphia court records and "rap sheets," they found that nonviolent offenders who committed their first co-offense with a violent accomplice were at increased risk for subsequent serious violent crime, independent of the effects of age and gender (Conway and McCord 2002, p. 104). This suggests that violence may "spread" from violent offenders to those inexperienced in violence.

Though not directly related to co-offending patterns, Haynie (2001) used data from the National Longitudinal Study of Adolescent Health to examine how network structures are incorporated into the roles of delinquent peers more generally. Two main findings emerged. First, friends' delinquency, as measured by responses from friends who composed the adolescent's friendship network, was associated with an adolescent's own self-reported delinquency. Second, network properties summarizing the structure of friendship networks moderated the delinquency/peer association. In particular, delinquent friends had a weaker association with delinquency when adolescents were located in a peripheral position within their peer network, when their peer network was not very cohesive, and when they had less prestige. Delinquent friends had a stronger association when adolescents were located in a central position within their friendship networks, when their friendship network was very dense, and when they were nominated as friends by others.

## C. Comparing Causes of Criminal Career Dimensions

One of the key questions raised by the criminal career paradigm is the extent to which the causes of one dimension, for example, onset, are the same as the causes of another dimension, for example, frequency. Evidence on this question is important because it is relevant to matters related to both theory and policy. For example, if the different criminal career dimensions result from the same causal process, then specific theories of onset, persistence, specialization, and desistance are unnecessary and more general theories of crime should suffice. If different causal processes are associated with different criminal career dimensions, then more dimension-specific or typological theories would

be needed. Relatedly, if the causes of criminal career dimensions are more similar than different, then policy proscriptions do not need to be as specific as they would need to be if the causes of various criminal career dimensions were different.

Several studies are germane. Paternoster and Triplett (1988) examined self-report data from South Carolina high school students and found that causal processes relating to prevalence and incidence were different. Paternoster (1989) examined the relations of several different criminological variables (i.e., peers, sanction risk, etc.) to onset, persistence/desistance, and frequency of delinquency, using the same data, and found many similarities across the offending dimensions, with the exception that peer involvement in delinquency had no impact on initiation but was related to continuation. Nagin and Smith (1990) used self-report data from the NYS to study the determinants of participation and frequency and found that, while some variables were associated with one but not the other dimension, the majority of variables were related to both dimensions. Loeber et al. (1991) used self-report data from the Pittsburgh site of the causes and correlates study to investigate the correlates of initiation, escalation, and desistance in juvenile offending. Although they had data for only two years, they, somewhat surprisingly, found that the correlates of initiation were distinct from the processes explaining escalation but were similar to the correlates of desistance. Using data from the Cambridge study, Farrington and Hawkins (1991) investigated whether several variables were similarly related to participation, early onset, and persistence. They found that, in general, the three crime outcomes were predicted by different variables measured in childhood.

Smith, Visher, and Jarjoura (1991) studied the correlates of participation, frequency, and persistence in delinquency with self-report data from the NYS and found that while some variables were related to specific dimensions of delinquency, a core of variables were related to multiple dimensions of delinquency. Nagin and Farrington (1992b) used the Cambridge data to examine the correlates of initiation and persistence and found that low IQ, having criminal parents, a "daring" or risk-taking disposition, and poor child rearing were associated with an initial conviction as well as subsequent convictions. Smith and Brame (1994) used self-report data from the NYS and found that, while many variables similarly predicted initial and continued involvement in delinquency, other variables predicted only one of these dimensions. For example, moral beliefs were related only to initiation

and not continuation. Triplett and Jarjoura (1994) also used the NYS to study the disaggregation issue and found that, consistent with labeling theory, informal labels were predictive of the decision to continue rather than to initiate delinquent behavior.

Mazerolle (1997) used the first five waves of the NYS to examine whether, on the basis of prevailing developmental theories, different factors such as exposure to delinquent peers, social class, and so on, predicted early and late onset of self-reported delinquency. He also examined whether the relationships differed for serious as opposed to more general or trivial acts of delinquency. In a series of logistic regression models, Mazerolle found support for different predictors of delinquency, dependent on participation age; however, the relationships were not observed for trivial acts of delinquency. In sum, he found support for developmental theories that assert that different factors differentiate early and late onset to delinquency, but only when serious acts of delinquency are considered.

Using data from the Seattle Social Development Project, Ayers et al. (1999) examined the correlates of onset, escalation, de-escalation, and desistance from age twelve to fifteen and found that many of the correlates distinguished those juveniles who remained involved in delinquency from those who de-escalated or desisted from delinquency. Ayers and his colleagues also found some similarities and differences across gender in how the different correlates were associated across the offending dimensions. Piquero (2001) used police contact data from the Philadelphia Perinatal Project and found that neuropsychological risk was related to early onset, chronic offending, as well as crime seriousness through age seventeen.

The evidence thus far on the correlates of different criminal career dimensions suggests that in most studies, some variables are associated with two or more dimensions and some are uniquely associated with just one dimension. Thus, no clear pattern has yet emerged. Even less is known about the relative magnitude of these effects. However, it does not appear that correlations are similar for all dimensions, as Gottfredson and Hirschi argued.

## D. "Chronic" Offenders

Criminologists have long recognized that a small group of individuals is responsible for a majority of criminal activity. This finding is one of the key foundations of the criminal career paradigm and its resultant policies.

1. *Recognition of Chronic Offenders.*    Wolfgang, Figlio, and Sellin (1972) focused attention on the chronic offender. They applied that label to the small group of 627 delinquents in the 1945 Philadelphia birth cohort who were found to have committed five or more offenses. This group constituted just 6 percent of the full cohort of 9,945 males and 18 percent of the delinquent subset of 3,475, but was responsible for 5,305 offenses, or 52 percent of all delinquency in the cohort through age seventeen. The chronic offenders were responsible for an even larger percentage of the more serious, violent offenses. The finding that a small subset of sample members is responsible for a majority of criminal activity is supported by data from other longitudinal data sets, including the second 1958 Philadelphia birth cohort (Tracy, Wolfgang, and Figlio 1990), the Puerto Rico Birth Cohort Study (Nevares, Wolfgang, and Tracy 1990), the Dunedin Multidisciplinary Health Study (Moffitt et al. 2001), the Philadelphia (Piquero 2001) and Providence (Piquero and Buka 2002) perinatal projects, the Racine birth cohorts (Shannon 1982), the Cambridge study (Farrington 2002), and also by cohort studies in Sweden (Wikström 1985), Finland (Pulkkinen 1988), and Denmark (Guttridge et al. 1983). The finding is also replicated across gender and race (see Moffitt et al. 2001; Piquero and Buka 2002) and emerges from both official and self-report data (Dunford and Elliott 1984). Research indicates that chronic offenders tend to exhibit an early onset, a longer career duration, and involvement in serious offenses—including person/violent-oriented offenses—than other offenders (Farrington et al. 1990; Piquero 2000; Farrington 2002). Thus, in any group or cohort of subjects, there is likely to be an uneven distribution of offenses with most individuals committing zero offenses, some individuals committing one or two offenses, and a very small number of individuals accumulating many offenses (Fox and Tracy 1988; Tracy and Kempf-Leonard 1996). It is no surprise then, that theorists have directly incorporated the chronic offender into their explanatory frameworks (see in particular Moffitt 1993).

2. *Defining Chronicity and Related Problems.*    Wolfgang, Figlio, and Sellin (1972) defined as chronic offenders those individuals with five or more police contacts by age seventeen. This five-plus cutoff has been employed in several studies (Hamparian et al. 1978; Shannon 1978; Kempf-Leonard, Tracy, and Howell 2001). However, since theoretical or empirical definitions of chronicity have yet to be established (Dunford and Elliott 1984; Le Blanc 1998, p. 169; Loeber et al. 1998, p. 15), questions have been raised about the extent to which similar definitions

of chronicity should be used across gender (Farrington and Loeber 1998; Piquero 2000), and researchers have also called into question the relatively arbitrary designation of five-plus offenses as characteristic of chronicity (Blumstein, Farrington, and Moitra 1985). For example, regarding gender, Piquero (2000) found only seven women who had five-plus offenses through age seventeen in the Philadelphia Perinatal Project and thus had to employ four-plus as the chronic offenders criterion for females. Piquero and Buka (2002), using data from the Providence Perinatal Project, were forced to use the criteria of two-plus for chronicity among females, because of the very small number of female delinquents who incurred more than three offenses.

Blumstein, Farrington, and Moitra (1985) raised other concerns with the use of five-plus as the chronicity cut point. They argued that the chronic offender calculation, which was based on the full cohort, overestimates the chronic offender effect because many cohort members will never be arrested. Instead, they urge that the ever-arrested subjects should be the base used to calculate the chronic offender effect. With this base, the 627 chronics with five-plus arrests represented 18 percent of those arrested, as opposed to 6 percent of the cohort. Blumstein, Farrington, and Moitra (1985) also argued, based on evidence presented by Blumstein and Moitra (1980), that the proportion of chronic offenders observed by Wolfgang, Figlio, and Sellin (1972) could have resulted from a homogenous population of persisters. Blumstein and Moitra tested the hypothesis that all persisters (those with more than three arrests) could be viewed as having the same rearrest probability. Such an assumption could not be rejected. Although those with five or more arrests accounted for the majority of arrests among the persisters, such a result could have occurred even if all subjects with three or more arrests had identical recidivism probabilities (Blumstein, Farrington, and Moitra 1985, p. 189). Thus, the chronic offenders who were identified retrospectively as those with five or more arrests could not have been distinguished prospectively from nonchronics with three or four arrests.

3. *Difficulty of Prospective Predictability*. Blumstein, Farrington, and Moitra (1985) also raised the concern that not all persisters are homogenous. As a result, they argued that researchers and policy makers should want to be able to distinguish prospectively the offenders who are likely to accumulate the largest number of arrests. Since Wolfang, Figlio, and Sellin (1972) identified the chronic offenders retrospectively, they offered no discriminators that could distinguish, in

advance, those individuals who were likely to emerge as chronic of-
fenders.

Blumstein, Farrington, and Moitra (1985) developed a model that
divided the Cambridge study into three groups: innocents (those with
no offenses), persisters (those with relatively high recidivism probabili-
ties), and desisters (those with relatively low recidivism probabilities).
Several important findings emerged. First, identification of chronic of-
fenders in the 1945 Philadelphia birth cohort as those with five or
more arrests was inappropriate; instead, on the basis of transition prob-
abilities, it was more reasonable to identify those with six or more ar-
rests as a relatively more homogenous group of chronic offenders
(Blumstein, Farrington, and Moitra 1985, p. 195). Second, they calcu-
lated recidivism probabilities for innocents, desisters, and persisters in
the Cambridge study. Third, using observations made at age ten of
boys in the Cambridge study to identify persisters prospectively, they
formulated two models: an aggregate model in which the entire cohort
of active offenders was characterized by three parameters and an indi-
vidual model in which each boy was characterized as a persister or
desister at his first conviction based on individual characteristics mea-
sured at ages eight to ten. Blumstein, Farrington, and Moitra (1985)
found that the strongest discriminator of chronics versus nonchronics
was "convicted by age thirteen," followed by "convicted sibling," and
"troublesomeness." The fifty-five youths scoring four or more points
out of seven on a risk variable included the majority of the chronics
(fifteen out of twenty-three), twenty-two of the nonchronic offenders,
and eighteen of those never convicted. Further analysis indicated that
it is appropriate to distinguish individuals based on differential recidi-
vism probabilities rather than some arbitrary number of arrests, and
this is especially important since their probabilistic model also permits
some persisters to drop out early and some few desisters to accumulate
a large number of arrests. Their analysis indicated that "to a reasonable
degree, many of the chronics can be identified at their first conviction
on the basis of information available at age ten" (Blumstein, Farring-
ton, and Moitra 1985, p. 201).

## E. Relevance to Incapacitation

Incapacitation effects are maximized when highest $\lambda$, longest dura-
tion, most serious offenders are incarcerated. Knowledge of offenders'
involvement in the various criminal career dimensions, especially the
frequency of offending, has direct import for incapacitation decisions

and outcomes. Identification of those offenders with the highest λ, exhibiting the longest career duration, and engaging in the most serious offenses would be an achievement of incapacitation goals. To the extent that incapacitation decisions are targeted on individuals exhibiting these offending characteristics, then incapacitation effects (realized by lower crime rates, shorter careers, and lower overall levels of criminal activity) would be maximized.

Crime control effects through incapacitation increase with the magnitude of individual offending frequency (λ), with the length of incarceration, and with the expected duration of the criminal career (Blumstein et al. 1986). To the extent that high λ offenders are incapacitated during the period in which they are at high risk of offending and not during the period when they are at low or no risk of offending, then more crimes will be averted by their incarceration. Incapacitation policies are more likely to be effective if they are applied during active careers and not after criminal careers have ceased or when careers are in a downswing, when offenders tend to commit crimes at rates "indistinguishable from zero" (see Cohen and Canela-Cacho 1994; Bushway et al. 2001). Incapacitative effects will depend on the effectiveness of the criminal justice system in identifying and incarcerating high-rate offenders during the peaks of their careers.

### F. New Questions/Criminal Career Issues Recently Raised

A number of research efforts have been designed to understand better the patterning and determinants of criminal activity over the life course. There appears to be a paradigm shift away from measurement of criminal career parameters and toward a search for risk and protective factors, a perspective very common to the public health field. In this section, we examine four key themes that emanate from longitudinal studies and current research, including how these studies have led to a new focus on risk and protective factors, why risk and protective factors are easy for practitioners to understand, why risk and protective factors provide policy guidance, and how risk and protective factors link research and intervention.

1. *Focus on Risk/Protective Factors.*   Blumstein et al. (1986) sought to describe the longitudinal patterning of crime over the life course, especially the manner in which the key demographic correlates of age, gender, and race were associated with criminal career dimensions. The report did not devote great attention to identification and explanation of factors associated with continued or curtailed involvement in criminal

activity over time. Much of the data and analysis reviewed in the report were from prior to 1985 when data collections were difficult and costly, especially those following individuals over long periods.

Since then, researchers have paid explicit attention to risk and protective factors associated with criminal activity over the life course. The risk factor prevention paradigm, imported from medicine and public health (Hawkins and Catalano 1992), focuses on factors that predict an increase in the probability of later offending (i.e., a risk factor) or a decrease (i.e., a protective factor) (Kazdin et al. 1997). Defining risk and protective factors has been controversial, and researchers continue to suggest that a uniform definition be developed (Farrington 2000). Risk and protective factors may also interact with one another; a protective factor (such as high IQ) may interact with a risk factor (such as poor socioeconomic status) to minimize the risk factor's effect (see Rutter 1985). It is also important to distinguish between risk factors that are predictive but not changeable (e.g., race) from those that are changeable (e.g., poor parenting). With knowledge of the effects of risk and protective factors, prevention and intervention efforts can be developed and targeted at the most appropriate individuals, families, and communities (see Tremblay and Craig 1995). In short, the risk factor paradigm aims to identify the key risk factors for offending, implement prevention methods to counteract them, and identify and enhance protective factors (Farrington 2000).

2. *Risk/Protective Factors in Practice.* A principal advantage of the risk factor paradigm is that it links explanation and prevention, fundamental and applied research, and scholars and practitioners (Farrington 2000, p. 7). It provides for the easy identification of factors that are associated with increased and decreased probabilities of criminal activity and allows for the implementation of prevention and intervention efforts aimed at reducing risk factors and enhancing protective factors. When a fatty diet and a lack of exercise are used as examples of risk factors for heart disease, it is easy to conceive of prevention and intervention efforts as encouraging people to eat healthier and exercise. A risk factor like family history of heart disease, by contrast, cannot be prevented but serves as a stimulus to other preventive actions. In the context of crime then, practitioners can be shown risk factors (i.e., poor parenting) and then asked to identify appropriate prevention and intervention efforts (e.g., parent training).

3. *Policy Guidance.* The risk factor paradigm is based largely on medical terminology and is easy to understand and to communicate. It

is no surprise that it is readily accepted by policy makers, practitioners, and the general public (Farrington 2000). Furthermore, because it involves establishing the key risk factors for delinquency, the risk factor paradigm provides useful information for implementing prevention programs designed to target those risk factors. Similarly, research on establishing the protective factors against delinquency provides important information for enhancing such factors. Hawkins and Catalano's (1992) Communities That Care (CTC) is a risk-focused prevention program that is based on the social development model that organizes risk and protective factors, and each community tailors the interventions according to its particular risk and protection profile. In general, CTC aims to reduce delinquency and drug use by implementing particular prevention efforts that have demonstrated effectiveness in reducing risk factors or enhancing protective factors (Farrington 2000, p. 11). In sum, the risk factor paradigm represents a clear advance over vague theories of criminal activity that were often difficult to assess empirically and provides clearer direction for prevention and intervention (Guerra 1998, p. 398).

4. *Link between Research and Intervention.*   The risk factor paradigm is well suited for the interplay between research and intervention. For example, the CTC program begins with community mobilization. Key community leaders (e.g., mayor, police chief, etc.) are brought together with the idea of getting them to agree on the goals of the prevention program and to support the implementation of CTC. Then the leaders set up a community board (e.g., including representatives of schools, parents, church groups, social services, police, etc.) that articulates the prevention effort. The board then carries out a risk and protective factor assessment in its particular community. After the assessment, the board develops a plan for intervention. Research is conducted on the implementation of the intervention and the intervention outcome. That information is then used either to strengthen the intervention effort or to modify it. The process is repeated over time as risk and protective factors may change within individuals, as well as within families, schools, and communities.

A number of efforts have generated important insight into the risk and protective factors associated with antisocial and criminal activity (Werner and Smith 1982; Stouthamer-Loeber et al. 1993). A recent comprehensive review of the various risk and protective factors associated with criminal activity, especially among serious offenders, has been influential in furthering research and intervention efforts follow-

ing the risk factor paradigm (Loeber and Farrington 1998). This paradigm shift into searching for risk and protective factors represents a significant advance in criminology and has fostered links between explanation and prevention, fundamental and applied research, and scholars, policy makers, and practitioners (Farrington 2000, p. 16).

## VI. Policy Implications

Research on criminal careers has direct import for decision making in the criminal justice system. Policy officials are interested in preventing criminal activity from starting and in modifying and terminating current criminal activity. In this section, we address four implications of criminal career research: the role of criminal career research in policy and individual decision making, individual prediction of offending frequencies ($\lambda$), sentence duration, and research on career length and desistance and its relation to intelligent sentencing policy.

### A. Role of Criminal Career Research in Policy and Individual Decision Making

Criminal career research relates to decisions made throughout the criminal justice process and system (i.e., arrest, pretrial release, prosecution, sentencing, and parole). A principal example of the importance of criminal career research for criminal justice policy is the length of criminal careers. Three-strikes and selective incapacitation philosophies assume that high-rate offenders will continue to offend at high rates and for long periods of time if they are not incarcerated. However, from an incapacitative perspective, incarceration is only effective in averting crimes when it is applied during an active criminal career. Thus, incarceration after the career ends, or when a career is abating, is wasted for incapacitation purposes (Blumstein, Cohen, and Hsieh 1982, p. 70).

1. *General Policy Guidance.* By identifying career lengths, especially residual career lengths, policy makers can better target incarceration on offenders whose expected remaining careers are longest. Incarceration policies should be based on career duration distribution information. The more hard-core committed offenders with the longest remaining careers are identifiable only after an offender has remained active for several years (Blumstein, Cohen, and Hsieh 1982). Earlier and later in criminal careers, sanctions will be applied to many offenders who are likely to drop out shortly anyway (Blumstein, Cohen, and Hsieh 1982, p. 71). In sum, the benefits derived from incapacitation

will vary depending on an individual's crime rate and the length of his or her remaining criminal career. Continuing to incarcerate an offender after his or her career ends limits the usefulness of incarceration.

2. *Identification of Serious "Career Criminals."* Since Wolfgang, Figlio, and Sellin's (1972) recognition of the "chronic offender," a search has been underway for "career criminals." Here, we describe three aspects of identifying career criminals, including recognition that skewness in the $\lambda$ distribution suggests seeking those in the high tail, the problem of identifying career offenders (i.e., false positives), and the limited usefulness of the concept in individual cases because of the need for prediction, including limited prediction validity and concern over false positives.

a. Skewness. Three main findings emerge from a number of different longitudinal crime studies, in different countries, in different time periods, and with different measurements of criminal activity. First, many individuals never commit, or are arrested for, a criminal act. Second, some individuals commit one or two crimes and desist. Third, a small number of individuals offend frequently over time. In any cohort of subjects, there will be an uneven distribution of offenses (Fox and Tracy 1988). It is this third finding, the recognition of skewness, that has led researchers and policy makers to study chronic or career criminals.

b. Problems with Identification. To the extent that criminal justice personnel can correctly identify and selectively target the small group of chronic/career criminals, criminal activity could be substantially reduced. Predictive classifications, however, have been fraught with problems including a high false positive rate (i.e., an offender is predicted to be a chronic offender but turns out not to be). Moreover, prospectively identifying career criminals early in their careers, when such information would be most useful, has been particularly difficult.

c. Limited Usefulness in Individual Cases. Since most of the criminal career research aimed at identifying serious career criminals has tended to examine aggregate distributions of offense rates in large samples, such information has limited usefulness in predicting chronicity in individual cases. This is largely because of the need for prediction on a more aggregate level. Current prediction tools have limited validity because of the inherent errors in predictions (Visher

2000). As many as one-half to two-thirds of such predictions have been shown to be incorrect (Blumstein et al. 1986; Decker and Salert 1986; Farrington 1987; Chaiken, Chaiken, and Rhodes 1993; Gottfredson and Gottfredson 1994; Spelman 1994). Visher (1986), for example, found that Greenwood's scale for predicting future criminal activity was unable to predict very accurately which inmates would commit new crimes, much less which inmates would go on to become career offenders. Still, researchers continue to develop tools for predicting high-rate offenders (Gottfredson 1999).

## B. Individual Prediction of λ

Rand's second inmate survey (Chaiken and Chaiken 1982) highlighted the extreme skewness of the distribution of λ for a sample of serious criminals (Visher 1986). Naturally, the identification of a small number of inmates who reported committing several hundred crimes per year led to the search for a method to identify these offenders in advance. If high-rate offenders cannot be identified prospectively, then crime control efforts will be hampered (Visher 1987). In this section, we highlight two related issues: the difficulty in identifying high λ individuals and the alleviation of the concern over prediction by "stochastic selectivity."

1. *Difficulty in Identifying High λ Individuals.* Although high λ individuals emerge in the aggregate, it has been difficult to identify specific individuals. Greenwood and Turner (1987) used data consisting of follow-up criminal history information on the California inmates who were included in the original Rand survey and who had been out of prison for two years to examine the extent to which Greenwood's seven-item prediction scale succeeded in predicting recidivism. The scale was not very effective in predicting postrelease criminal activity when the recidivism measure is arrest. The majority of released inmates, regardless of whether they were predicted to be low- or high-rate offenders, were rearrested within two years. Moreover, the seven-item scale was also a poor predictor of "safety" arrests (i.e., murder, aggravated assault, rape, robbery, or burglary) as 46.9 percent of low-rate offenders and 54.7 percent of high-rate offenders were arrested for a safety offense. Greenwood and Turner (1987, tables 3.11, 3.12) also created a measure of the offender's annual arrest rate (i.e., the number of arrests per year of street time) for the follow-up sample and defined high-rate offenders as those inmates who had an actual arrest rate greater than 0.78. They found that the seven-item scale

was less accurate in predicting annual arrest rates than it was in predicting reincarceration. For example, among those predicted to be low-moderate-rate offenders, 39.1 percent had a high annual arrest rate, while the comparable estimate among high-rate offenders was 57.4 percent. In part, this was a weak test because it used the arrest rate ($\mu$) rather than $\lambda$ as the outcome measure. To the extent that there is a negative association between $\lambda$ and the arrest probability, then that would diminish any power to the prediction based on factors associated with high $\lambda$.

There are also concerns related to the false positive prediction problem in identifying high $\lambda$ individuals. For example, Visher (1986, pp. 204–5) reanalyzed the Rand second inmate survey and generated a number of important conclusions. First, the estimates of $\lambda$ for robbery and burglary were sensitive to choices in computation (i.e., handling missing data, street time, etc.). Second, some inmates convicted of robbery and burglary denied committing any robberies and burglaries. Third, some inmates reported annual rates of 1,000 or more robberies or burglaries, thus strongly affecting the distribution of $\lambda$, and especially its mean. Fourth, $\lambda$ varied considerably across the three state samples. Fifth, Visher's analysis of the Greenwood scale for identifying high-rate offenders indicated that 55 percent of the classified high-rate group (27 percent of the total sample) were false positives who did not commit crimes at high rates. In fact, the prediction scale worked better in identifying low-rate offenders. Sixth, the anticipated reduction in the California robbery rate identified by Greenwood and Abrahamse (1982) was overestimated. Finally, because the scale captured only frequency and not termination of careers, its prospective accuracy is likely to deteriorate further as careers end.

Using longitudinal data on a sample of serious California offenders released on parole, Haapanen (1990) tested the assumption underlying the selective incapacitation model that criminal careers are characterized by a reasonably constant rate of criminal behavior, especially among high-rate offenders. Haapanen found that arrest rates were not stable and declined with age. He found that few offenders maintained a consistent pattern of being in the lowest, middle, or highest third of the sample in terms of their rates of arrest over a four-year period (Haapanen 1990, p. 140). A small minority (28 percent over three periods and 12 percent over four periods) were in the highest third over most of the periods. Thus, the assumption that rates are stable will likely overestimate the amount of crime that could be prevented by

selectively incapacitating those identified as high-rate offenders be-
cause high-rate offenders are not always high rate. Another important
finding emerging from Haapanen's analysis is that in the four years
prior to incarceration, offenders were accelerating in criminal activity
(as measured by their arrests), suggesting that the preincarceration
period may not be appropriate for establishing typical levels of distri-
butions of offense rates. Arrest rates tended to be much lower after
release from incarceration. Finally, of those offenders who had the
highest rates of arrest prior to prison, only 40 percent were among the
highest third after release, as compared to almost 30 percent of those
who were not high rate prior to prison (Haapanen 1990, p. 141).
Haapanen (1990, pp. 142–43) concluded that the identification of
high-rate offenders is "problematic" and likely to produce a large pro-
portion of false positives.

Recently, Auerhahn (1999) replicated Greenwood and Abrahamse's
(1982) selective incapacitation study with a representative sample of
California state prison inmates. She found that the selective incapacita-
tion scheme advocated by Greenwood and Abrahamse performed
poorly with a scale that closely mimicked the one developed and em-
ployed by Greenwood and Abrahamse. Auerhahn found that the over-
all predictive accuracy of her scale was 60 percent, indicating a great
deal of error in identifying serious, high-rate offenders. In sum, the
problem of identifying high-rate offenders appears to limit the utility
of sentencing strategies based on selective incapacitation (Visher 1987,
p. 538).

2. *Concern and Need for Prediction Alleviated by "Stochastic Selectivity."*
Many analyses of the crime control potential of increasing incarcera-
tion rely on a single estimate of mean $\lambda$ derived from prison inmates
and applying it indiscriminately to all related populations of offenders
(Canela-Cacho, Blumstein, and Cohen 1997). This assumes that all of-
fenders engage in the same amount ($\lambda$) of criminal behavior—regard-
less of whether they are in prison or jail, or free in the community—
and that the probability of their detection and incarceration is equal.
Unfortunately, measures of $\lambda$ derived from arrestee/convictee popula-
tions display a strong selection bias because individuals who have gone
through the criminal justice process are unlikely to be representative
of the total offender population. This selection bias could be because
samples of arrestees have a higher propensity for arrest or different of-
fending frequencies. Regardless of the source of bias, there is consider-
able diversity among offender populations. A highly heterogeneous

distribution of offending frequency in the total population of offenders combines with relatively low imprisonment levels to lead to substantial selectivity of high $\lambda$ offenders among resident inmates and a correspondingly low mean value of $\lambda$ among those offenders who remain free (Canela-Cacho, Blumstein, and Cohen 1997). "Stochastic selectivity," then, draws new inmates disproportionately from the high end of the distribution of free offenders. These new inmates will selectively display high average $\lambda$'s, but their average $\lambda$ will be lower than that of the current inmates. Furthermore, the higher the incarceration probability following a crime, the deeper into the offender pool incarceration will reach, and the lower will be the incapacitation effect associated with the incoming cohorts (Canela-Cacho, Blumstein, and Cohen 1997).

Using data from the second Rand Inmate Surveys, Canela-Cacho, Blumstein, and Cohen (1997) studied the issue of stochastic selectivity by applying a mixture model that measures the overrepresentation of high $\lambda$ offenders among prison inmates as a function of variability in individual offending frequencies and severity of criminal justice sanction policies. Focusing on the crimes of robbery and burglary among inmates in California, Texas, and Michigan, they derived estimates of $\lambda$ for offenders in prison, entering prison, free in the community, and the entire population of similar offenders.

A number of important findings emerged. First, if all offenders within a state and crime type were assumed to face an identical imprisonment risk and time-served distribution, the share of similar offenders who were in prison increased substantially with increasing $\lambda$. Second, the proportion of low $\lambda$ burglars and robbers among free offenders was much larger than among resident inmates, while at the high end of the offending frequency distribution, there was a larger proportion of high $\lambda$ burglars and robbers among resident inmates than among free offenders. Thus, the concentration of high $\lambda$ offenders found among inmates results from stochastic selectivity operating on heterogeneous distributions of $\lambda$. In other words, selectivity occurred naturally as high $\lambda$ offenders experienced greater opportunities for incarceration through the greater number of crimes they committed (Canela-Cacho, Blumstein, and Cohen 1997, p. 142), thereby obviating the need for efforts to identify explicitly individual high $\lambda$ offenders. Since high $\lambda$ offenders represent a small fraction of the total population of offenders, it seems unwise to use the mean $\lambda$ of prisoners to represent the mean for the total population of offenders. In sum,

analyses of the impact of incarceration policies that rely on mean values of $\lambda$ will substantially overstate the likely crime reduction to be derived from expanding imprisonment because the population of free offenders is dominated by lower $\lambda$ offenders.

## C. Sentence Duration

Information about crime rates and career lengths is particularly useful for incapacitation and incarceration decisions and policies. Principal among these is the decision regarding sentence length.

1. *Estimates of Criminal Career Duration.*   Many current sentencing policies are based on the assumption that high-rate offenders will continue committing crimes at high rates and for lengthy periods. Thus, many policies prescribe either an additional period of years to a particular sentence or a lengthy incarceration stint (i.e., a twenty-five-year sentence for a third strike). The extent to which this policy is effective, however, is contingent on the duration of a criminal career.

Much debate regarding sentence length has centered on three-strikes policies. These policies severely limit judges' discretion because they prescribe a mandatory prison sentence of (typically) twenty-five years to life. The incapacitation effectiveness of three-strikes laws, however, depends on the duration of criminal careers. To the extent that sentencing decisions incarcerate individuals with short residual career lengths, a three-strikes law will waste incarceration resources (Stolzenberg and D'Alessio 1997, p. 466).

California's three-strikes statute requires enhanced penalties for any felony conviction if one prior conviction was for a listed strike offense and for those convicted two or more times of a strike offense. For the former group, imprisonment is mandatory, and prison sentences are three times longer than the usual time served for the particular felony. For the latter group, any felony conviction can result in a minimum of twenty years served in prison (Zimring, Kamin, and Hawkins 1999, p. 1).

Early research by Greenwood and his colleagues (1994) estimated that a fully implemented three-strikes law would reduce serious felonies by 22–34 percent. Stolzenberg and D'Alessio (1997) used aggregate data drawn from the ten largest cities in California to examine the impact of California's three-strikes law on serious crime rates. Using an interrupted time-series design, they found that the three-strikes law did not decrease serious crime or petty theft rates below the level expected on the basis of preexisting trends. Zimring, Kamin, and

Hawkins (1999) obtained a sample of felony arrests (and relevant criminal records) in Los Angeles, San Francisco, and San Diego, both before and after the California law went into effect. First, 10 percent of all felonies were committed by the two groups that were targets of the law, and two-thirds of those were committed by persons with only one prior strike (p. 2). Second, the profile of crimes committed by the two targeted groups was similar to the profile of crimes committed by other people. Third, while both second-strike- and third-strike-eligible defendants had more extensive criminal histories than ordinary felony defendants, they were not more active than defendants with two or more prior felony convictions who did not have strikes on their records. Fourth, while the three-strikes law was applied to between 30 and 60 percent of the second-strike-eligible cases, only 10–20 percent of the third-strike-eligible cases received the full third-strike treatment (p. 3). However, among those receiving the third-strike treatment, their imprisonment length was considerably increased (p. 51). Fifth, the mean age at arrest for two strikes and above was 34.6 years. That is not surprising because offenders with strikes tend to be older since they have had time to accumulate adult felony records (Zimring, Kamin, and Hawkins 1999, p. 34). This is particularly important because "on average the two or more strikes defendant has an almost 40 percent longer criminal adult career behind him (estimated at 16.6 years) than does the no-strikes felony defendant. All other things being equal, this means that the twenty-five-years-to-life mandatory prison sentence will prevent fewer crimes among the third-strike group than it would in the general population of felons because the group eligible for it is somewhat older" (Zimring, Kamin, and Hawkins 1999, p. 34). Older felons, then, are likely to be further along—and closer to the end of—their criminal careers. Finally, when comparing crime trends in the three cities before and after the law, Zimring, Kamin, and Hawkins found that there was no decline in the crimes committed by those targeted by the new law. In particular, the lower crime rates in 1994 and 1995 (just immediately after the three-strikes law went into effect) were evenly spread among targeted and nontargeted populations, suggesting that the decline in crime observed after the law went into effect was not the direct result of the law (p. 83).

Caulkins (2001) investigated whether the use of different definitions for the first, second, and third strikes, or different sentence lengths, could make incarceration more efficient (i.e., reduce more crimes). He used data from California (see Greenwood et al. 1994). Assuming that

the lengths of criminal careers were exponentially distributed, he found that the broader the definition of what constituted a strike, the greater the reduction in crime but the greater the cost per crime averted (p. 240). The problem with a very broad definition is that it fails to take advantage of stochastic selectivity, or the notion that high-rate offenders make up a larger proportion of third- rather than first-strike offenders (Caulkins 2001, p. 242). Caulkins concludes that the three-strikes law would be more effective if second- and third-strike offenders served six- and ten-year terms instead of the ten- and twenty-year terms required by the current law, and if sentences were lengthened for first-strike offenders.

Using data from Florida, Schmertmann, Amankwaa, and Long (1998) concluded that the aging of prison populations under three-strikes policies in that state will undermine their long-run effectiveness. In particular, they noted that the policies will cause increases in prison populations due to the addition of large numbers of older inmates who are unlikely to commit future offenses (p. 445).

The key to the sentence duration issue, and why estimates of criminal career duration are so important, rests on the characteristics of the person-years—not the people—that are removed from free society as a result of such policies (Schmertmann, Amankwaa, and Long 1998, p. 458). Such policies will be effective only to the extent that they incarcerate offenders during the early stages of their criminal careers when they are committing crimes at a high rate and not when they are older and winding down their criminal careers. Research on the rehabilitative and deterrence effects of incarceration on criminal career parameters is sorely needed.

## D. Research on Career Length and Desistance

Sentencing practices involving lengthy sentence durations assume that affected offenders will continue to commit crime at a high rate and for a long period. To the extent that this is the case, incapacitation policies will avert crimes and thwart continued careers. However, to the extent that offenders retire before the expiration of a lengthy sentence, shorter career durations will reduce the effects of lengthy sentences (see Blumstein, Cohen, and Hsieh 1982; Spelman 1994; Caulkins 2001).

Unfortunately, research on career duration and desistance is in its infancy. Empirical research on these issues is difficult, but not impossible. Knowledge on this subject will be important for furthering crimi-

nal justice policy and the cost-effective use of criminal justice resources.

### VII.  Directions for Future Criminal Career Research

The criminal career paradigm was developed to structure and organize knowledge about features and dimensions of individual offending and the patterning of criminal activity over the life course. Researchers have provided important evidence on criminal career dimensions, have developed between- and within-individual hypotheses regarding the causes and patterning of criminal activity, and have developed methodological and statistical techniques that furthered the study of criminal careers. Researchers have also provided evidence regarding the within-individual patterns of criminal activity that underlie the aggregate age/crime curve that challenges Gottfredson and Hirschi's claims that the shape of the aggregate age/crime curve is the same for all offenders and is unaffected by life events after childhood.

Much work remains to be done. We discuss the sorts of research needed to inform theory and policy, the types of data collection and modeling required for each criminal career dimension, and the methodological issues that need to be addressed.

### A.  Research Needed for Informed Theory and Policy

Evidence on criminal career issues cuts to the heart of theory and policy. On the theoretical side, knowledge on the correlates of criminal career dimensions is relevant to the necessity for general versus typological models. If research indicates that the correlates of one offending dimension are similar to another offending dimension, then more general and non-dimension-specific theories are warranted. If the correlates of one offending dimension are different from another offending dimension, then the causal processes underlying these two particular dimensions are probably different, and different explanations and theories are required.

Better knowledge on various criminal career dimensions would aid policy initiatives designed to prevent initial involvement, curtail current offending, and accelerate the desistance process. If research suggests that poor parental socialization is related to early initiation, then prevention efforts should include parent-training efforts. Similarly, if drug use is associated with continued involvement in delinquent and criminal behavior, then intervention efforts should include drug treatment. Finally, if some set of correlates is associated with desistance,

then policy efforts may wish to provide for specific prevention and intervention efforts.

Knowledge on career length and residual career length could best inform criminal justice policies because it deals directly with sentencing and incapacitation policies that are now driven more by ideology than by empirical knowledge. For example, if residual criminal career lengths average around five years, criminal justice policies advocating multidecade sentences waste scarce resources. Similarly, if offenders are incarcerated in late adulthood when their residual career lengths have diminished, incarceration space will be wasted, and health care costs will increase, thereby further straining scarce resources.

## B. Data Collection and Modeling for Each Dimension

Empirical study of criminal careers requires data collection for large samples of individuals beginning early in life and continuing for a lengthy period into adulthood. Such data are needed if questions surrounding initiation, continuation, and desistance are to be adequately addressed. Continued data collection and research are important to identify and study unaddressed and unresolved criminal career issues and to update thirty-year-old estimates.

1. *What Is Known, Not Known, and Needs to Be Known.* A number of empirical efforts have generated important information on key criminal career dimensions that has been both descriptive and etiological. For example, researchers have identified important determinants of initiation, persistence, and desistance, have discovered that specialization is more the exception than the rule, and have shown that career lengths are not as long as current criminal justice policies presume them to be. Still, a number of important questions remain unanswered.

First, evidence on the correlates of particular criminal career dimensions has tended to indicate that there are some important differences, although there are also some common correlates. Much of this work has employed samples of adolescents and typically only males. Future studies should use data from the adult period and with disaggregation across race and gender and explore how risk and protective factors relate to various criminal career dimensions.

Second, only a handful of studies have studied how sanction effects influence criminal careers (Farrington 1977; Smith and Gartin 1989; Manski and Nagin 1998). Work is needed on the effects of different penal treatments on various criminal career dimensions and whether these relationships vary across age, race, and gender.

Third, evidence is beginning to mount concerning heterogeneity within offending populations, suggesting that theories cannot treat all serious offenders in the same way (see Canela-Cacho, Blumstein, and Cohen 1997). Research is needed on why some serious offenders continue their antisocial behavior while others stop, whether and why persistent heterogeneity or state dependence matters for some but not all offenders, and why some correlates are related to continuation but not desistance, and vice versa.

Fourth, researchers have provided some information on recidivism probabilities, but much more work remains to be done. We know perilously little, from self-reports, about how recidivism probabilities fluctuate in the period from adolescence into adulthood, and how such probabilities are conditioned by neighborhood characteristics. Little information exists on how recidivism probabilities vary across crime types over time.

Fifth, researchers have tended to report data from either self-reports or official records, with few reporting information from both self-reports and official records linking the juvenile and adult periods. Important questions remain as to whether these different measurement approaches provide similar or different information with regard to key criminal career dimensions (see Dunford and Elliott 1984; Weiner 1989, p. 67). In addition, future efforts should attempt to determine if expectations derived from several of the recently articulated developmental theories apply equally well to self-reported and official records. Lynam, Piquero, and Moffitt (2002) found that specialization in violence varied by the type of measurement approach, with violence specialists in the Dunedin study identified in self-reports but not in official records through age twenty-six.

Sixth, co-offending has gone relatively underinvestigated. Although some research has examined the extent to which co-offending patterns vary in the juvenile years, almost no research has explored co-offending in adulthood and across subgroups defined by race and gender. This may have much to do with measures of criminal activity. Official records seldom contain data on co-offending, and researchers seldom ask explicit co-offending questions in their self-report surveys. Future work should investigate this subject, especially regarding recruitment.

Seventh, much criminal career research has concentrated on male subjects. Less information is available comparing male and female offending patterns (though see Piper 1985; English 1993; Baskin and Sommers 1998; Moffitt et al. 2001; Broidy et al. 2002; D'Unger, Land,

and McCall 2002; Giordano, Cernkovich, and Rudolph 2002). Research may help explain the longitudinal patterning of female criminality generally and the relevance of gender-specific theories (Lanctôt and Le Blanc 2002).

In a recent study comparing male and female offending trajectories using data from the Christchurch Health and Development Study, Fergusson and Horwood (2002) found that the same five trajectory groups applied to both males and females and that the risk factors associated with trajectory-group membership operated similarly for males and females. The only gender differences were that females were more likely to exhibit low-risk or early onset adolescent-limited offending while males were more likely to exhibit chronic offending or later adolescent-limited onset. Future work should explore criminal career dimensions of female offenders, gender-specific theoretical models, and whether policy implications vary across gender (see Warren and Rosenbaum 1987). For example, do males' and females' deviant behavior develop and escalate through similar processes (Lanctôt and Le Blanc 2002)? Are state-dependent effects more important for females than males? Such research is particularly important in the wake of recent challenges regarding the generality (across gender) of Moffitt's typology (see Silverthorn and Frick 1999).

Eighth, much research on criminal careers has been quantitative. While it has generated important insights, more qualitative work is needed into subjects' lives. Several qualitative studies have provided unique insights into desistance (see Shover 1996; Baskin and Sommers 1998; Maruna 2001; Giordano, Cernkovich, and Rudolph 2002).

Ninth, career length has received little empirical attention. This is unfortunate because career length has relevance to sentencing and incapacitation decisions. One problem with studying career length is the right-hand censoring that occurs because offenders are not studied until their deaths. Future research should provide both descriptive and etiological information on career lengths, especially how career lengths vary for different types of offenders, for different types of crime, and for age, race, and gender subgroups.

Tenth, much research has concentrated on "classic" depictions of street offenders. Recent work has examined the criminal career pattern of white-collar offenders (Weisburd and Waring 2001). Efforts should be made better to understand the differences between street and suite offenders.

Eleventh, continued work unpacking the relationship between past

and future criminal activity is warranted. Paternoster, Brame, and Farrington (2001) used conviction records from the Cambridge study to examine whether variation in adult offending was consistent with a conditional random process. Through age forty, adult offending was consistent with a random process, after conditioning on adolescent differences in the propensity to offend. Further research with different samples and offending measures is necessary.

Twelfth, the ecological context within which offenders reside and operate is an underdeveloped research area (Lynam et al. 2000; Wikström and Loeber 2000; Wikström and Sampson, forthcoming). Since certain ecological contexts contain high rates of criminal activity, a basic question arises: are high crime areas simply those populated with the highest rate offenders? Little criminological research has examined the criminal careers of places (see Reiss 1986b; Spelman 1995), and even less research has tracked the criminal careers of high-rate offenders in high crime ecological contexts over time.

Thirteenth, few efforts have been made to link self-reports and official records to estimate $q$, or the probability of arrest per crime, and its relationship to $\lambda$ (see Blumstein and Cohen 1979; Dunford and Elliott 1984; Cohen 1986; Farrington et al., forthcoming). Such analyses will help develop offense-specific estimates of the probability of arrest for a particular crime and indicate whether offenders differ from one another in their arrest risk per crime. Variations in $q$ for any offense type may result from differential enforcement practices that increase arrest vulnerability for some offenders compared to others (Cohen 1986, p. 335). Thus, a lower $q$ for certain subgroups will lead to their underrepresentation among arrestees and to a corresponding overestimate of their $\lambda$ if the same $q$ was applied uniformly to all subgroups in offense-specific analyses (Cohen 1986, p. 335). It would also be interesting to know if the probability of arrest per crime increases or decreases with increasing frequency. If it decreases with offending frequency, then this may suggest some sort of "learning" effect by which high $\lambda$ offenders become apt at avoiding detection (see Spelman 1994).

Fourteenth, although traditionally believed rare, adult onset of offending has been a neglected criminal career dimension. Recent work by Eggleston and Laub (2002) shows the importance not only of describing adult onset but of understanding its correlates.

Finally, although researchers have documented patterns of non-offending, or intermittency, throughout offenders' careers (Frazier 1976; Barnett, Blumstein, and Farrington 1989; Nagin and Land

1993), little research has been done on this issue (Piquero, forthcoming). Future research should attempt to determine whether intermittency periods become longer over time (with age) and whether some crimes evidence different intermittent patterns than other crimes.

2. *Update Thirty-Year-Old Estimates.* Much of the knowledge base surrounding criminal careers emerged from classic data sets and from inmate surveys completed almost thirty years ago. Much more recent information is needed across different types of samples and with different measurement protocols. For example, an updating of participation, frequency, and career duration estimates is needed as they are likely to provide important information that could be used in designing and implementing more effective criminal justice policies. Such information is particularly important because of the increases in prison populations over the last thirty years. Such updates should also examine the changes that have occurred in sanction rates and the degree to which the various λ distributions have changed, particularly the extent to which the λ distribution of inmates may have declined as a result of the much higher incarceration rates (see Canela-Cacho, Blumstein, and Cohen 1997, p. 167).

C. *Methodological Issues*

Empirical study of criminal careers must overcome several methodological issues including accounting for street time and death, the strengths and weaknesses of modeling approaches, and sample attrition. These issues are relevant for both official and self-report records.

1. *Accounting for Street Time and Death.* Much analysis of criminal careers centers on the importance of controlling for street, or exposure, time. Unfortunately, because of the difficulty of collecting such data, researchers have been frequently unable to implement controls for street time. The importance of this issue was recently demonstrated by Piquero et al. (2001) who found that the conclusions regarding the size and shape of criminal trajectories varies considerably depending whether street time is controlled. Future research should control for street time as desistance patterns may reflect street time more than desistance.

Similarly, mortality should continue to be examined. Before age forty, delinquent individuals are more likely than nondelinquent individuals to die from unnatural causes such as accidents and homicide (Laub and Vaillant 2000). If such individuals are assumed to have desisted from crime in longitudinal studies, researchers will incorrectly

identify these deceased delinquents as desisting delinquents. Mortality information should be a key priority in longitudinal studies, especially those that focus on high-risk populations as they enter into adulthood (Lattimore, Linster, and MacDonald 1997).

Laub, Sampson, and Eggleston (2001) reinforced these points. They showed that the shape and size of offending trajectories in the Glueck data were highly influenced by controls for street time, length of observation windows, and mortality, thereby underscoring the importance of considering such methodological issues.

2. *Various Modeling Approaches.* A number of modeling approaches are used to describe criminal career patterns. Each attempts to ask and answer similar questions regarding the nature of offending over the life course. Most studies, however, have tended to rely on solely one approach. In an important study that applies several different modeling approaches to the same research question and data set, Bushway, Brame, and Paternoster (1999) found that modeling strategies generally converged on the same substantive result, though some important differences emerged. They suggested that researchers continue to apply multiple models in order to learn more about the strengths and weaknesses of each.

Researchers should continue to extend current modeling approaches and to develop new ones. Recent efforts have extended modeling approaches to account for the joint distribution of two outcomes. Brame, Mulvey, and Piquero (2001) extended the semiparametric model to study violent and nonviolent offending simultaneously. Their results, using the 1958 Philadelphia birth cohort study, indicated that individuals scoring high on the violent measure were the same as those scoring high on the nonviolent measure.

Finally, researchers should develop and apply unique methodologies for understanding and visualizing lives. Maltz and Mullany (2000) outlined an analytic framework designed to explore issues related to criminal careers generally and life-course issues specifically. Their approach is chronological, recognizes that different people may have experienced different events and thus may need different variables to understand their behavior, recognizes that people may have different reactions to similarly experienced events, and can be studied using an exploratory graphical analysis that is more free form than algorithmic. Their analytic technique can be viewed as a complement to the more advanced quantitative methods described earlier.

3. *Sample Attrition.*   Longitudinal studies inevitably incur sample attrition. This is especially relevant for serious offenders, who are notoriously absent from longitudinal studies and who tend to drop out much more frequently than non- or less-serious offenders (Cernkovich, Giordano, and Pugh 1985). Sample attrition would not be much of a concern if the attrition was random; however, to the extent that the sample attrition is nonrandom, estimates of delinquent/criminal behavior will be biased.

Brame and Piquero (forthcoming) used the first and fifth wave of the NYS to examine sample attrition and found that some of the attrition was nonrandom. This is important because it indicates that attrition is related to involvement in criminal activity, and thus time-trend estimates of delinquent/criminal activity may be biased. Future research should attempt to sort out random and nonrandom components of sample attrition. In general, greater efforts should be made to minimize attrition (Farrington et al. 1990).

Criminal career research focuses on between- and within-individual differences in offending over time. Researchers should continue their efforts to address the important methodological issues that confront this line of research. Information derived from criminal career research is important to advance fundamental knowledge about offending and to assist criminal justice decision makers in dealing with offenders.

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