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Variables that initiate and maintain an early-onset trajectory for juvenile offending

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Abstract
A trajectory defined by three time-ordered events was offered as a useful adjunct to building a development theory about antisocial behaviors. A sequence was defined with significant linkages between antisocial childhood behavior and early arrest and between early arrest and chronic offending. The majority of chronic offenders traveled through all three events in the sequence. Each event in the sequence shared a common process of disrupted family process plus frequent family transitions and marked social disadvantage. The findings support the hypothesis that the process that leads to antisocial behaviors at grade four may also maintain the entire sequence. The level of disrupted process at initiation and a time-based measure of involvement with deviant peers predicted which individuals moved forward in the sequence and which did not. The findings are consistent with the idea that the majority of chronic offending juveniles follow a trajectory that can be explained by a single theory.

Although longitudinal studies consistently show children's aggressive behavior to be surprisingly stable (Loeber, 1982; Olweus 1979), little or no information is available about how the form of aggressive behavior changes over time. In this article, we hypothesize that when highly antisocial children become adolescents, the form in which the behaviors are expressed changes over time in a recognizable, time-ordered trajectory. As used here, a trajectory for antisocial behaviors has the following characteristics: (a) There is a measurable start point that provides a reliable estimate of individual differences in antisocial behaviors; (b) as time unfolds, there are detectable changes in the form in which the antisocial behaviors are expressed; (c) the majority of the individuals found at the more extreme points on the trajectory have previously passed through the earlier points (i.e., the sequence is transitive); (d) we assumed that the sequence trajectory moves toward increasing severity as defined by increasing risk of adult chronic offending.

There are several ways in which an empirically defined trajectory could serve as a useful adjunct in building a developmental theory about antisocial behaviors. First, it could serve as a basis for estimating whether one or more paths are required to explain the most extreme event in the trajectory. For example, it may be that the majority of chronic offenders do not move first to antisocial and then to early onset. Perhaps they arrive at chronic offending from some other path. It may also

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be that each point on the trajectory requires a different causal mechanism, again, suggesting the need to consider multiple paths. Alternatively, we hypothesized that each event in the sequence may be driven by a shared set of causal mechanisms (i.e., the entire trajectory may reflect a single underlying model). This article examines each of these hypotheses.

Childhood-based measures of antisocial behavior assessed at grade four define the earliest point in the trajectory. The selection reflects the consistent finding of a significant relation between childhood measures of antisocial behavior and later juvenile and adult criminal acts (Farrington & Hawkins, 1991; Loeber, 1982; Loeber & Dishion, 1983). In fact, some studies have demonstrated that a correlation with juvenile crimes holds, even for assessments made as early as the first grade (Kellam, Brown, Rubin, & Ensminger, 1983). In keeping with findings from the growth studies by Patterson, DeGarmo, and Yoerger (1997), we assumed that the initiation for most of the antisocial boys in our sample would have occurred prior to grade one.

The concept of trajectory implies changes over time. This consideration dictated the choice of "age at first arrest" as a second point in the sequence. In a high-risk sample such as the Oregon Youth Study (OYS), about a quarter of the boys were first arrested by age 14 years. An early first-arrest event delineates a shift from childhood forms of antisocial acts to acts that constitute indictable delinquent offenses. A study of intraindividual growth in new forms of antisocial acts showed that much of the change in form (e.g., truancy, substance abuse, theft) begins in late childhood and accelerates during early adolescence (Patterson, 1993). The choice of age at first arrest as the second event in the trajectory reflects a growing body of evidence showing that it is a major predictor of adult arrest (Blumstein, Farrington, & Moitra, 1985; Gendreau, Little, & Goggin, 1996; Loeber, 1982; Patterson, 1996; Stattin & Magnusson, 1991). Several investigators take the position that early and late timing for first arrest represent two entirely different paths to juvenile offending (Patterson & Yoerger, 1993, 1997; Simons, 1993; Stattin & Magnusson, 1991).

The concept of a trajectory requires that each event in the sequence be related to the one that follows. For example, measures of childhood forms of antisocial acts should predict early arrest. This, in fact, is consistently shown in the studies by Blumstein, Cohen, Roth, and Visher (1986), Loeber (1982), Patterson, Crosby, and Vuchinich (1992), and Sampson and Laub (1993). In the OYS, 10-year-old boys were assessed on a composite score based on ratings by parent, teacher, peers, and child self-report. Early onset was defined by an arrest before the age of 14. The correlation between the two variables was .46 ($p < .001$).

Although a significant correlation between adjacent events is a necessary condition for a trajectory, the utility of the concept rests on more detailed descriptive data generated by three questions. (a) What is the likelihood of moving from childhood antisocial behaviors to early police arrest? (b) What is the likelihood that a child passed through the first event but not the second? (c) What is the likelihood of passing through both events? Finally, the concept of a trajectory implies a transitive sequence. In this context, it would mean that all boys who were arrested early also had been identified even earlier as an antisocial child. (d) How many boys arrested early had not previously been identified for antisocial behavior? If there were a substantial group of such individuals, it would suggest that there may be not one but, rather, several different paths to the same outcome. The same set of questions will be raised for each pair of adjacent points on the trajectory.

As used here, the concept of a trajectory is described by sequential changes in form; but it also implies sequential increases along a dimension of deviancy and in severity. Each of the transitions in the trajectory represents a significant increment in risk of adult (chronic) arrest as shown by Patterson and Yoerger (1997). Chronic juvenile offending was selected as the third event in the trajectory and defined as three or more police arrests prior to age 18 years. The empirical literature strongly supports the connection between early arrest

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and chronic offending. For example, in the Philadelphia study, Wolfgang, Figlio, and Sellin (1972) found a correlation between age of first juvenile arrest and chronicity of subsequent arrests that approached −1.00 (i.e., the younger first time arrested boy was more at risk for chronic status). The comparable correlation for the OYS was −.59 ($p < .001$). The research literature also suggests that status as a chronic juvenile offender may be one of the strongest predictors of a future adult criminal career (Farrington et al., 1990; Moffitt, 1993; Pulkkinen, 1986; Sampson & Laub, 1993; Stattin & Magnusson, 1991). A review by Blumstein et al. (1986) of data from three longitudinal studies showed that given three juvenile arrests, the median risk for adult offending was .73; and given four juvenile arrests, the median risk was .89.

Presumably, this 3-point trajectory describes growth along a single antisocial-deviancy dimension as suggested in the writings of Gottfredson and Hirschi (1990). In our study, we were interested in estimating the proportion of chronic offenders who passed through all three points in the sequence. Does the trajectory describe the path followed by the majority of chronic offenders? In summary, the first purpose for this article is to describe an early-onset trajectory for antisocial behaviors that are increasing in severity. The first point in the trajectory was defined by a composite measure of childhood forms of antisocial behavior assessed at ages 9 to 10 years. The second point was defined by age at first arrest assessed between the ages of 9 and 10 through 14 years. The third point was based on frequency of arrests prior to age 18.

Shared Processes for the Early-Onset Trajectory

The second purpose of the study was to examine the possibility that a single set of mechanisms could explain the initiation as well as the movement through the remainder of the trajectory. Specifically, we hypothesized that the mechanisms that drive antisocial behaviors in children would also explain who will be at significant risk for both early arrest and chronic offending. If a single model accounted for all three points in the trajectory, this would have major implications for the design of prevention trials. The goal is in close keeping with Reid's (1995) injunction that the design of effective prevention trials require theories that specify the causal mechanisms that govern behavior. Movement along a sequence toward increasingly severe forms of antisocial events is analogous to a trajectory toward increasingly severe symptoms found in some medical disease processes. For example, patients with lung cancer move through a sequence of increasingly severe symptoms, each stage accompanied by an increasing risk of death. The sequence is transitive in that each event would be a necessary prelude to the one that follows. However, a prior symptom is not itself a cause for the symptom that follows. A prior event in the sequence is merely a predictor. It is the underlying disease process that is the causal mechanism that drives the changes in symptoms and determines the order in which they occur.

In this study, disrupted parenting practices are thought to be the proximal mechanism for the production of antisocial forms of deviancy that occur during the interval when the individual is a member of a family. During early adolescence, direct training by the deviant peer group functions as a second proximal mechanism that finds expression during the early arrest and chronic offending events for the trajectory (Dishion, Andrews, & Crosby, 1995; Patterson, 1993). Contextual variables, such as social disadvantage and frequency of family restructuring (transitions), are thought to make indirect contributions, particularly to the later stages of the trajectory. Among other things, the contextual variables may, for example, determine the availability of extremely deviant peers.

We assumed that disrupted parenting practices and direct training by deviant peers are mechanisms analogous to the disease process for the progression of cancer symptoms discussed earlier. Furthermore, we hypothesized that the underlying process is so stable across time that measures collected during childhood when the trajectory begins may also describe the basic processes that maintain the juvenile trajectory for antisocial behaviors through ad-

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olescence. The hypothesized stability in process is based on findings from the OYS where multimethod and agent indicators were used to define parental discipline and monitoring assessed at grade four and again at grade six. The stability path coefficients were .82 and .75, respectively (Patterson & Bank, 1989). Our studies of social interactional sequences lead us to believe that it is the bidirectional relation between parent and child that contributes to these long-term stabilities (Patterson, 1979; Patterson & Moore, 1979). Given extended interactions, the dyad drifts into conflict as a kind of absorbing state that is highly stable over time.

Details of how disrupted context and family process produce negative child outcomes were outlined in the coercion model in Dishion, Patterson, and Griesler (1994); Patterson (1982); Patterson, Reid, and Dishion (1992); and Snyder (1995). A core assumption in the coercion model is that parenting skills—such as discipline, monitoring, and family problem solving—control the reinforcing contingencies that maintain antisocial childhood behaviors. If disrupted parenting practices define the mechanisms that produce antisocial outcomes, then we would expect correlational models to demonstrate strong relationships between measures of these parenting practices and child outcomes. The first test of the hypothesis was based on a normal sample of adolescents (Patterson, 1982). Multimethod and multiagent measures of parental monitoring and discipline correlated significantly with police arrest data. Forgatch (1991) tested the model further using structural equation models based on three different at-risk samples. The findings showed that latent constructs for parental discipline and monitoring account for 30–52% of the variance in latent constructs for antisocial behaviors. Metzler and Dishion (1992) demonstrated that a similar model was effective for a sample of normal adolescents; and, more recently, Biglan et al. (1996) found acceptable fits for models predicting general deviancy in three samples of normal adolescents.

The clinical intervention literature provides indirect evidence for the causal status of parenting skills on childhood behavior. A half-dozen random assignment and observation-based evaluations showed that training parents in family management skills was associated with significant reductions in childhood antisocial behaviors. (See reviews of these studies by Kazdin, Esveldt–Dawson, French, & Unis, 1987; Lipsey & Wilson, 1993; Patterson, Dishion, & Chamberlain, 1993.) However, these studies did not provide for pre- and postmultimethod assessment of parenting practices. Because of this omission, we cannot specify that the magnitude of improvement in parenting skills covaried with the magnitude of improvement in child behavior (i.e., the causal variable is parenting). Recent prevention and intervention trials used both adequate measurement and random assignment designs to test the causal status of parenting variables. These studies consistently provide convincing evidence for the causal status of parenting behaviors (Chamberlain, Ray, & Moore, 1996; Dishion, Patterson, & Kavanagh, 1992; Forgatch, 1996).

In our studies of families of younger children, the effects of contextual variables, such as social disadvantage and family transitions (divorce, repartnering), on childhood outcomes are largely mediated by whether or not the parenting practices become disrupted (Bank, Forgatch, Patterson, & Fetrow, 1993; Patterson, 1983; Patterson, Reid, & Dishion, 1992). However, models for older samples and delinquent outcomes typically show that although some of the effects are mediated through parenting, both social disadvantage and family transition variables make significant direct contributions to delinquent outcomes. In keeping with this latter set of findings, Farrington and Hawkins (1991) found that low income and large family size made direct, rather than indirect, contributions to predicting chronic juvenile offending. In the present article, we hypothesized that social disadvantage and family transition would significantly correlate with early onset and status as a chronic offender.

Finally, there is one further problem to be considered. Although parenting practices and contextual disruptors may serve as maintenance mechanisms, how does one explain who advances in the trajectory and who does

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not? Coercion theory specifies that interactions with deviant peers shape new forms of antisocial behavior (Patterson, 1993; Stoolmiller, 1994). As the child reaches adolescence and spends more time outside the family, the contributions of deviant peers become increasingly significant (Dishion et al., 1995), whereas the relative contributions of parents diminish somewhat. Longitudinal data also show that increasing involvement with deviant peers is associated with growth in delinquency (Stoolmiller & Eddy, 1994). Presumably, the peer training also contributed to increasing the severity of the deviant behavior being performed. We hypothesized that status at a given point on the trajectory plus a time-dependent measure of the current level of involvement with deviant peers would each make significant predictions of movement forward to the next, more severe stage.

The database used to test these hypotheses was from the OYS longitudinal study of at-risk families living in the highest crime areas in a medium-size metropolitan center. Multimethod and multiagent measures of childhood behaviors and parenting variables were assessed at grade four. Police arrest data were collected every other year through high school. Logistic regression analyses were used to test the significance of the linkage between one stage and the next. A multivariate logistic analysis was used to predict status at each stage.

Methods

Participants

Two successive birth cohorts of fourth grade boys and their families were recruited for the OYS to comprise a total sample of 206. For each cohort, grade schools were randomly selected from neighborhoods characterized by the 10 highest delinquency rates in a moderate-size, Pacific Northwest metropolitan area. Six schools were selected for Cohort I and seven for Cohort II. The cohorts had two schools in common. At the selected schools, 74.4% of all families of fourth grade boys agreed to participate in the study. Capaldi and Patterson (1987) summarized the sample demographics and recruitment procedures.

The majority of the sample was Anglo-American and either working class or unemployed. The large number of unemployed and underemployed parents reflected the acute local economic recession that occurred during the 1st year of data collection. The median annual income for the sample was approximately $15,000. Each family was paid up to $300 for participating in 20 hr of assessment.

The families are reassessed annually even though many have left the state. In the 11th year of the study, 99% of the boys and mothers continued to participate.

Assessment

OYS assessments included measures of behavior in home, school, and community settings. Home observations, interviews, questionnaires, videotapes of family problem-solving tasks, and telephone contacts with parents and children sampled behavior at home. Teacher questionnaires, peer nominations, and achievement and intelligence tests sampled school adjustment. Juvenile court records documented problem behavior within the community. Capaldi and Patterson (1991) presented details of the assessment instruments.

In accord with Fergusson and Horwood (1987) and many other investigators, such as Simons, Wu, Conger, and Lorenz (1994), we believed that the assessment procedures describing parenting practices and child outcomes should include indicators from multiple methods and agents (Bank, Dishion, Skinner, & Patterson, 1990; Patterson & Bank, 1986). We assumed that defining latent constructs in this way would enhance the possibility of generalizing models across samples and sites. Recent across-site replications support this hypothesis (Conger, Patterson, & Gé, 1995; Rueter & Conger, 1995).

Constructs

Constructs used in these analyses are described below. The psychometric properties

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of the constructs were summarized by Capaldi and Patterson (1989).

Socioeconomic status. Based on information from an interview with the parents, the Hollingshead (1975) 4-factor index was used to classify and weight parental occupations and education levels. A composite score was formed from the sum of the two weighted items and then standardized. The distribution for the score was acceptable with a kurtosis of .01 and skew of –0.71.

Family transitions. A parent interview during the initial year of assessment established a record of any changes in family structure that had occurred during the target boy's lifetime. At the start of the study, 79 families were intact, 45 had a single parent, 57 had a stepparent, and 23 had experienced three or more transitions. The score for frequency of transitions was standardized for use in the present analyses. Skewness was .35 and kurtosis was –1.20 for the resulting distribution.

Childhood antisocial behaviors construct. The antisocial behaviors construct was a composite of grade four parent, teacher, target boy, and peer indicators. For each parent, scores were obtained from the Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1979), for overt (7 items; e.g., "argues a lot") and covert (5 items; e.g., "steals at home") antisocial behavior items. The Overt-Covert Aggression (OCA) questionnaire described in Capaldi and Patterson (1989) also yielded overt (11 items; e.g., "screams or yells") and covert (18 items; e.g., "cover up wrong doing") subscales. Prior factor analyses for boys in grade four had shown that the covert and overt items defined one (rather than two) factor (Patterson, Reid, & Dishion, 1992). In the present report, the two scales were combined to form a single score.

Separate scores for mothers and fathers were generated for both the CBCL and the OCA. Based on the OYS data, each of the scores for overt and covert antisocial behaviors were standardized. Items from the parent telephone interview (8 items; e.g., "disobeyed his parents"), described in Capaldi and Patterson (1989), were averaged over six interviews separated by approximately 3-day intervals. Cronbach's standardized αs for all scales were greater than .70. Test–retest correlations for a subsample retested after 4 to 6 weeks were .68 ($p < .001$) for the CBCL score and .84 ($p < .001$) for the OCA score. The parent indicator was computed as the mean of the standardized CBCL, OCA, and the telephone interview scores.

The teacher indicator was based on a priori scales for overt (11 items; e.g., "gets in many fights") and covert (7 items; e.g., "lying or cheating") antisocial behaviors developed from the teacher CBCL (Achenbach & Edelbrock, 1986). Cronbach's standardized αs for the overt and covert scales were .92 and .82, respectively.

The target-boy indicator was formed from the mean of two scores from the structured and telephone interviews. The child telephone interview described in Capaldi and Patterson (1989) contained 9 overt items (e.g., "talk back to an adult") and 4 covert items (e.g., "break anything on purpose"). The antisocial behaviors items were averaged over six telephone interviews. Cronbach's standardized αs were .82 for the overt scale and .42 for the covert scale. The structured interview with the child as described in Capaldi and Patterson (1989) was carried out at the Oregon Social Learning Center. The interview included 9 overt items, such as "tease anyone," and 14 covert items, such as "cheated on school tests." Cronbach's standardized αs were .79 for the overt scale and .84 for the covert scale.

The items for the peer-nomination scale were described in Capaldi and Patterson (1989). The scores for the peer-nomination scale were based on six overt items, such as "kids who push and shove," and three covert items, such as "kids who skip school." In response to each question, each peer made nominations from a list of all the OYS subjects in that school. The nominations were totaled for each boy and standardized within schools. Cronbach's standardized αs were .94 for the overt scale and .83 for the covert scale. The peer indicator was formed from the mean of the standardized overt and covert scores.

The mean of the standardized parent,

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teacher, target boy, and peer indicators formed the construct score. Measures of skewness and kurtosis were within acceptable limits for each of the indicators. The values for the construct score were also acceptable, with a skewness of .94 and kurtosis of 1.1 (Capaldi & Patterson, 1989).

A median split was used to dichotomize the construct score for the logistic regression analyses. The trajectory metaphor implies a larger number of individuals at the start and then fewer as we move toward the end point (adult chronic offending). Matching the cutoffs for all three events does, of course, reduce the false positive error; but the price is to increase the false negative error. More to the point, it shifts the problem away from the original idea of the trajectory.

Discipline construct. For each family, approximately 25 min of home observations focused on the target boy were obtained over three occasions. The discipline construct was composed of two direct observation indicators, nattering and abusive parenting, and one observer impressions indicator. The nattering indicator was computed as the probability that the parent would direct negative behavior at the target boy, given that the parent was interacting with the boy. Abusive parenting was defined by three Family Process Code categories (Dishion, Gardner, Patterson, Reid, & Thibodeaux, 1983): verbal attack (e.g., "I hate you"); coercion (e.g., "Stop hitting your sister, or I'll spank you"); and physical aggression (e.g., shoving or physically attacking). The abusive parenting indicator was defined as the probability that the parent would display abusive behavior toward the target boy, given that the parent was interacting with the boy. The test–retest reliability over a 6- to 8-week interval was .35 for each indicator.

The scales for observer global ratings of parental discipline skills included 6 items for mothers (e.g., "gave rationales") and 11 items for fathers (e.g., "clearly pinpointed behavior"). The item selections were based on the results of separate itemetric studies for the two parents. Cronbach's standardized αs for the mother and father scales were .77 and .78, respectively. The test–retest reliability over a 6- to 8-week interval was .68 ($p < .001$) for the parent indicator.

Based on the OYS sample, the scores for each indicator were standardized and combined to form a construct score. Skewness (3.30) and kurtosis (16.63) were very high for the low base rate abusive parenting indicator. The distributions of the remaining indicators and construct score were within acceptable limits. Skewness and kurtosis for the composite score were −1.16 and 2.38 (Capaldi & Patterson, 1989).

Monitoring construct. The monitoring construct consisted of indicators from the child interview, parent telephone interview, and interviewer impressions questionnaire. Six items from the child interview (e.g., "How often do you check in after school?") formed a scale with a Cronbach's standardized α of .55. For a 6- to 8-week interval, the test–retest reliability for the indicator was .63 ($p < .001$). The parent telephone interview indicator consisted of a single item ("How many hours did you or your spouse spend with your son yesterday?") sampled at each of six interviews. The interviewer impressions indicator consisted of two items (e.g., "How well is this child monitored?"). Over a 6- to 8-week interval, the test–retest reliability for this indicator was .51 ($p < .013$). All three indicators and the construct score (skewness = −.52; kurtosis = .33) were acceptably distributed.

Deviant peer involvement constructs. Deviant peer involvement constructs were computed every other year from grade 4 through grade 12. At grade 4, the construct consisted of three indicators. The child interview scale was composed of 11 items (e.g., "How often have your friends stolen something worth less than $5?") with a Cronbach's standardized α of .86. The parent indicator consisted of two items each from the mothers' and fathers' CBCL and OCA (e.g., "Does he hang around with children who get in trouble?"). The correlation between the mother and father scores was .39 ($p < .001$). The mean of the standardized mother and father scores formed the parent indicator. Over a 6- to 8-week interval, the test–retest correlation for this indicator was

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.72 ($p < .001$). A single item from the peer nominations ("kids who belong to a tough group of kids") was the third indicator. Skewness and kurtosis were acceptable for all the indicators and the deviant peer construct score (skewness = .89; kurtosis = .76).

The deviant peer construct was computed from similar item pools for grades 6, 8, 10, and 12. Detailed descriptive information for each year is available on request.

Wandering constructs. The wandering construct was a measure of the target boy's unsupervised time, primarily outside the home. At grade four, the construct was composed of a single scale of eight items from the telephone and structured interviews with the parents and target boy (e.g., "Was your son out after 7:00 p.m. last night without an adult?"). Cronbach's standardized α for the scale was .50, and skew (.76) and kurtosis (0.99) were within acceptable limits. This construct was also computed from similar items every other year from grade 4 through grade 12. Detailed descriptive information for grades 6 through 12 are available on request.

Juvenile court records. Juvenile court record searches were conducted to ascertain the date and nature of all police contacts with the target boys. When families moved to other communities, record searches were conducted in those jurisdictions as well. Police contacts for reasons other than delinquency (e.g., abuse or neglect of the target boy) and for minor traffic violations were excluded from these analyses. The records provided a complete set of arrest data through 18 years of age for both cohorts.

Results

The analyses begin with a summary of the data that describes the likelihood of the target boy moving from one event to another, together with the likelihood that he might arrive at an event without having moved through the prior event(s). The second step examines the frequency with which individuals follow the various patterns that are possible in a 3-event sequence. The key question here concerns the number of chronic offenders who moved through the entire sequence. The third step examines the contribution of the context and process (parenting) variables to maintain the individual as he moves through the progression. The last step examines two approaches to predicting which individual will penetrate furthest into the trajectory. The first hypothesis tested is that the greater the disruption in family process and contextual variables during childhood, the further the movement through the progression. The second hypothesis tested was that time dependent measures of deviant peer involvement would also predict which individual moved forward and which did not.

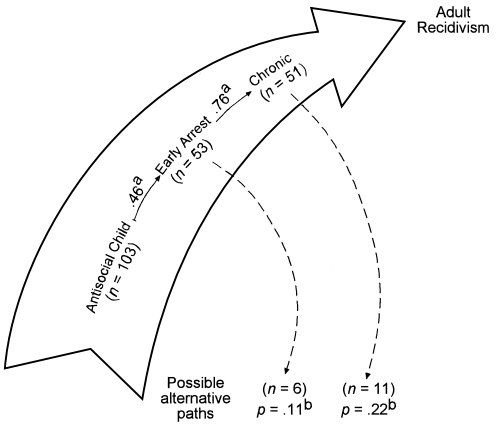


Figure 1. Juvenile trajectory to increasing severity. [a]*p*(B/A), likelihood of moving on; [b]*p*(not A/B), likelihood of not having been in the prior stage.

Descriptive and linkage data for a trajectory

We hypothesized that at each point in the trajectory, the data would be consistent with the transitivity assumption such that the majority of individuals at an advanced point would have passed through the prior point. For example, Figure 1 shows that only 6 of the 53 individuals arrested early had not been identified as antisocial children. These 6 individuals scored below the median on the composite score for antisocial behavior. The small number of (false negative) errors are consistent

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Figure 2. Linkages between adjacent events in the early-onset trajectory. [a]Numbers above the line are β weights; numbers below the line are odds ratios; $*p < .001$.

with the assumption of a transitive sequence.

Of the 51 chronic offenders, 11 had not been early starters. In examining these cases further, seven of them had been identified as antisocial; but their first arrest was delayed until after the age of 14 years. These seven exceptions play an interesting role that became evident when we moved on to more formal tests of the transitivity hypothesis. It may be that future studies would require a more stringent definition of chronic. There were 45 individuals with four or more arrests. When introduced into the trajectory, the false negative remained low (22%). The findings are consistent with the idea that the majority of chronic offenders had been early starters.

It can be seen that less than half of the antisocial boys (46%) moved forward to early arrest; and of those arrested early, 76% had become chronic offenders by age 18 years. The next question examined concerned the significance of these linkages among the three events that defined the trajectory. The findings from the univariate logistic analyses are summarized in Figure 2. In keeping with the hypothesis, each event was a significant predictor of the next event in the sequence. For example, as expected, a high antisocial behaviors score was significantly related to an early arrest. The relationship was defined by a β of 2.6 ($p < .001$). Given an antisocial behavior score above the median, the odds of an early arrest were more than 13 times greater than for low-scoring boys. Given an early arrest, the odds of being a chronic offender were more than 39 times greater. As would be required of a trajectory, the linkages between events are significant.

If the sequence is transitive, then each stage would be a necessary precursor only for the stage that immediately followed. This would require that event B (early onset) mediates the impact of the prior event A (antisocial) on the stage that follows C (chronic). In their discussion of the characteristics of a mediational model, Baron and Kenny (1986) pointed to the necessity of first demonstrating in the present instance that the antisocial stage is in fact correlated with the chronic offending stage. Capaldi and Patterson (1996) showed that indeed this was the case. The next step reflects the overlap between the terms transitive and mediational. If the transitivity assumption was correct, then, by definition, the contribution of antisocial to chronic would become nonsignificant after the contribution of antisocial to early arrest had been partialed out. A mediational model makes the same assumption.

Hierarchical logistic regression analyses were used to test the hypothesis: Does antisocial make a significant contribution to chronic even after its relation to early arrest has been partialed out? The most conservative answer is that it does not. The β was .96 ($p = .06$) with an odds ratio of 2.6. A replication study based on a sample of single-parent families showed that the contribution of antisocial behavior to chronic offending was nonsignificant after the contribution to early arrest had been partialed out (Forgatch, Patterson, & Stoolmiller, 1994). However, even if the borderline findings are accepted, the outcome would be a trajectory defined by two (antisocial behavior and chronic offending) rather than by three events.

We also examined the transitivity assumption at a more micro level. Transitivity can be thought of as requiring each individual to display an orderly pattern of movement through the sequence such that status in any given event is accompanied by consistent status in all prior events. At the individual level, failure to achieve status in one event should

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Table 1. *Pattern frequencies for early-onset trajectory*

	Antisocial	Early Onset	Chronic	Frequency	Total
Patterned	+	0	0	49	
	+	+	0	11	
	+	+	+	36	
					96
Nonpatterned	+	0	+	7	
	0	+	+	4	
	0	0	+	4	
	0	+	0	2	
					17
Nonoffenders	0	0	0	93	
					93
Totals	103	53	51		206

Total Chronic = 51. p (Full pattern/chronic) = .706.

consistently be followed by a failure to achieve status in all the events that follow. We are also interested in the proportion of chronic offenders who moved through the entire progression.

Findings relating to these hypotheses are summarized in Table 1. The first row in the table shows that 49 boys tested above the median on the antisocial composite score (+) at grade four but then did not move forward (0, 0) in the trajectory. The second row shows that there were 11 boys who were both antisocial (+) as children and had an early-onset arrest (+) but failed to become chronic offenders (0). Thirty-six boys moved through each of the three events in the sequence. Thus, 96 individuals moved in a manner commensurate with the idea of "an orderly progression." In contrast, 17 individuals deviated from patterned behavior in one form or another. Of those who entered the trajectory at any point, 85% could be said to be patterned. There were 93 individuals who did not enter the trajectory at any point.

Of 51 chronic offenders, 71% moved through all three points (antisocial, early arrest, and chronic offending) in the trajectory. Taken together, the findings are consistent with the hypothesis of a single path to chronic juvenile offending. The majority of chronic offenders moved through all points in the trajectory.

Tests for shared-components hypothesis

The coercion model stipulates that the same process that starts the antisocial behaviors will also be present at all later points in the trajectory. It was predicted that the two parenting variables (discipline and monitoring) and the two context variables (social disadvantage and marital transition frequency) assessed during childhood correlate significantly with each of the three events in the early-onset trajectory. In Table 2, the results of the univariate logistic regression analyses are summarized separately for each event in the sequence. In the shared-components hypothesis, 11 of the 12 tests were significant. Boys whose childhood families were characterized by disrupted parental discipline and monitoring practices were at significant risk, not only for antisocial behaviors during childhood but also for arrest before age 14 years and for chronic offending by age 18 years. With one exception, boys from families characterized by social disadvantage and frequent transition were also at significant risk for each event in the trajectory.

The available data are consistent with the hypothesis that more advanced stages in the progression may share causal components with less advanced stages. A multivariate logistic regression examined in more detail the uniqueness of the contribution of each vari-

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Table 2. *Univariate logistic regression analyses for contextual and parenting variables*

Maintenance Variables	Early-Onset Trajectory					
	Antisocial Child		Early Onset		Chronic Offender	
	β	*p*	β	*p*	β	*p*
Social disadvantage	0.47	.002	0.65	.001	0.66	.001
Marital transitions	0.23	.106	0.56	.001	0.49	.003
Parental monitoring	–0.64	.000	–0.44	.009	–0.44	.009
Parental discipline	–0.97	.000	–0.66	.000	–0.63	.000

$N = 202$.

Table 3. *Multivariate logistic regression analyses of shared components analyses*

Maintenance Variables	Early-Onset Trajectory								
	Antisocial Child		Exponentiated	Early Onset		Exponentiated	Chronic Offender		Exponentiated
	β	*p*	β	β	*p*	β	β	*p*	β
Parenting Model									
Social disadvantage	0.25	.140	1.29	0.46	.033	1.58	0.48	.027	1.61
Marital transitions	0.08	.603	1.09	0.50	.006	1.66	0.42	.019	1.52
Parental monitoring	–0.53	.003	0.59	–0.31	.097	0.74	–0.32	.083	0.73
Parental discipline	–0.78	.000	0.46	–0.48	.008	0.62	–0.44	.015	0.65

able to each stage. The findings are summarized in Table 3.

As expected, the impact of contextual variables (social disadvantage and marital transitions) on antisocial childhood behavior was mediated by measures of parenting practices. Both parental monitoring and discipline made unique contributions to this stage. A one unit (1 *SD*) increase in effective monitoring produced a decrease of 0.59 units in risk of antisocial behaviors. A one unit increase in effective discipline was associated with a 0.46 decrease in antisocial behaviors.

For early arrest, the contribution of ineffective discipline continued to make a significant contribution, although monitoring was of only borderline importance. At this juncture, both of the contextual variables contributed directly to early arrest. For example, an increase of one unit in transitions was related to an increase of 1.66 units in risk of early arrest. There was a commensurate increase in risk associated with a one unit increase in social disadvantage. This same pattern of findings held when predicting risk of chronic offending. Childhood assessment of parental discipline continued to make a unique contribution to chronicity; whereas in a multivariate format, the contribution of parental monitoring was no longer significant. Both social disadvantage and frequent family transitions made unique and significant contributions to risk of chronic offending.

The findings are consistent with the idea that processes identifiable at initiation to the trajectory also contribute significantly to maintenance of the trajectory during the entire sequence. However, the argument would be strengthened if it could be shown that the level of disruption during the initial stage also predicts how far the individual will move into the trajectory. The analyses were based only upon those individuals who were in the trajectory. Three groups were formed. Individuals

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Table 4. *Level of risk at initiation to level of penetration on early-onset trajectory*

	Level of Penetration				
Risk Variable	One Event	Two Events	Three Events	*F*	*p*
n =	55	22	36		
Parent discipline					
Mean	–0.16	–0.06	–0.51	3.111	.049
Social disadvantage					
Mean	–32.16	–28.32	–28.44	2.972	.055
Transitions					
Mean	1.00	1.62	1.46	3.514	.033

who occupied just one point on the trajectory formed one group, all those occupying two points defined another group, and those occupying all three points defined a third group. An ANOVA was used to compare the three groups on discipline, social disadvantage, and transitions. We hypothesized that individuals shown to occupy two or three points on the trajectory, as compared to those with only a single point, would be characterized by higher initial levels of disrupted parenting, transitions, and social disadvantage. The findings are summarized in Table 4.

The progressions are not as smooth as one would wish, but the general trends are in keeping with the hypothesis. The greater the disruption in childhood-based measures of parental discipline and transitions, the greater the subsequent penetration into the trajectory. The social disadvantage variable showed a similar trend, but the contribution was borderline ($p < .055$) in significance.

Finally, the hypothesis was tested that current levels of involvement with deviant peers would also serve as a significant predictor of which individuals moved to higher levels of risk. For example, to predict early arrest, the variables entered included a fixed childhood measure of antisocial behaviors, plus time-dependent measures of deviant peer involvement, and wandering from grades four, six, and eight. The results of the multivariate analysis are summarized in Table 5. Prediction based on prior status as an antisocial child made only a borderline contribution to predicting early arrest after the contribution of current involvement with deviant peers and wandering had been partialed out. In keeping with the hypothesis, the primary predictor of movement from childhood antisocial behaviors to early arrest was the time-dependent measure of deviant peer involvement. An increase of one unit in this involvement was associated with a 6.4-fold increase in risk of early arrest.

The multivariate analysis predicting movement to chronic offending included early arrest plus time-dependent measures of deviant peer involvement and wandering based on data from grades 10 and 12. The analyses showed that the major predictor was prior status as early arrest. Even after the contributions of deviant peer involvement and wandering had been partialed out, a one-unit decrease in age of first arrest was associated with a 40-fold increase in risk of chronic offending. However, consistent with the hypothesis, a time-dependent measure of deviant peer involvement made an additional significant contribution to the prediction of chronic offending. The general pattern of findings was consistent with the hypothesis that information about the prior event in the sequence plus current information about deviant peer involvement provides a significant basis for predicting forward movement toward increasing severity.

Implications

The findings are consistent with a hypothesized trajectory that begins with childhood an-

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Table 5. *Nonshared components that predict the next stage in the sequence*

To Predict Early Arrest ($n = 103$)				To Predict Chronic Offending ($n = 53$)			
Predictor Variables	β	*p*	Exponentiated β	Predictor Variables	β	*p*	Exponentiated β
Antisocial child	1.03	.060	2.81	Early Arrest	3.69	.000	40.00
Deviant peers[a]	1.85	.000	6.35	Deviant peers[b]	1.54	.000	4.65
Wandering[a]	0.28	.287	1.32	Wandering[b]	0.31	.422	1.37

[a]These were time-dependent variables such that the Early-Onset database were grades 4, 6, and 8.
[b]For Chronic Offending, the database was grades 10 and 12.

tisocial acts, moves to early arrest, and then advances to chronic juvenile offending during adolescence. The descriptive data show that the majority of individuals at a given point in the trajectory had previously traveled through the prior adjacent point. The findings also suggest that the majority of chronic offenders move through the entire sequence defining this path. Of the 51 juveniles with three or more arrests by 18 years of age, 71% had moved through each of the prior events in the trajectory, and 92% had moved through at least two of the three stages in the sequence. It seems reasonable to assume that there is a single, main path to chronic juvenile offending. In passing, it is interesting to note that this is also the main path to violent juvenile offending. Capaldi and Patterson (1996) showed that the preponderance of violent juvenile offenders had also been chronic offenders. Only 3 of the 26 violent offenders had not been chronic offenders.

The general pattern of findings relate directly to the utility of differentiating between early and late onset as two qualitatively different paths to juvenile offending. The family and contextual variables as shown in this report correlate with each point on the early-onset trajectory that had previously been shown by Patterson and Yoerger (1993; 1997) and Patterson, Crosby, and Vuchinich (1992) to differentiate early from late-onset police arrest. Subsequent analyses have also shown that although 76% of the early-onset boys became chronic offenders, the comparable figure for late-onset boys was only 19%. The risk of adult arrest was .42 for the early-arrest group but only .16 for the late-onset group. The combined findings lead us to reject the late-onset path as a an alternative to the early-onset trajectory in predicting long-term negative outcomes such as chronic adult offending. In that some key findings have been replicated in the follow-up studies of divorced families (Forgatch et al., 1994), we believe the three points define a trajectory that will serve as a general model for other risk samples as well. It seems to us that, given further replications, this is a useful way of thinking about how deviancy develops and moves in an orderly fashion toward greater severity.

Current analyses of OYS follow-up data for young adults between 18 and 22 years of age showed that 52% of the adult recidivist offenders had moved through all three points in the early-onset trajectory for juvenile offenders (Patterson, 1996). Stattin and Magnusson (1991) analyzed the data from three Swedish samples to identify the trajectories taken by adults who were persistent chronic offenders. The pattern followed by most of the chronic adult offenders was to have been arrested two or more times prior to age 15 years, and then arrested one or more times during their young adult years. In the total Swedish sample, this small group of career offenders (5.4%) accounted for 62% of all adult crimes. The pattern is similar to what was found in a meta-analysis of adult recidivists by Gendreau et al. (1996). They found early arrest and preadult arrest were among the best predictors.

Findings from this article suggest that separate models may not be required to explain antisocial childhood behavior, early arrest, and chronicity. The analyses showed the

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childhood levels of dysfunctional parental discipline practices, social disadvantage, and transitions significantly predicted each of the points in the trajectory. The variables that account for antisocial childhood behavior also predict early arrest and chronic juvenile offending. We conclude that the three points on the trajectory may reflect a single underlying process.

We view the movement through the trajectory as reflecting growth in deviancy and a general progression toward increasing severity. The growth is thought to be accumulative in that many of the childhood forms of antisocial behavior, such as temper tantrums, argumentativeness, and noncompliance, are retained, whereas others are replaced by new forms. We were particularly interested, therefore, in examining questions concerning who it is that continues to grow in deviancy and who does not. The findings show that the higher the initial level of disruption in parental discipline and transitions, the further the penetration into the trajectory. This movement into the trajectory was further enhanced if the individual was currently heavily involved with members of the deviant peer group.

As a general case, the model and its correlates have considerable implication for the design of prevention studies. Following Reid's (1995) injunction to base prevention trials on theory driven causal mechanisms, the present findings emphasize the contribution of parenting practices in prevention trials for antisocial children and early adolescents. The coercion model emphasizes that the family must change the social environment in which the child lives (Patterson, Reid, & Dishion, 1992). The current findings suggest that the components must also take into account the difficulties of parent training under conditions of extreme social disadvantage and family transition. The findings also underscore the importance of reducing the amount of time the preadolescents and adolescents spend in routine activities that are not supervised by adults (Dishion et al., 1994; Osgood, Wilson, Bachman, O'Malley, & Johnston, 1996; Stoolmiller, 1994). The current findings also have some interesting implications for how one might think about measuring outcomes from prevention trials. For example, the appropriate goal might be to reduce the future growth in risk rather than just reduce the frequency of juvenile offending. The present findings also suggest that prevention programs might better target boys who are on the early-onset rather than the late-onset path. Our findings suggest that the late-onset group is no more at risk of adult arrests than are individuals who were never arrested as juveniles (Patterson & Yoerger, 1997). Caspi and Moffitt (1995) also concluded that the late-onset, transient delinquent is, in fact, close to the societal norm for antisocial behaviors (i.e., almost all adolescents briefly engage in one or more indictable offenses as part of their normal development).

In the past decade, there has been a renewed interest in applying parenting-practices theory to both intervention and prevention trials. Strengthening parental practices has consistently been shown to reduce antisocial behaviors in younger children in clinical trials with random assignment designs (Dadds, Schwartz, & Sanders, 1987; Eisenstadt, Eyberg, McNeil, Newcomb, & Funderburk, 1993; Patterson, Chamberlain, & Reid, 1982; Webster–Stratton, 1984). Follow-up studies have also shown that such interventions significantly reduced future police arrests and out-of-home placements (Patterson & Forgatch, 1995). In addition, data are now available from six prevention studies that employed random assignment and careful pretrial, post-trial, and follow-up measurement. Each of the studies included components for training parents in discipline, supervision, and family problem-solving practices (Dishion et al., 1992; Dodge & Conduct Problems Prevention Research Group, 1993; Eron, 1994; Maguin, Zucker, & Fitzgerald, 1994; Reid, Eddy, Bank, & Fetrow, 1994; Tremblay, Kurtz, Mâsse, Vitaro, & Pihl, 1995). Although all six studies have reported positive outcomes for short-term follow-up, it is too early to say whether the procedures significantly reduce risk of adolescent delinquency.

The general strategy in the OYS requires

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families to participate in 20 hr of assessment every 2 years. This in turn necessitates a small sample. The sample size is a major weakness of the present study. One solution is to seek out across-site replication studies, exemplified in reports by Simons et al. (1994) and Conger et al. (1995). However, even with replication, we are left with the problem of not knowing whether the model would fit other segments of our society, such as inner-city and rural families or ethnic groups. In addition, we have only limited information about application of the coercion model to girls. The studies that have been completed suggest that although there is a general fit (Biglan et al., 1996; Metzler & Dishion, 1992), some specific aspects of the model must be altered to fit gender differences as shown in the McFadyen–Ketchum, Bates, Dodge, and Pettit (1996) studies. It may also be that the model must be modified to children who differ in biologic risk. These questions will serve as major foci for the next generation of longitudinal designs.

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