THE DEVELOPMENT OF PERSISTENT CRIMINAL OFFENDING IN MALES

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In this study, we evaluated a model of criminal offending that included the influences of family environment, cognitive ability, and early behavior problems. Analyses were conducted on a large sample of juvenile offenders (N = 4,146) who were committed to the California Youth Authority (CYA) in 1964 and 1965, with a 20-year follow-up of arrest data. Results suggest that an adverse family environment was related to the timing and frequency of juvenile delinquency. Cognitive ability, early involvement with alcohol, early age at first arrest, and the number of early arrests were all significant predictors of chronic criminal offending after ages 21, 25, and even after age 31. The timing of first arrest was found to be one of the most important variables for the prediction of chronic criminal activity.

The field of criminology has recently witnessed an increase in the influence of perspectives from developmental science. Following a National Academy of Science report on criminal careers (Blumstein, Cohen, Roth, & Visher, 1986) and a long tradition of crime prediction research (Farrington et al., 1990; Glueck & Glueck, 1950; Gottfredson & Gottfredson, 1994; Loeber & Dishion, 1983; Wolfgang, Figlio, & Sellin, 1972), developmentally oriented theorists have made significant contributions to the field. The advances are so dramatic that Loeber and LeBlanc (1990) argue that there is an emerg-

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ing field of "developmental criminology." Prominent in this research direction are several areas of inquiry: the contribution of family environment (e.g., consistent discipline) to juvenile delinquency (Patterson, Capaldi, & Bank, 1991; Patterson, DeBaryshe, & Ramsey, 1989), the significance of stable individual characteristics (e.g., cognitive abilities) in the development of persistent offending (e.g., Moffitt, 1993), and the role of early behavior problems (e.g., drug and alcohol difficulties or an early termination of school) in persistent offending (Farrington, 1992).

Despite these theoretical advances, very few studies have explored the life course significance of an early onset of delinquency. Little is known about whether these early "criminogenic" factors actually predict criminal offending beyond young adulthood. Research on the long-term predictive validity of developmental influences is urgently needed to fill this gap in knowledge. However, we are aware of only a few studies (e.g., Robins, 1966; Sampson & Laub, 1993) that have linked early antisocial behavior to later adult crime. This study was designed to evaluate these influences using data from a large-scale, 20-year longitudinal study of 4,146 male adolescent offenders committed to the California Youth Authority (CYA). These adolescents were first assessed when they were admitted for CYA custody in 1964 and 1965 with a comprehensive test battery. Their arrest records for the next 20 years subsequently were obtained in 1984 and 1985. In the following sections, we review the relationship between an early onset of delinquency and persistent offending, and we discuss the etiological significance of family environments, individual characteristics, and early behavior problems in the development of criminal behavior. Finally, we discuss our hypotheses and analytical strategy.

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AGE AT FIRST ARREST

One of the strongest predictors of persistent offending involves an early age at first arrest (Blumstein et al., 1986; Farrington et al., 1990; Patterson, Crosby, & Vuchinich, 1992; Patterson, Forgatch, Yoerger, & Stoolmiller, 1998; White, Moffitt, Earls, Robins, & Silva, 1990). In a comprehensive review, Loeber and LeBlanc (1990) showed that a relatively early onset of antisocial behavior predicts a long and serious antisocial career. For example, age at onset of delinquency was strongly related to the number of offenses committed in adulthood in two Philadelphia birth cohorts (Tracy, Wolfgang, & Figlio, 1990; Wolfgang et al., 1972; Wolfgang, Thornberry, & Figlio, 1987). In their analyses of the Glueck and Glueck (1950) data, Sampson and Laub (1993) found that boys who were delinquent during childhood were three to four times more likely than nondelinquent boys to commit crimes during adulthood. A similar relationship between age at onset and persistent offending has also been reported in data collected in Europe (Farrington, 1992; Stattin & Magnusson, 1991).

Although a substantial body of evidence has accumulated to support the importance of studying age at first arrest in the development of persistent offending, much less is known about the actual correlates of age at first arrest and other psychosocial influences on persistent offending. In various theoretical writings and empirical research, it has been suggested that an early age at first arrest and later persistent offending can be traced to family environmental factors, individual characteristics such as cognitive ability, and early behavior problems such as an early termination of school and involvement with alcohol and drugs (e.g., Farrington et al., 1990; Moffitt, 1993; Patterson et al., 1989; Sampson & Laub, 1993).

FAMILY ENVIRONMENT

The developmental precursors of criminal behavior can be systematically traced back to variation in an individual's early rearing environment (e.g., Blumstein et al., 1986; Farrington, 1995; Loeber & Stouthamer-Loeber, 1987). For example, McCord (1979, 1996) traced adult criminality to the child-rearing environment, including such things as parental affection and supervision. Patterson and col-

leagues (Patterson et al., 1989, 1991, 1992) demonstrated that parents' lack of family management skills and disrupted parenting practices provide direct training for the development of antisocial behavior that leads to an early onset of delinquency. In their studies, children and adolescents who first had contact with police prior to age 15 were found to be at greater risk for both chronic juvenile offending and for a career as an adult offender (Patterson et al., 1991, 1992).

Longitudinal data reported in both the United States and Europe lend support to the contention that parental family management skills are an important factor in delinquency. For example, Sampson and Laub (1993) demonstrated that delinquent behavior becomes more likely as an individual's social ties to his parents become attenuated and as parental supervision and discipline become lax and haphazard. They identified four factors that were significantly associated with delinquent behavior: (a) erratic, threatening, and harsh/punitive parental disciplinary practices, (b) low parental supervision, (c) parental rejection, and (d) weak emotional bonding between boys and their parents. Farrington (1995) reported that poor parental supervision and child-rearing practices when children were as young as age 8 were related to the initiation of juvenile delinquency and adult crime.

COGNITIVE ABILITY

Cognitive abilities (most often measured by IQ tests) are one individual characteristic that has been frequently linked to crime (Hirschi & Hindelang, 1977). For instance, Wolfgang et al. (1972) found that at each socioeconomic level, delinquents had lower IQ scores than nondelinquents. Similarly, Lipsitt, Buka, and Lipsitt (1990) reported that cognitive ability test scores measured as early as 4 to 7 years old were negatively related to juvenile offenses prior to age 18. Farrington (1995) reported that IQ measured at 8 to 10 years of age was consistently found to be a significant predictor of subsequent delinquency.

A series of investigations conducted by Moffitt and her colleagues also support the proposition that delinquency and crime are related to cognitive abilities (Moffitt, Gabrielli, Mednick, & Schulsinger, 1981; Moffitt, Lynam, & Silva, 1994; Moffitt & Silva, 1988a; White et al., 1990; White, Moffitt, & Silva, 1989). This group has demonstrated that the link between cognitive ability and self-reported delinquency

holds prospectively even after controlling for race, socioeconomic status, test motivation, and academic attainment (Lynam, Moffitt, & Stouthamer-Loeber, 1993). By using self-reported delinquency instead of official records, Moffitt and Silva (1988b) suggest that the association between cognitive abilities and delinquency is not simply due to a greater detection of less intelligent delinquents by police.

EARLY BEHAVIORAL PROBLEMS

Criminal and delinquent activity may be influenced by early-emerging behavioral problems such as alcohol and drug use and an early termination of education. The relationship between early substance use and crime is well-established (Hindelang, Hirschi, & Weis, 1979; Hirschi, 1969; Kandel, 1978). These studies showed that adolescents who drink, smoke, or use illicit drugs, compared to teenagers who abstain, are significantly more likely to steal, get into fights, and commit other delinquent acts. Another early behavior problem that may influence criminal behavior is an early termination of education, as suggested by Thornberry, Moore, and Christenson (1985) and Lynam et al. (1993). Leaving school at an early age and substance abuse may limit future job prospects and subsequent involvement in socially sanctioned activities. This lack of opportunity may predispose an individual to future deviancy.

There appears to be a theoretical convergence on the importance of early antisocial tendencies in future criminal offending. For example, Moffitt (1993) argued that poor self-control due to diminished cognitive ability is an important factor in life-course-persistent offending. This lack of self-control helps to channel individuals into criminal activity and prevents them from finding viable alternatives to crime. Gottfredson and Hirschi (1990) maintain that inadequate self-control is the major influence on criminal behavior. Similarly, Patterson and his colleagues (e.g., Patterson et al., 1989) have suggested that antisocial tendencies, which are developed in the home, create difficulties for the developing individual in such areas as school and normal peer relations. The individual is then isolated from prosocial relationships and institutions, thus increasing the likelihood of participation in crime.

The current research examines the influence of family environments, cognitive ability, and early behavior problems on crime and

delinquency. Several testable hypotheses are derived from the previously reviewed literature. First, we predicted that family contexts and cognitive ability would be related to juvenile delinquency, both in terms of an early first arrest and the frequency of arrest before age 17. Second, we expected these variables measuring juvenile delinquency to be associated with future persistent criminal offending. In this study, we were especially interested in examining the role that an early first arrest may play in predicting persistent offending. Third, drawing on Moffitt (1993), we expected cognitive ability to be significantly related to the frequency of adult arrests. Fourth, we expected that early substance use and an early age at educational termination would correlate with adult criminal activities. Finally, we conducted a set of analyses designed to provide a more intuitive illustration of the importance of an early age at first arrest for the development of persistent offending.

METHOD

PARTICIPANTS

The data used here are part of a larger data set designed to investigate the criminal career patterns of violent offenders (Wenk, 1990). Data were collected on a sample of 4,146 young male offenders who were committed to the CYA between January 1964 and December 1965 at the Deuel Vocational Institution (DVI) in Tracy, California. The CYA provides a setting for training, treating, and educating youthful offenders who are unsuitable for local juvenile facilities but whose age and maturity make them unsuitable for imprisonment with adults.

Our results are based primarily on the 2,263 offenders for whom we have complete information on the variables included in the analyses. This relatively lower sample size was primarily due to the minimal language proficiency required for the personality and attitude measures (see below). The ethnic breakdown of this sample was 1,299 European Americans (57.4%), 382 Hispanic Americans (16.9%), 532 African Americans (23.5%), 50 offenders of Asian American background, and other individuals who did not specify their ethnicity

(2.2%). The average age at reception at the DVI Regional Guidance Center was 19 years, which was significantly older than the average CYA ward at that time (16.5 years). This is because the DVI provided intake functions for primarily the oldest wards committed for custody.

Arrest records were collected over the next 20 years following CYA admission. Arrest histories, based primarily on arrest records, supplied by the CYA and the California Bureau of Criminal Identification and Investigation (CBCII) were available for 3,729 of the original 4,146 individuals. The remaining 417 individuals either had their records purged (see Gottfredson & Gottfredson, 1994) or their records sealed (in the case of death).

PROCEDURE

The data were collected through self-reported questionnaires, caseworker interviews, and official records. As part of the assessment processes, offenders were tested individually and in groups. The information generated during the 1964 to 1965 assessment phase was systematically collected for research purposes by the CYA clinical staff, researchers, or other governmental agents (e.g., test proctors from the Department of Labor for the General Aptitude Test Battery) as part of routine processing. In some assessment sessions, inmate helpers also assisted with administering self-report questionnaires. Each weekly intake group spent their first complete week at the DVI in testing. Some offenders were occasionally not tested because the institution was under lock-up for security reasons or tests were not administered on holidays. Thus, not all youths were given the entire test battery, and some measures were administered only to a subset of youth for specific reasons. For example, only approximately 66% of the individuals (n = 2,755) could read at or above the fifth-grade level in English and were given the personality and attitude test using the Composite Opinion and Attitude Survey (COAS) (see the following section for a description).

MEASURES

Measuring history of drug and alcohol use. Each youth's history of drug and alcohol use was determined by clinical staff and researchers

through clinical interviews and various CYA documents, including probation, arrest, and assessment records. A young man was classified as having a history of a drug or alcohol problem if the official documents showed a previous record of drug or alcohol use prior to his arrest. He was classified as not having a history of drug (coded 0) (n = 2,278) or alcohol use (coded 0) (n = 3,488) if no such indication appeared in the official records. Those with a history of alcohol use problems were further divided into two groups based on clinical judgment of the official records: those with moderate problems (coded 1) (n = 1,244) and those with severe problems (coded 2) (n = 624). On the same basis, those with a history of drug use problems were further divided into three groups: those who engaged in "insignificant isolated experimentation" with drugs (coded 1) (n = 263); those who engaged in moderate involvement that constituted more than isolated experimentation (coded 2) (n = 337); and those with severe problems, including long-term users and youths with drug addictions (coded 3) (n = 58).

Assessing family environment. Because the data collection was originally designed to allow for the study of individual characteristics and criminal careers, no systematic efforts were made to directly collect information about family environments and functioning. Fortunately, a variety of psychological instruments were used during the assessment process, including the COAS that could be used to measure family characteristics. The COAS was developed for research purposes by the California Department of Corrections and is a combination of other psychological instruments, including the Minnesota Multiphasic Personality Inventory (MMPI) (Hathaway & McKinley, 1943) and the California Psychological Inventory (CPI) (Gough, 1957).

Thirty-nine COAS items were directly relevant to the assessment of the family environment. Through a series of analyses, we were able to construct four scales with a total of 39 dichotomous response items that assess different domains of the family environment. *Family Attachment* (10 items) indicates a lack of affective ties between youths and significant others, especially their parents. Sample items include whether respondents had felt that they would like to leave home, whether they had felt hatred toward family members they usually

loved, and whether they had often gone against their parents' wishes. The alpha coefficient for this scale is .70. *Family Cohesiveness* (11 items) refers to closeness among family members, especially between parents and children, and effective communication patterns whereby the child can share thoughts and feelings with his parents. Items included asking respondents if they were able to go to their parents with their problems when they were children, whether they and their family members were always very close to each other, and whether their families were less peaceful and quiet than other families when they were children (reverse-coded). The alpha coefficient for this scale is .82. *Family Respect* (9 items) refers to the parents' lack of family management skills. Examples include questions such as "I feel that sometimes I was punished without cause," "My parents treat me more as a child than a grown-up," and "My parents and family find more fault with me than they should." The alpha coefficient for this scale is .60. *Family Role Modeling* (9 items) measures family members' personal problems, such as a quick temper, and indicated whether the respondent could look up to his father as an ideal man. This scale has an alpha coefficient of .65. For most of our analyses, we reverse-coded Family Cohesion (so that higher scores reflected less family cohesion) and summed all four scales together to create an index of family adversity.

Measuring cognitive ability. Three measures of cognitive ability were used to form a summary index of cognitive ability: the total score from the California Achievement Test Battery (Tiegs & Clark, 1951), the G-factor from the General Aptitude Test (Dovak, 1947), and the Raven Progressive Matrix Test (Raven, 1960). The reliability of these measures is well established, and they were used as standard measures of intelligence and scholastic achievement at the time of assessment. For most of our analyses, we summed all three scales together to create an index of cognitive ability.

Measuring antisocial tendencies. We modified and expanded a 33-item delinquency scale that Hathaway and Monachesi (1957) developed from the MMPI item pool to form our measure of antisocial tendencies. Although Hathaway and Monachesi reported that their scale had high internal consistency and differentiated delinquents from

nondelinquents, we found this scale to have only moderate internal consistency with our sample (alpha = .68). Moreover, some of the items appeared to have questionable face validity (e.g., "I very much like hunting," "I would like to hunt lions in Africa," "I forget right away what people say to me," "One or more of the members of my family is very nervous," and "I have never seen a vision"). Based on our reading of the contemporary research, we modified the Hathaway and Monachesi scale by deleting 16 items that we judged to be of low face validity and added 11 items that we thought to be of central importance to the antisocial trait (e.g., "It would be better if all the laws were thrown away," "I can easily make other people afraid of me and sometimes do for the fun of it," and "I used to steal sometimes when I was young"). Our 28-item modified and expanded version of the antisocial tendency scale had a significantly improved internal consistency, with an alpha coefficient of .80.

Measuring early onset of delinquency and age upon leaving school. We used age at first arrest as our indicator of an early onset of delinquency. This measure was computed using information from official arrest records by calculating the difference between the year in which the offender was first arrested and the year of his birth. Early starters included those whose first arrest occurred at age 15 or younger, and the late starters were those whose first arrest occurred after age 15 based on the distinctions proposed by Patterson et al. (1992). Offenders reported the age at which they had left school as part of the 1964 to 1965 assessment.

Measuring life-course-persistent offending. We calculated frequencies of arrests during several periods: when the offender was 18 to 20 years old, 21 to 25 years old, 26 to 30 years old, and 31 years or older. It is more appropriate to compare frequencies of arrest between early and late starters within these frequency periods rather than comparing total frequencies of arrests over the entire life span because early starters, by definition, begin their criminal careers sooner and thus may have a greater likelihood of a higher total frequency of arrest. We selected these particular age intervals because of our concern about the skewed statistical distribution of criminal offenses.

RESULTS

Table 1 provides results pertaining to the tests of our hypotheses about the correlates of crime and delinquency. In our first set of analyses, we sought to understand the correlates of early age at first arrest. To conduct these analyses, we used linear regression. We regressed Age at First Arrest on a set of variables that included Adverse Family Environment, Antisocial Tendencies, Cognitive Ability, History of Drug Use, History of Alcohol Use, and Age Upon Leaving School. In this analysis, we controlled for the impact of race/ethnicity. These results are displayed in the first column. We then regressed the Frequency of Arrest Before Age 17 on the same set of predictors. These results are displayed in the second column of Table 1.

As shown in Table 1, Adverse Family Environment was significantly related to Age at First Arrest, $B = –.04$, $p < .01$, and Frequency of Arrest Before Age 17, $B = .02$, $p < .01$. This result supports the theoretical proposition that family factors are influential in predicting the onset and frequency of juvenile delinquency. History of Alcohol Use was not significantly related to Age at First Arrest but was related to the Frequency of Arrest Before Age 17, $B = .10$, $p < .05$. A similar pattern of results was found with History of Drug Use: It was not related to Age at First Arrest but was related to Frequency of Arrest Before Age 17, $B = .18$, $p < .01$. This pattern suggests that drug and alcohol use influence the amount of juvenile delinquency but not necessarily the timing of delinquency. Age Upon Leaving School was related to Age at First Arrest, $B = .21$, $p < .01$, and Frequency of Arrest Before Age 17, $B = –.14$, $p < .01$. This suggests that leaving school early is related to the timing and amount of juvenile delinquency. Antisocial tendencies were related to both Age at First Arrest, $B = –.05$, $p < .01$, and Frequency of Arrest Before Age 17, $B = .03$, $p < .01$, indicating that an antisocial disposition is related to both the timing and frequency of juvenile delinquency. Cognitive Ability was not related to Age at First Arrest, $B = .03$, $p > .05$, *ns*, or to Frequency of Arrest Before Age 17, $B = .00$, $p > .05$, *ns*. Taken together, these results suggest that an adverse family environment, early involvement with drug and alcohol use/abuse, early departure from school, and an antisocial disposition exert statistically significant influences on juvenile delinquency.

TABLE 1: Unstandardized Regression Coefficients Predicting Juvenile Delinquency and Adult Crime

		Juvenile Delinquency					
		Age at First Arrest	*Arrest Frequency Before Age 17*	*Adulthood Crime Frequencies*			
				Arrests 18 to 20	*Arrests 21 to 25*	*Arrests 26 to 30*	*Arrests After 30*
Independent Variables							
Intercept	*B*	16.30**	1.73**	4.50**	3.14**	2.89**	1.44**
	SE	0.52	0.51	1.09	1.97	2.59	3.72**
Adverse family environment	*B*	–0.04**	0.02**	–0.02	–0.02	–0.02	–0.01
	SE	0.01	0.01	0.04	0.03	0.06	0.01
Cognitive ability	*B*	0.03	0.00	–0.05*	–0.12**	–0.10**	–0.07*
	SE	0.02	0.02	0.02	0.03	0.01	0.02
Early behavioral problems							
History of alcohol use	*B*	–0.09	0.10*	0.38**	0.30**	0.41**	0.28**
	SE	0.06	0.04	0.06	0.10	0.17	0.09**
History of drug use	*B*	–0.11	0.18**	–0.01	0.29**	0.18**	0.12
	SE	0.06	0.05	0.30	0.10	0.06	0.09
Age upon leaving school	*B*	0.21**	–0.14**	0.09	0.06	–0.12*	0.02
	SE	0.04	0.03	0.05	0.08	0.05	0.06
Antisocial tendencies	*B*	–0.05**	0.03**	0.03*	0.02	0.00	0.00
	SE	0.01	0.01	0.01	0.04	0.03	0.02
Age at first arrest	*B*	—	—	–0.36**	–0.33**	–0.16**	–0.12**
	SE	—	—	0.10	0.09	0.06	0.03**
Arrest prior to 17	*B*	—	—	–0.07	0.20**	0.30**	0.20**
	SE	—	—	0.06	0.04	0.05	0.04**
Demographic controls							
African American	*B*	–0.69**	0.58**	0.20	0.50**	0.73**	1.12**
	SE	0.11	0.08	0.21	0.14	0.22	0.37**
Hispanic	*B*	–0.49**	–0.21	0.00	0.06	0.81**	0.72**
	SE	0.12	0.20	0.02	0.09	0.12	0.13**
Asian and others	*B*	0.07	0.31	–0.38	–0.53	–0.47	0.55
	SE	0.29	0.09	1.33	1.14	0.83	0.42
R^2		0.06	0.07	0.10	0.10	0.10	0.09
Adjusted R^2		0.06	0.06	0.10	0.10	0.10	0.09

NOTE: $n = 2{,}147$.
*$p < .05$. **$p < .01$.

We next turned to the question of the longitudinal prediction of persistent offending. In these analyses, the dependent variables were the frequency of arrests when the offenders were 18 to 20 years old, 21 to 25 years old, 26 to 30 years old, and 31 years or older. To evaluate the hypothesis that developmental history variables would predict chronic offending, we included Adverse Family Environment, Age Upon Leaving School, Antisocial Tendencies, Cognitive Ability, History of Alcohol Use, and History of Drug Use in our linear regression analyses. We also included Age at First Arrest and Frequency of Arrests Before Age 17 as predictors to study the influence of juvenile delinquency on future criminal behavior.

The results from these four analyses are displayed in columns 3 to 6 of Table 1. As hypothesized, Cognitive Ability significantly predicted persistent offending after the offenders turned 18, $B = -.05$, $p < .05$, for ages 18 to 20; $B = -.12$, $p < .01$, for ages 21 to 25; $B = -.10$, $p < .01$, for ages 26 to 30; $B = -.07$, $p < .05$, for age 31 and older. As expected, History of Alcohol Use significantly predicted frequency of arrests during every age interval, $B = 0.38$, $p < .01$, for ages 18 to 20; $B = .30$, $p < .01$, for ages 21 to 25; $B = .41$, $p < .01$, for ages 26 to 30; $B = .28$, $p < .01$, for age 31 and older. History of Drug Use significantly predicted frequency of arrests only when the offenders were age 21 to 25, $B = .29$, $p < .01$, and 26 to 30 years of age, $B = .18$, $p < .01$. Antisocial Tendencies were significantly related to arrest frequency when the offenders were 18 to 20 years old, $B = .03$, $p < .05$, but not during other periods. Unlike the results for the juvenile delinquency variables, the composite score of Adverse Family Environment did not significantly predict any of the persistent offending indicators. This may suggest that adverse family environments do not directly influence criminal behavior in adulthood but may instead "launch" individuals into more criminality by influencing an early start to delinquency.

In our earlier analysis of juvenile delinquency variables, Antisocial Tendencies significantly predicted age at first arrest and frequency of arrests before age 17. This effect is consistent with the hypothesized role that family environments play in predisposing individuals to increased arrest by launching them on a criminal pathway that begins with an early arrest. Indeed, a younger age at first arrest predicted arrest frequency during all periods, $B = -.36$, $p < .01$, for ages 18 to 20; $B = -.33$, $p < .01$, for ages 21 to 25; $B = -.16$, $p < .01$, for ages 26 to 30;

$B = -.12$, $p < .01$, for age 31 and older. This result underscores the important role that timing of initiation plays in life-course-persistent offending.

An interesting finding in these regression analyses involves the relationship between Frequency of Arrest Before 17 and arrest frequency during subsequent age intervals. Whereas Frequency of Arrest Before 17 was related significantly to frequency of arrests in every age interval after age 21, it was not significantly associated with number of arrests between ages 18 and 20. We interpret this finding to indicate that, during the peak period of arrests in this sample (age 18), an increasing number of adolescence-limited offenders participated in criminal activities. Because adolescence-limited offenders were arrested at roughly equal rates, as were life-course-persistent offenders at the peak age for arrests, it is more difficult to distinguish the groups from one another at that age (Moffitt, 1993).

Consistent with the findings of Thornberry et al. (1985), Age Upon Leaving School was significantly related to arrest frequency when the offenders were 26 to 30 years old, $B = -.12$, $p < .05$, suggesting that leaving school at a younger age predicts more frequent offending during this period. Unexpectedly, however, Age Upon Leaving School was not related to arrest frequency during other age intervals. This may suggest that the adverse consequences of a premature termination of formal education may become more pronounced later in life.

Some interesting patterns regarding ethnic differences also emerged from these analyses. African American youths were arrested more frequently than were European American youths only after age 21, $B = .50$, $p < .01$, for ages 21 to 25; $B = .73$, $p < .01$, for ages 26 to 30; $B = 1.12$, $p < .01$, for age 31 and older. Hispanic American youths were arrested more frequently than were European American youths only after age 25, $B = .81$, $p < .01$ for ages 26 to 30; $B = .72$, $p < .01$, for age 31 and older. Asian American youths and those who did not identify their ethnicity did not differ significantly from European American youths in arrest frequency, $B = -.38$, $p > .05$, *ns*, for ages 18 to 20; $B = -.53$, $p > .05$, *ns*, for ages 21 to 25, $B = -.47$, $p > .05$, *ns*, for ages 26 to 30; $B = .55$, $p > .05$, *ns*, for age 31 and older. Finally, the variance in arrest frequency that the predictor variables explained showed a remarkable consistency, ranging from .10 during the first three age periods to .09

TABLE 2: Comparison of Desistance and Persistence Rates Between the Early and Late Starters By Age

	Desisters	*Persisters*	χ^2	*OR*
After age 21				
Early starters	13 (2.2%)	590 (97.8%)		
Late starters	399 (12.8%)	2,727 (87.2%)		
Total	412 (11.0%)	3,317 (89.0%)	57.08	6.64
After age 25				
Early starters	69 (11.4%)	534 (88.6%)		
Late starters	766 (24.5%)	2,360 (75.5%)		
Total	835 (22.4%)	2,894 (77.6%)	49.62	2.51
After age 31				
Early starters	219 (36.3%)	384 (63.7%)		
Late starters	1,507 (48.2%)	1,619 (51.8%)		
Total	1,726 (46.3%)	2,003 (53.7%)	28.74	1.63

NOTE: Early starters are defined as those who had their first arrest before age 15. OR = odds ratio.

after age 31, indicating that these variables remained consistent predictors beyond young adulthood.

To further evaluate the importance of the timing of juvenile delinquency in predicting life-course patterns of criminal behavior, we compared "early starters" (first arrest at age 15 or younger) and "late starters" (first arrest after age 15) in terms of their respective patterns of desistance in the criminal career. The classification of the offenders into early versus late starters was based on the work of Patterson et al. (1991, 1998), who suggested that first arrest at or prior to age 15 is a critical discriminator of early starting. Because these analyses did not involve other variables, fewer offenders had missing data. Consequently, we were able to base our analyses on data from 3,729 offenders whose official arrest records between 1964 and 1965 were available. These offenders were classified as desisters or persisters on the basis of their arrest records: Whereas the desisters had no official records of rearrest after the age under consideration, persisters did. Table 2 presents the results of these comparisons.

As shown in Table 2, about 11% of the offenders ($n = 412$) desisted by age 21. By age 25, approximately 22.4% of the offenders ($n = 835$) desisted. This proportion increased to about 46.3% ($n = 1,726$) by age 31. If the idea that an early age at first arrest has important conse-

quences for life-course patterns of crime, early starters should be disproportionately more likely to persist in criminal activity. As shown in Table 2, by age 21, only 2.2% of the early starters desisted compared to 12.8% of the late starters. The $\chi^2(1, N = 3{,}729)$ value of 57.08 indicates a significant association between early starter status and persistent offending ($p < .01$). The risk of persistent offending, as indicated by the odds ratio (OR) is 6.64. This suggests that the early starters were at significantly higher risk for continued offending after age 21 than were the late starters. This pattern continued beyond age 25, $\chi^2(1, N = 3{,}729) = 49.62$, $p < .01$, OR = 2.51, and beyond age 31, $\chi^2(1, N = 3{,}729) = 28.74$, $p < .01$, OR = 1.63.

Table 3 presents the total frequency of arrests along with percentages who were persistent offenders and their arrest frequencies cross-classified by number of arrests before age 17. The average arrest frequency for the entire study period increased as the number of arrests prior to age 17 increased. This positive association was also generally evident for the average arrest frequencies after ages 21, 25, and 31 years. There was a slight drop in the average number of arrests after 31 for those with 4 arrests before age 17 ($M = 2.37$) as compared to those with 3 arrests before age 17 ($M = 2.48$). However, this difference is small and may reflect variability due to a decreased sample size at 4 arrests prior to age 17. The general trend was for increases in arrest frequencies after ages 21, 25, and 31 as the number of arrests prior to age 17 increased. Significant differences emerged between offenders with no juvenile arrests prior to age 17 and those with 1 juvenile arrest. Offenders with no juvenile arrests experienced an average of 5.85 arrests after age 21, 3.46 arrests after age 25, and 1.21 arrests after age 31, compared to 9.38, 5.91, and 2.10, respectively, for offenders with one juvenile arrest.

The number of juvenile arrests was related to persistence; offenders with more juvenile arrests were more likely to persist in criminal activity. For example, 91.2% of the men with 1 juvenile arrest record were arrested again after age 21 compared with 67.2% of the men with no arrests before age 17. Those who had experienced more juvenile arrests generally continued to be arrested more frequently after ages 25 and 31. For example, 70% of the men with 5 or more juvenile arrests were arrested at least once after age 31, compared to 36.9% of

TABLE 3 Number of Arrests and Percentage Who Persisted at Different Frequencies of Arrest Before Age 17

Number of Arrests Prior to 17	*Sample Size*	*Total Frequency of Arrest*	*After Age 21*		*After Age 25*		*After Age 31*	
			M *Arrests*	*% Persisted*	M *Arrests*	*% Persisted*	M *Arrests*	*% Persisted*
0	(*n* = 2,061)	8.96	5.85	67.2%	3.46	55.9%	1.21	36.9%
1	(*n* = 883)	15.06	9.38	91.2%	5.91	80.0%	2.10	56.5%
2	*(n* = 533)	17.48	10.93	94.6%	6.54	85.6%	2.35	58.9%
3	(*n* = 346)	18.59	11.22	97.4%	6.69	85.8%	2.48	63.1%
4	(*n = 163)*	20.74	11.82	93.9%	6.72	84.0%	2.37	61.3%
5+	(*n* = 160)	24.01	13.08	98.8%	8.14	91.2%	3.28	70.0%

NOTE: *M* Arrests = average number of arrests. % Persisted = percentage of individuals who persisted in offending.

those with no arrests before age 17. These results indicate a clear pattern of association between chronic juvenile offending and persistent offending in adulthood.

DISCUSSION

The main purpose of this study was to evaluate models of life-course criminal offending based on insights from developmental research. First, we examined the importance of family environments, cognitive abilities, and early behavioral problems in the timing and frequency of juvenile delinquency. We then sought to study the influence of these correlates and variables measuring juvenile delinquency on the frequency of criminal offending in adulthood. Finally, we further demonstrated the impact that an early start in juvenile delinquency has on shaping life-course patterns of crime.

We found adverse family environment to be a significant correlate of both juvenile delinquency variables: Young men who grew up in adverse family contexts were more likely to be arrested at younger ages and to have more arrests prior to age 17. This finding is consistent with those that have emerged from other longitudinal studies (Farrington, 1995; Loeber, Stouthamer-Loeber, Kammen, & Farrington, 1991; Wolfgang et al., 1972). Adverse family environments, however, were not significantly related to the frequency of offending in adulthood. We interpret this result to suggest that family environments are influential in later criminal careers by serving to launch individuals into more severe forms of juvenile delinquency. This involvement in relatively more severe forms of juvenile delinquency, in turn, places individuals at risk for lifelong criminal activity. Family environments may diminish in their direct influence on life-course patterns of crime as individuals age and move beyond their families of origin. Future research will need to replicate this intriguing finding.

Cognitive ability exerted a significant influence on long-term criminality but was not a significant predictor of juvenile delinquency variables. This finding is consistent with the ideas proposed by Moffitt (1993) that during juvenile years, the adolescent-limited and life-course-persistent offenders may not be easily distinguishable. The

neuropsychological substrate serves to differentiate the adolescent-limited from life-course-persistent offenders only when longitudinal adult criminal patterns are assessed. Using cognitive ability as a proxy for neuropsychological functioning, we found that low cognitive ability was significantly associated with frequencies of arrest after age 18.

Why are individuals with lower cognitive ability more likely to engage in life-course-persistent offending? Moffitt's (1993) theory focuses on impulsivity, attention deficits, and a lack of abstract thinking ability, whereas more sociologically oriented theorists argue that low cognitive ability impairs adjustment to school and other social settings, which then leads to criminality (see Hirschi & Hindelang, 1977). We interpret the link between cognitive ability and crime in terms of the protective function of cognitive ability in modern society. Under adverse circumstances, individuals with higher cognitive ability are more likely to desist from illegal activities than those with low cognitive ability because more competent individuals may be more likely to explore legitimate alternatives to crime. To a large degree, cognitive ability can be regarded as a component of resilience (Masten, Best, & Garmezy, 1990). Indeed, Kandel et al. (1988) found that higher IQ scores served as a protective factor against involvement in serious criminal activities in a high-risk sample of Danish men. White et al. (1989) obtained similar results for both males and females in New Zealand.

We found that early behavior problems exert a significant influence on persistent offending. Early involvement with alcohol and drug use was a significant predictor of adult arrest frequency. This suggests that early substance use and abuse can influence criminal behavior throughout the life span. It is possible that substance abuse reduces the competency of an individual to find viable alternatives to crime.

These findings offer strong evidence for the importance of age at onset of delinquency for lifelong criminality. We found consistent support for the theoretical proposition that the timing of first arrest is a key influence on the subsequent criminal career. Our work demonstrates that early starters are at significantly higher risk than late starters for chronic offending. This prediction was true for chronic juvenile offending, as measured by number of arrests before age 17 (Patterson et al., 1998) and for persistent adult offending. These results further substantiate the theoretical claim that qualitatively different types of

offenders (i.e., early vs. late starters) may exist and that these populations may need to be examined separately (Moffitt, 1993; Patterson et al., 1989).

This study contributes to the growing literature concerning influences on persistent offending in several important ways. First, the findings were obtained with a large sample of adolescent offenders. We are not aware of any existing studies that have collected such detailed data on such a large sample, permitting the types of analyses we conducted. This methodological strength reduces the ambiguity of the results. Second, our study provided a robust test of developmental explanations of persistent offending. Departing from the traditional paradigm of comparing delinquents and nondelinquents, we examined adolescent offenders who became involved in the antisocial process at different points in time and with different frequencies. We consider this to be a more rigorous method for testing developmental theories of crime. Finding significant differences in a relatively homogeneous group (all of the offenders were incarcerated at one point in time) constitutes a conservative test of developmental theories. Third, this study provides longitudinal data. We are aware of few other longitudinal studies (e.g., Sampson & Laub, 1993) in which offenders were followed into their late 30s to determine how far across the life span that life-course-persistent offending can be predicted. Farrington (1995) and Moffitt (1993) have called for more studies that follow offenders into midlife to evaluate accurately the timing of criminal career termination. Our study allows such tests.

In this study, we join Moffitt and Patterson in proposing that prevention and intervention efforts should be implemented during early stages of development. If the pattern of chronic offending is heavily influenced by childhood or early adolescent experiences, parenting education should be part of intervention programs. Treatment of offending juveniles should move beyond a myopic focus on the individual to include attention to the individual's family. Thus, we support prevention and rehabilitation efforts that focus on addressing the individual, his or her family, and his or her larger social ecology such as neighborhoods and schools. Treatment should also pay special attention to early substance use and/or abuse.

We wish to emphasize, however, that the findings reported here do not imply that efficacy in child rearing and early alcohol and drug

involvement completely explain patterns of adult criminal behavior. Caspi and Bem (1990) explained that continuity and change involve lifelong cumulative and interactional processes. Research that explores these processes as they relate to the development of life-course-persistent criminal activity is needed. We need to know more about the complicated system of influences that promotes chronic offending. This knowledge will be crucial in designing successful strategies for delinquency prevention. Finally, because so many of the men in our sample desisted from crime at different points in their lives, the salient life events that redirect individuals' life trajectories should be identified (Sampson & Laub, 1993).

Caution is called for in interpreting these findings. First, the amount of variance we could account for with our set of predictors was modest. Persistent offending is influenced by multiple factors, and accounting for a large amount of variance is not to be expected in most research situations (see Ahadi & Diener, 1989). Clearly, persistent offending is influenced by a number of variables not included in our models. These other factors may include impulsivity, peers, psychopathy, and neighborhood influences (e.g., Lynam, 1996; Lynam et al., 2000). Future research is needed to fully understand the complex mosaic of factors that promote persistent offending.

Second, the archival data did not indicate the offenders' socioeconomic status. Although controlling for the effect of socioeconomic status is of great importance in the analysis of criminal offending, we believe that this omission does not necessarily constitute a threat to our substantive inferences. Much work from developmental psychology conceptualizes socioeconomic status as a distal influence, the impact of which is mainly mediated by more proximal mechanisms (see Conger, Patterson, & Ge, 1995; Lynam et al., 1993; Moffitt et al., 1981).

Third, the family environment measurement was less than ideal, given the original design of the study. These variables were self-reported and measured retrospectively at intake to the DVI. Moreover, although the four measures included in this construct were internally consistent and tapped several important family environment domains, they were not originally designed for this purpose. The variables lacked assessments of consistent discipline, monitoring, inductive reasoning, and family problem solving, which Patterson (1982) pro-

posed as core indicators of family management skills. We expect that the effect of Adverse Family Environment on Antisocial Tendencies and the Age at First Arrest would be significantly larger if such measures were included.

Fourth, the operationalization of persistent offending as frequency of arrests after certain ages assigns equal weights to offenses of varying seriousness. Although criminological studies have consistently indicated that little evidence supports specialization of crime (Gottfredson & Hirschi, 1990), separate analyses of different types of crimes (e.g., violent vs. property crimes, or felonies vs. misdemeanors) may shed further light on the persistent antisocial process.

Fifth, although the assessments taken in 1964 and 1965 clearly preceded subsequent arrests, the temporal sequencing of variables such as Adverse Family Environment, Cognitive Ability, Antisocial Tendencies, Age at First Arrest, Age Upon Leaving School, and Frequency of Arrest Prior to Age 17 is ambiguous at best. The first arrest may trigger a chain of events, including worsened parent-child interaction, poorer academic performance, escalation of antisocial behavior, and further arrests. Ideally, the study of these behavioral trends should begin in childhood, at least before the onset of adolescence. Future researchers certainly should investigate early life stages to specify temporal order in model evaluation. Despite the obvious limitations of analyzing archival data, however, the models estimated here are based on theoretical propositions derived from longitudinal observations (Moffitt, 1993; Patterson et al., 1989, 1991), and the results they yielded are consistent with those of most other longitudinal studies (e.g., Lynam et al., 1993; Patterson et al., 1998).

Sixth, it is possible that official records may underestimate delinquent behavior because some of the delinquent acts may not have come to the attention of authorities. Studies have shown, however, that official records of police arrest and self-reported delinquent behavior tend to be significantly correlated (Hindelang et al., 1979; Tracy, 1987). Finally, only official arrest records from California were used due to difficulties in obtaining records outside the state. Offenses that the offenders may have committed in other states, therefore, could not be included in our measures of criminal activity. This limitation, however, may not be serious because the majority of the offenses these offenders committed can be expected to be geographically restricted.

In addition, we have no plausible reason to expect that individuals who moved out of California would be disproportionately concentrated in particular groups (e.g., early starters).

Despite these limitations, these results strongly support the developmental perspective in the study of persistent offending. It appears that family factors, individual differences, and early behavioral problems are all influences on criminal behavior. Although we caution against overgeneralizing the results of this study to other populations, we are confident about the robustness of the results based on their remarkable consistency with both theory and previous research. Future research should direct attention to further identification of the precursors of an early onset of delinquency and continued exploration of the complex processes involved in crime and delinquency.

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