

## QUICK READ SYNOPSIS

Developmental Criminology  
and Its Discontents:  
Trajectories of Crime  
from Childhood to Old Age

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### A Life-Course View of the Development of Crime

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*Background*

In this article, the focus is on whether (and why) adolescent delinquents persist or desist from crime as they age. Three major issues are addressed:

- A life-course view of the idea of developmentally distinct groups that have unique causes. Contrary to predictions from developmental theory,
  - The authors find desistance from crime is the norm for all men and all crimes.
  - They also find little support for the idea that offender trajectory groups can be identified prospectively and that such offender groups are causally distinct.
- A revised life-course view of turning points, one that captures how people move in and out of various states over time.
- A life-course view that takes human agency and people's choices in life seriously.

- Crime in the Making** In *Crime in the Making*, the authors used a theoretical framework to explain childhood antisocial behavior, juvenile delinquency, and crime in early adulthood.
- The transition to young adulthood brings potential turning points.
  - An age-graded theory was developed to emphasize informal social controls that are transformative as individuals age.
    - Delinquency and other antisocial conduct are strongly related to troublesome adult behavior across a variety of experiences.
    - One mechanism is called “cumulative disadvantage” whereby serious delinquency undermined things such as employability and enhanced chances of continued offending.
  - A fundamental thesis of the age-graded theory of informal social control is that whereas individual traits and childhood experiences are important to understand behavior, experiences in young adulthood and beyond can redirect criminal trajectories in a more positive or negative way.
  - There is a need to further understand age and crime and to delve deeper into a person-based exploration of the life course.
- Following the Glueck Men** The authors followed up the men from the Gluecks’ original study, *Unraveling Juvenile Delinquency*, to investigate the following areas:
- Age and crime—they concluded that a middle-ground position was necessary in that there is enormous variability in individual age-crime curves and yet age has a direct effect on offending. This has implications for developmental criminology and the conceptual meaning of the age-crime relationship.
  - Mechanisms of persistence and desistance—they wanted to better understand patterns of stability and change in offending over the life course. Turning points such as marriage and military service are implicated in the process of desistance from crime.
  - The long-term follow-up data are quite relevant to examining trajectories of crime and thus the existence of life-course-persistent offender groups.
- NOTE: The findings show that antisocial behavior in children is a good predictor of antisocial behavior in adults, yet most antisocial children do not become antisocial adults—we cannot distinguish well who will persist or desist as adults.
- Predictability** Is there a small group of offenders who maintain a distinctly high rate of offending over the full life course? Areas looked at are
- predictability of life-course-persistent offending,
  - childhood risk and family adversity,
  - latent class models of desistance, and
  - age at desistance.
- Turning Points** A major issue is the role of turning points in development and growth.
- The authors have modified their views in light of the fact that many important life events are repeating in nature.
  - Marriage is a good example of a process that leads to desistance from crime by cutting off the person’s past, providing new relationships, new levels of supervision, structured routines focused on family life, and situations that allow for the emergence of a new script about the self.
- Human Agency** A vital feature that emerged was the role of human agency (the purposeful execution of choice and will) in the process of desisting from crime and persistent offending.

*Conclusions*

- Former delinquents often develop a new sense of self and an identity as a desister from crime as they become family men and hard workers.
- Some men persist in crime simply because of the rewards they perceive from crime or as a willful resistance to authority.
  - They perceive injustice resulting from experiences with the criminal justice system and express alienation from elite society.

NOTE: Human beings make choices to participate in crime or not, and human social action cannot be left out of the theoretical picture.

The authors view this article as offering a dual critique of social science theory and current policy about crime over the life course.

- Some believe that childhood and adolescent risk characteristics are all that really matter. This article pleads that we also look at turning points in later life, in the purposeful actions of men and women, and in the workings of chance.
- The authors' work is also critical of "structuralist" approaches wherein it is argued that location in the social structure (such as poverty and social class) are what really matter in explanations of crime.
- Evidence was exhibited that certain institutions, such as marriage, predicted crime even when each man served as his own control.

NOTE: Long-term outcomes cannot be easily predicted—by emphasizing time-varying events, the authors learned that stability and change do not neatly fit a simple linear "growth" model of development.

## Offender Classifications and Treatment Effects in Developmental Criminology: A Propensity/Event Consideration

Michael R. Gottfredson,  
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*Background*

Interest in classification of the offender population is frequently associated with efforts to discover differential treatment choices, under the assumption that not all offenders are alike.

- Empirical classification requires important methodological issues, including
  - the selection and measurement of classification elements,
  - the rules used to assess similarity and difference, and
  - the reliability of empirically derived classes.
- These issues cannot be adequately resolved independent of theories about the causes of the behavior in question.
- What distinguishes current typological research is the promise from developmental criminology that by adding age (or time) offender typologies might yield enhanced prediction or a more complete explanation for offending.
- Some scholars are skeptical about the prospects for criminology of the typological approach because of

- versatility in offending,
- general propensities for crime and deviance,
- a preference for parsimony,
- uncertainty about differential treatment effectiveness,
- concerns with how types of offenders are identified, and
- advances in explanatory models for crime and delinquency.

*Time and Age* The typologist's problem is to identify those ways in which some offenders are alike and different from others in nontrivial ways.

- The problem is to do so in a way that makes time or age essential.
- Two sets of findings in the recent work of Laub and Sampson should be considered in an interrelated way.
  - Their analyses of the likelihood of enhanced predictions of offending over the life course focused on the time of offending at different ages.
  - Analyses suggesting that some events during the adult life course have major effects on the probability of future offending.

NOTE: These findings have major implications for long-standing discussions about the meaning of age effects, the notion of "careers," and the validity of general theories.

*Individual Differences*

Individuals differ in their tendency to engage in delinquency and crime; these differences are robust over time and place.

- The author's theory emphasizes how individuals come to differ in their susceptibility to (mostly) informal controls on behavior.
- These differences influence the tendency to commit crimes and the environments and life circumstances that make crime more or less likely.
- Propensities and events are not independent of each other—school completion affects employment prospects and certain life circumstances affect opportunities for criminal involvement.
- The event-propensity distinction is useful for conceptualizing and measuring the dependent variable in delinquency research.
  - The event quality of acts creates a cloud over the clear meaning for an interpretation of measures of delinquency.
  - It is possible that all children, as they age from six to thirteen, reduce their delinquency in highly structured settings such as a classroom—toleration of bad behavior is less tolerated even if a child generally increases delinquency elsewhere.

NOTE: The author's propensity-event theory of crime emphasizes socialization experiences in the early years in life and on the lifelong influences that childhood experiences seem to have. Control theory could account for different onsets and different trajectories over a portion of the life course.

*The Age Effect*

The predictions derived from a ubiquitous decline in offending with age are as follows:

- Incapacitation will be ineffective in reducing the crime rate.
- Absent control group comparisons, all treatments permitting selection by the offender postadolescence will appear effective as long as the follow-up is long enough.
- Programs that seek to change the propensity for crime at a young age have the best chance of substantial individual crime reductions.

*Conclusion*

A general theory can account for differences in propensity that have a high degree of stability.

- A theory that allows for change in offending at different times in life.

- A theory that recognizes the general decline in crime with age.
  - A theory that dispenses with offender classifications that have little added predictive or explanatory value.
- NOTE: Criminology will be greatly advantaged by attending to these implications.

## Explaining When Arrests End for Serious Juvenile Offenders: Comments on the Sampson and Laub Study

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(St. Louis) School of Medicine

### Background

This article points out achievements and problems observed by Lee Robins in the article by Sampson and Laub, "A Life-Course View of the Development of Crime." Achievements include locating a high proportion of the men at seventy who were initially studied about age thirteen, collecting arrest and death records for them, and getting very interesting interviews with fifty-two of them. Problems identified were the following:

- *Lack of information about incarceration and ill health.* This meant that the authors could not exclude periods when these men were not at risk of committing crimes.
- *Crimes committed that did not appear in the arrest records obtained.* These include the following:
  - Crimes committed while in prison.
  - Crimes committed while in military service.
  - Arrests in other states that were not reported to the FBI
  - Crimes committed which were attributed to someone else.
  - Crimes against persons who chose not to press charges
  - Undetected crimes.

Missing crimes may cause an underestimate of the length of the active criminal career.

- *Possible missing deaths*—The National Death Index was not initiated until several years after the Gluecks' effort to locate these men for interview. Even after its initiation, it would unavoidably misidentify deaths of men who changed their names and would admit any whose bodies were not identified.
- *Age as a marker of vitality*—Street crimes taper off with aging because it diminishes agility and energy, but the speed with which they diminish varies greatly across individuals. This study had no way to assess physical fitness per se and used age as an imperfect indicator of it.
- *The interviews*—Only a small proportion of the men for whom addresses were known were interviewed.
- *Limited record sources*—Current privacy rules make it virtually impossible to get records without written permission. Because subjects who were not located cannot be asked for permission and some of those located would be

unwilling to give it, no attempt was made to get records other than arrests and deaths.

- *Reliance on men's own explanations for their desistance*—Among the fifty-two men interviewed, those who had desisted were asked to explain it. They gave interesting answers, but many of them may not themselves have understood why it happened.
- *No early predictors of desistance found*—While childhood factors predicted the level of offending, taken together, they were not found to significantly predict the age at last arrest. Looking at these factors individually might have found some that did predict age at desistance.
- *Sample homogeneity may have prevented finding childhood predictors of the time of desistance*—Perhaps the subjects of this study had such uniformly bad early behavior and poor family conditions that their childhoods were too much alike to allow finding predictors of future desistance there.

#### Conclusion

Comparison of the Sampson and Laub study with any other study of antisocial children is hampered by the fact that no other has dealt with such severely antisocial children and no other has had so long a follow-up period.

- Nonetheless, this study agrees with other studies on certain important results:
  - Childhood and adolescent antisocial behavior are powerfully associated with adult criminality.
  - Despite their troubled childhoods, some of these youngsters with serious antisocial behavior do not become highly antisocial adults. Those without adult arrests had better employment records.

NOTE: Because the article by Sampson and Laub shows that all serious delinquents eventually desist, one can argue for changing the focus of research on the longitudinal view of street crime from explanations of desistance to explanations for persistence. We still do not know what keeps a minority of street criminals active beyond their thirties.

#### The Future

This study concentrates on only a portion of the world of crime—that committed by adults who already had serious delinquency as children or adolescents. To broaden the range of childhoods found to be criminogenic would seem to require a very large sample to include the relatively rare white-collar criminal and those with adult onset. To reduce the number of cases needed, a first study might interview subsamples representing each type of adult criminality about their childhoods. This could provide a more diverse set of backgrounds likely to be criminogenic, which could be oversampled to reduce the final sample size of a prospective study. For the second, prospective study, subjects could be selected in childhood from the general population, oversampling each of the childhood patterns thought to be criminogenic. Such a study, with last follow-up at about age fifty, when almost all will have desisted but fewer will have died, should provide a more complete picture of patterns of desistance over the whole range of adult criminality, with ample numbers available for interview.

## Response—When Prediction Fails: From Crime-Prone Boys to Heterogeneity in Adulthood

Robert J. Sampson, Harvard University;  
and John H. Laub, University of Maryland

*Background* This article is a response to formal commentaries by Michael Gottfredson and Lee Robins on the article by Robert Sampson and John Laub in this volume titled “A Life-Course View of the Development of Crime.”

*The Problem* Referring to changes in offending over the life course due to events such as marriage, Gottfredson says, “In propensity-event theories, such changes in offending can come about either because the propensity for involvement in crime and related behaviors changes or because the opportunities to engage in crime change.” The authors, Sampson and Laub, respond,

- We believe marriage has an effect on *both* criminal propensity and criminal events, especially in shaping opportunities to offend.
- In earlier work, we conceived of marriage as a single turning point, largely affecting propensity, whereas in our current work we conceive of marriage in more dynamic (time-varying) terms.
- Additional evidence on marriage can be found in our life-history narrative data (Laub and Sampson 2003).

*Causal Homogeneity* Robins says that we underestimated the effect of causal “homogeneity” in the Gluecks’ delinquent sample in *Unraveling Juvenile Delinquency (UJD)*.

- Robins specifically contends the sample is homogeneous on crucial childhood and adolescent variables of causal interest—for her this is not an adequate data set to test developmental theories of offending.
- We acknowledge certain limitations in the *UJD* design as well as our own follow-up study of the delinquent men, such as the restricted scope of official records and possible retrospective bias in our follow-up interviews.
- We also concur that our data cannot be used to definitively assess the validity of the adolescent-limited hypothesis of Moffitt (1993).
- However, there are other important predictions in developmental theory that our data speak directly to, in particular by providing the opportunity to examine long-term trajectories of crime and the purported existence of life-course-persistent offender groups.

*The Authors’ Response* We are not saying that adult crime cannot be predicted in general or that there are no adult offenders who persist longer than others—rather, our argument is twofold in nature.

- All offenders eventually desist from crime as they age—in this fundamental sense the age effect is “invariant.”
- Conditioned on childhood risk or juvenile delinquency, we cannot predict the wide variability in long-term trajectories of offending.

NOTE: Robins claims this lack of prediction is because of causal homogeneity—the boys were all delinquent and thus similar on causal variables. From this perspective, the boys were selected to become adult offenders and any test of childhood prediction is therefore unfair.

*Further Analysis*

Logically, if heterogeneous adult outcomes exist when childhood factors are “homogeneous,” then by definition the childhood paradigm cannot provide the answer and we must look to explanatory factors in the adult life course.

- Moreover, we can directly test the causal homogeneity critique. In new analysis presented in our *Annals* response that is contrary to Robins’s expectations, most of the measures of child risk in the Glueck delinquent-group data do in fact predict individual differences in adult crime before controlling for delinquency—supporting our strategy.
- Childhood risk factors predict a fractal set of age-crime curves (varying in level) rather than qualitatively distinct trajectory groups.

*Sample Selection for Life-History Interviews*

Critics have questioned the nature of our sample selection criteria and the notion that our fifty-two men are similar to or representative of the rest of the five hundred delinquents in potentially causal variables. Our strategy was as follows:

- Using criminal history records, our goal was to yield maximum variability in trajectories of adult crime.
- We classified eligible men into strata that reflected persistence in crime, desistance, and “zigzag” offending patterns.
- Our interview completion rate (66 percent) was beyond what we expected and compares favorably with other long-term follow-up studies with high-risk samples.
- Finally, in new analysis presented in the *Annals* response, the results clearly show that our targeted sample of interviewed men is indistinct from the larger pool from which they were drawn.

*Conclusion*

We offer a life-course conception of crime as a temporally emergent, socially interactive, and hence relational process as one of the core ideas to organize future theory and research on the development of crime.

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## What Has Been Learned from Group-Based Trajectory Modeling? Examples from Physical Aggression and Other Problem Behaviors

Daniel S. Nagin, Carnegie Mellon University;  
and Richard E. Tremblay, University of Montreal

*Background*

The purpose of this article is threefold:

- to summarize some key findings from the application of group-based trajectory models.
- to clarify the proper statistical interpretation of a trajectory group.
- to lay out some guidelines on the types of problems for which use of group-based trajectory modeling may be particularly productive.

*Model Comparisons*

There is a key distinction between standard growth curve modeling and group-based modeling.

- In conventional growth curve modeling, the unknown distribution of parameters describing individual-level trajectories by assumption is approximated with a specific continuous distribution function.
- In the semiparametric group-based trajectory model, the distribution of parameters is approximated by a finite number of trajectory groups.

*Useful Findings* A summary of findings based on group-based trajectory modeling that showcase its strengths include the following:

- Late onset physical aggression is the exception, not the rule—A large body of evidence based on group-based trajectory modeling shows that the peak frequency of physical aggression occurs during early childhood and that trajectories of physical aggression generally decline thereafter. Examples of groups following a trajectory that can be characterized as late onset physical aggression are unusual.
- Clarifying developmental taxonomies—There is a long tradition in developmental psychology of taxonomic analysis and theorizing about both normal and pathological development. Group-based trajectory modeling is very useful in clarifying and testing such analyses/theories. For example, consider an analysis of the predictors of desistance. A desisting trajectory of offending is characterized by a period in which the offending rate is substantial followed by a decline to a negligible rate. This approach identifies a far more interesting and distinctive group of individuals than the conventional static definition of desistance that typically includes large numbers of individuals who have committed only a few minor delinquent acts in adolescence and none thereafter.
- Clarifying predictors and consequences of developmental trajectories—Trajectory groups can be thought of as latent strata in longitudinal data that distinguish clusters of individuals following distinctive developmental paths. An illustration of the utility of this form of data stratification is a study that shows that the most powerful predictors of membership in high-aggression trajectory groups compared to lower-aggression trajectories were high levels of hyperactivity and opposition assessed in kindergarten. However, only maternal characteristics distinguished between a trajectory of chronic physical aggression and that which started high in childhood but declined during adolescence.

*Guidelines* Guidelines for the use of group-based trajectory modeling: for what types of problems is the methodology particularly appropriate?

- One guideline relates to the adjective “growth” that modifies “curve modeling.” The prototypical application of standard growth curve modeling involves a process in which population’s members follow a common developmental pattern of either increase or decline. However, for “multinomial” developmental phenomena for which the conception of a common growth process does not naturally fit, a group-based approach is particularly appropriate.
- A second guideline concerns the motivation for the analysis. One common aim of analyses of longitudinal data is to uncover distinctive developmental trends in the outcome variable of interest. For example, do sizable numbers of youths follow a trajectory of adolescent onset conduct disorder? The group-based approach is ideally suited for testing whether such distinctive patterns are present in the data.
- A third guideline concerns the possibility of path dependencies in the response to turning point events such as marriage or to treatments such as hospitalization for a psychiatric disorder. Path dependencies occur when

the response to a turning point event or treatment is contingent upon the individual's developmental history. The group-based trajectory model is well suited for identifying and testing whether the response to a turning point event or treatment is contingent upon the individual's developmental trajectory.

*Conclusion*

The rapid growth of group-based trajectory modeling stems in part from its usefulness in summarizing complexity.

- A hallmark of modern longitudinal studies is the variety and richness of study subjects and their circumstances.
- Researchers should not be so bogged down in complexity that lessons learned from data are lost on them and their audience.
- Group-based trajectory modeling improves a researcher's ability to identify, summarize, and communicate complex patterns in longitudinal data.

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## Developmental Trajectory Modeling: A View from Developmental Psychopathology

Barbara Maughan, Institute of Psychiatry,  
King's College London

*Categorical and Dimensional Models of Behavior*

The distinctive feature of the group-based approach to trajectory modeling derives from its assumption that there may be clusters or groupings of individuals whose development on any given behavior of interest follows differing age-related patterns in its developmental course.

- Specified categories can enhance communication and may provide a useful framework in which to examine interactions among hypothesized risks.
- Researchers widely recognize that many of the behaviors that we study are dimensionally distributed and do not show clear-cut points differentiating "normality" and "pathology."
- Latent groupings may differ in degree rather than kind; the heuristic value of group-based approaches derives in part from their capacity to allow for direct tests of a range of hypothesized patterns of association.
- There is a need to entertain categorical and dimensional conceptions and to explore and contrast models and findings from each.

*Heterogeneity in Antisocial Behavior*

Although variations in course may be key pointers to heterogeneity in antisocial behavior, other features may also be important.

- In general, criminal career studies have identified only limited evidence of specialization in offending in adulthood.
- The developmental literature, by contrast, has highlighted a variety of distinctions that seem likely to carry important implications for the understanding of early developmental processes:
  - some on different manifestations of antisocial tendencies,
  - some on age at onset, and
  - some on associated features such as hyperactivity.
- Nagin and Tremblay focus predominantly on physical aggression, and have amassed extensive evidence to show

- that the peak age for physical aggression is not, as had been assumed, in the teens, but in early childhood; and
- that this pattern also holds for subgroups of children following quite different aggression trajectories—peak levels for the great majority are already evident in the preschool years.

*Implications* The conclusions have wide-ranging implications.

- Much aggression is likely to reflect an innate tendency that most children unlearn or learn to control early in childhood.
- If the origins of aggression lie early in development, environmentally oriented risk research also needs to focus there.
- In terms of process, if the typical pattern is one in which most young children are helped to control aggressive tendencies over the toddler period, more may be learned at this stage from exploring failures in proactive parenting than focusing on the coercive processes that have proven so productive in understanding exacerbations in troublesome behavior later in childhood.

NOTE: The findings provide beginning pointers to sources of heterogeneity in childhood antisocial behavior. Nagin and Tremblay's work on aggression provides a model for the type of detailed, systematic focus on well-characterized phenotypes that will form the building blocks for such efforts.

*Developmental Perspectives* Developmental criminology involves two main areas of study:

- The development and dynamics of offending over age.
- The identification of explanatory or causal factors that predate or co-occur with behavioral development and affect its course.

NOTE: Nagin and Tremblay provide numerous examples of the contribution of the group-based trajectory approach to each of these domains of inquiry. As their work also illustrates, tracking the dynamics of behavior raises the issue of why some behavioral trajectories vary so strikingly with age.

*Developmental Processes* To address the above concern, we need to turn to a different type of covariate, reflecting not preconditions for offending but other aspects of individual development or social context that co-occur with observed changes in behavior and may help understand variations over age. Chronological age may index a variety of processes:

- Changes in social experience: leaving school, starting work are examples that hold implications for antisocial behavior.
- Duration of exposure to risks or to the cumulating consequences of prior behavioral difficulties.
- Changes in cognitive level.
- Variations in biological maturity.

NOTE: Substituting one or more of these metrics for chronological age may cast further light on developmental processes associated with age-related change in antisocial behavior and crime.

*Exploring the Effect of Changes in Adolescent Years* The author's recent work has been exploring how far some of the known changes of the adolescent years might illuminate the sharp rise in overall levels of offending reflected in the age-crime curve, in age-trends in conduct disorder (CD) and in a more nuanced way, in some of the specific trajectory groupings identified by Nagin and Tremblay.

*Conclusion* A developmental perspective offers major advantages but, along with them, raises key challenges such as the need to match conceptualizations with

appropriate methodological tools. Nagin and Tremblay have done much to advance those ends.

## How Do We Study “What Happens Next”?

Stephen W. Raudenbush, University of Chicago

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- Background* A key purpose of longitudinal research is to generate knowledge that can support effective social interventions.
- Longitudinal records of behavior are artifacts of a flow of social action unfolding in continuous time: a person’s actions generate social reactions, and social interventions trigger varied individual responses.
  - We want to know “what happens next?” Given a person’s past behavior, what interventions does a person experience and how does that person respond?
  - How does “trajectory group modeling” contribute to such knowledge?
- Do Trajectory Groups Exist?*
- In applied work, Nagin and Tremblay assert that real structural differences exist between members of “trajectory groups” and that formal statistical modeling provides a firm basis for making inferences about such groups. This way of thinking is attractive to clinicians, who seek to classify persons for the purpose of diagnosis and treatment.
  - Yet in a recent methodological paper, Nagin and Tremblay warn that trajectory groups should not be regarded as real, that group-based modeling provides an approximation to a more complex reality, and that users of the approach have erred in “reifying” the existence of groups.
  - If groups do not exist, a key question arises: What is gained by this kind of approximation? Does the concept of trajectory groups improve predictions of future behavior? If not, it may be advisable to avoid tempting researchers into believing that such groups exist. We would then not need to warn them against reification of the model assumptions.
- Conflicting Views of Human Development*
- Researchers have found that statistical inferences about the number of groups and their composition change over time. Nagin and Tremblay offer one explanation; the current article offers an alternative explanation.
  - Nagin and Tremblay have adopted a view of development as revealed essence. At any time, inferences about developmental trajectories are imperfect because underlying differences between people have not yet fully unfolded. Additional waves of data collection reveal these differences ever more clearly. As more data are collected, shifts in inferences about the number and composition of groups represent improved approximations to true underlying differences.
  - An alternative view is that each participant possesses a large number of potential trajectories, depending upon the time-varying interventions that each participant will experience. The interplay between individual differences at any time and later time-varying interventions ensures ever-increasing developmental complexity over time.
- Implications for Statistical Modeling*
- Rather than conceiving of trajectory groups to approximate developmental complexity, the author recommends an approach that combines a model for individual differences with a model for time-varying interventions. Such

models, while seemingly quite simple, can generate developmental complexity consistent with what social scientists actually observe when they look closely at behavior over time.

- This approach is illustrated in two examples. The first concerns children's cognitive growth during elementary school: children differ in their expected growth curves given "typical" teachers, but teacher differences generate deflections from expected growth. The interplay between individual differences and time-varying deflections generates developmental complexity. The second example concerns violent offending during adolescence. Expected trajectories of offending, given a common history, follow a family of age-crime curves. However, data on multiple cohorts reveal the interplay between individual differences and differences in historical experience. The interplay between individual differences and historical experiences generates developmental complexity.

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## Response—Further Reflections on Modeling and Analyzing Developmental Trajectories: A Response to Maughan and Raudenbush

Daniel S. Nagin, Carnegie Mellon University;  
and Richard E. Tremblay, University of Montreal

### *Raudenbush Commentary*

The Raudenbush commentary argues that hierarchical linear modeling (HLM) is a better statistical approach to modeling change than group-based trajectory modeling. The logic of his argument seems to be as follows:

- The group-based trajectory model requires every member of a group to have exactly the same trajectory.
- Trajectory groups are empirically unstable.
- A model based on a finite number of groups "waiting to be revealed as we collect data" cannot possibly explain the diversity of developmental paths present in the data.

### *Response to Raudenbush*

The response to Raudenbush is as follows:

- All statistical models including HLM involve approximation; the issue of approximation error should be framed in comparative, not absolute, terms—"How do the costs and benefits of alternative modeling approximations stack up against one another?"
- As to the first criticism, the argument that the group-based model requires every member of a trajectory group to follow exactly the same trajectory is no more true than the statement that in the HLM framework all individuals follow their trajectories in lock step.
- As to the second criticism, Raudenbush is referring to changes in the shapes and sizes of trajectory groups that attend adding successively more time periods of longitudinal data. Had HLM been applied to these same data measured over successively longer periods of time, equivalent instabilities would have been observed. Trajectory models, whether estimated in a

group-based format or as an HLM, are models of data that have been collected, not of data that have yet to be collected.

- As to the third criticism:
  - The group-based trajectories are no more paths waiting to be revealed or, as Raudenbush also asserts, “immanent in persons at the outset of the study” than are the individual-level trajectories based on random effects that underlay HLM.
  - Contrary to Raudenbush’s seeming suggestion, covariates such as marital status or participation in therapeutic interventions can readily be embedded in group-based trajectory models (see Nagin et al. [2003] and Nagin [2005]). Furthermore, Haviland and Nagin (forthcoming) describe an approach based on group-based trajectory modeling for making more confident inferences about causal effects of such events. A firmer statistical basis for making valid causal inference is surely central to modeling “what happens next.”
  - The Raudenbush commentary simply asserts that HLM will predict better than the group-based model. This conclusion does not follow from the structure of the models, and the commentary provides no empirical evidence in support of this assertion.

*Judging a Model*

A model should be faithful to the observed data, and should aid understanding. It must be judged by both an empirical and a cognitive standard.

- Organizing data according to trajectory groups has several important transparency virtues: the abundance of data in modern longitudinal studies is accompanied by complexity; trajectory groups are powerful devices for organizing complexity.
- Trajectory groups describe the trajectory of behavior that has occurred; that behavior is not reified but real.
- Nothing in the structure of a group-based trajectory asserts that a trajectory is permanent, that no intervention can change it, or that it will continue beyond the period of the observed data.

*Closing Observation on Raudenbush Commentary*

Nagin and Tremblay do not advocate the primacy of group-based statistical modeling compared to HLM. They also caution readers against accepting arguments for the primacy of any other statistical method including HLM. The complexity of studying developmental trajectories is too great to be left to any one statistical method.

*Response to Maughan*

Nagin and Tremblay agree with most of Maughan’s comments and use them as an opportunity to reflect further on research questions and strategies that will help in better understanding human development. These include the following:

- To understand the development of antisocial behaviors, we need to rethink what we mean by oppositional, antisocial, delinquent, and criminal behaviors. It will be helpful to have descriptive data on the development of each of the behaviors presumed to be antisocial. Behaviors should be aggregated only if they have the same developmental trajectories. Once we know the development of antisocial behaviors, then we can start looking at the development of other correlates such as hyperactivity and callousness toward others to create subcategories of antisocial development.
- One important task of longitudinal research is to trace the development of each type of antisocial and criminal behavior. This is not an easy task because there are numerous forms of antisocial behavior, developmental precursors

of criminal behavior often start early in life, and these behaviors can continue until old age. By piecing together results from different longitudinal studies, we can get an idea of the general trends from womb to tomb.

- To understand variation over age in antisocial behavior, we need to study other aspects of individual development and social context that co-occur with observed changes in antisocial behavior. These variables should not displace age as the main covariate. The four covariates proposed by Maughan need to be studied with reference to age, not instead of age—they all vary with age because they depend on age.

## Explaining Multiple Patterns of Offending across the Life Course and across Generations

Terence P. Thornberry,  
University of Colorado at Boulder

### *Patterns*

The most central aspects that developmental theories of delinquency should explain involve the following:

- *Onset of offending*—There is a challenge to account for the age of onset of offending:
  - They need to offer a conceptualization of age of onset, how variable it is, and if its variability is discrete or continuous.
  - They need to offer an explanation for why people begin to offend when they do.
- *Course*—A developmental model should include a conceptualization of the course of offending with respect to whether there is a tight or loose association between age of onset and the length of criminal careers and whether that association is discrete or continuous.
  - It must account for persistence and give a causal explanation of the association between age of onset and persistence.
- *Desistance*—Developmental theories should include an explanation of the social and psychological processes that lead to desistance.
  - There should be an explicit consideration of whether desistance occurs suddenly or whether it is gradual.
  - Theories should address whether the causes are simply the reverse of those associated with onset.
  - Models should explain the link between age of onset and both the likelihood and timing of desistance.

### *Manifestations of Behavior*

The manifestations of antisocial behavior vary over the life course, and during childhood and adolescence they center on delinquency and substance use.

- Interactional theory offers these expectations about onset:
  - Offending is relatively commonplace—a majority will be involved in antisocial behavior.
  - Relatively few offenders will have extensive criminal careers.
  - Onset is continuously distributed across the age distribution.
  - There can be late bloomers or late onset.

- Interactional theory is a sociogenetic model of the course of human development in which the human organism always remains open and responsive to changing social environments.
- The theory views desistance as composed of two processes:
  - The first reflects the downward movement from the peak of involvement to the start of noninvolvement.
  - The second reflects the maintenance of behavior at zero or near-zero level of offending.

NOTE: Interactional theory does not anticipate sharp turning points that quickly deflect offending trajectories from high levels to zero.

- There is some association between the timing of onset and the timing of desistance.
- Desistance is likely a product of changing life circumstances.

*Trajectory Approach*

Nagin and Land's (1993) trajectory approach summarizes developmental patterns of behavior, including criminal behavior, and the relationship between level of offending and age.

- It models onset, varying levels of offending without severe restrictions on the shape or number of inflection points.
  - It does not constrain the pattern of offending to be the same for all individuals.
- One of the limitations is whether the trajectory groups (individuals sharing a similar offense history) represent discrete groups with different etiologies or reflect more dense areas from a single underlying distribution.
- The method is a convenient way of describing a complex phenomenon by dividing it into smaller descriptive units.

*Desistance*

The process of desistance occurs at numerous ages, not just at the transition from adolescence to adulthood as implied by the age-crime curve.

- The movement toward desistance occurs before one is likely to see the impact of marriage, work, and family—the typical explanations.
- Three factors are hypothesized to lead to desistance:
  - As the age of onset increases, the strength of the causal factors associated with antisocial behavior diminishes.
  - The causal factors for this behavior are not strongly coupled.
  - These youth are less likely to experience strong negative consequences from feedback effects from delinquent behavior.

*Offending Theory*

If the onset of offending is continuously distributed, then the theoretical task is twofold:

- Theories need to account for why some offend and some do not.
- They need to account for why some start earlier and others later.

NOTE: The author indicates that earlier-onset offenders are more likely to continue offending because of the stability in the strength of the causal forces that led to early onset and the negative consequences of that behavior. He also says that continuing economic and relationship problems, combined with the use of alcohol and drugs, is likely to lead to offending well into the adult years for late bloomers.

*Prosocial Careers*

A small portion of the population manages to avoid involvement in delinquency entirely.

- A pattern of prosocial behavior requires conditions that either prevent the development of predispositions or are able to compensate for these conditions so they do not lead to antisocial behavior.

*Inter-  
generational  
Relationships*

- Economic means to provide for one's family reduces the risk.
- Strong bond to family helps foster prosocial behavior.
- An intergenerational perspective leads to two questions:
  - Does a parent's own involvement in antisocial behavior generate risk for his or her children?
  - If it does, what are the mediating processes that link the generations?
- The author presents a life-course model of the mediators associated with intergenerational continuity in antisocial behavior.

NOTE: The model identifies at least some of the mediating processes.

- Other mediating pathways are likely to incorporate into a fuller explanation.
- The focus on continuity addresses the dominant part of intergenerational linkages—there are clear patterns of discontinuity also.

*Discussion*

These intergenerational results have a number of interesting implications for understanding the origins of delinquency.

- There is some intergenerational transfer of risk.
- Parent characteristics and behaviors are important in understanding delinquency.
- Results also indicate that parenting behaviors are systematically related to earlier aspects of the parent's own development.
- The impact of parenting is not confined solely to the impact of parents. Grandparents also appear to have a role.

## Making Sense of Crime and the Life Course

D. Wayne Osgood, Pennsylvania State University

*Interactional  
Theory and the  
Life Course*

Interactional theory treats criminal career features such as onset, frequency, and duration as phenomena worthy of attention but not as deriving from separate causal processes.

- The theory unites them through a unified explanation, thereby using a parsimonious and general framework to give serious attention to the phenomena highlighted by the criminal career paradigm.
- Thornberry and Krohn build this unifying position around the simple idea that offending at all ages is the result of the total magnitude of all relevant forces.
- Thornberry follows and extends Sampson and Laub's (1993) life-span development orientation through attention to the age-graded relevance of the key causal factors.
  - In interactional theory, this varying relevance is due to the age differences in the levels of the causal variables.
  - The age difference in causal contribution is because the levels rather than causal impacts of these factors vary with age.
- This framework would also predict that heavy exposure to delinquent peers at a young age could engender early-onset offending and a shift from good to bad parenting could produce late-onset offending.

NOTE: Thornberry wisely reserves the possibility that a variable's causal impact would change with age for exceptional cases when that is justified by a

strong life-course argument. Strong parental guidance cannot compensate for these weaknesses after youth leave home to face challenges in life.

*Duration of Offending*

Interactional theory takes a unified approach to explaining the stability of offending and its association with age of onset.

- Thornberry, making good use of the idea that offending is a product of the total causal force, accounts for stability of offending through the combination of stable causes and the correlation of earlier causes with later ones.
- Thornberry differs from Moffitt in that he views the age of onset as a continuous variable of modest predictive power, rather than a key marker for a typology of persistent versus short-term offending.

*Osgood's Suggestions*

Osgood has a few suggestions for modest alterations in the current presentation of interactional theory that may tighten its consistency around the features of its general explanatory approach.

- Avoid the “risk factor” approach of dichotomizing continuous variables, such as converting an extensive measure of parenting skills to poor versus adequate parenting.
- Thornberry should rethink the position that extreme levels of causal factors are inherently stable—a simpler position would be that, when risk is extreme, even a moderate improvement is likely to leave sufficient causal force to produce continued offending.
- We should follow Thornberry’s lead in seeking unifying explanations that make sense of the differences in results produced by alternative offense criteria.

*Typological Theory versus Empirical Findings*

Tensions remain between typological theory and the empirical findings.

- On one hand, many trajectory typology studies have found evidence of the groups hypothesized by Moffitt (1993): long-term, high-rate trajectories that match life-course-persistent offenders and late-onset, short-term trajectories that match adolescent-limited offenders.
- On the other hand, virtually all of these studies identify additional groups not hypothesized, such as low-rate chronic offenders and late-onset, but long-term offenders.
- The use of categorical research approaches does not require accepting that offenders actually fall into discrete and homogeneous groups.

NOTE: Thornberry’s article not only demonstrates a pragmatic stance about the categorical research approach but also shows the continuing relevance of the debate about categorical versus continuous conceptions of individual differences in offending over time.

- He views age of onset as a continuous basis for differentiating pathways in offending, in contrast to Moffitt’s view of age of onset as the key marker differentiating her two types of offenders.
- Osgood says in this article that there are many shades of gray between the white and black of saints and serial killers.
- It is important that developmental and life course criminologists give greater prominence to continuous conceptions of offending rather than unreservedly adopting a categorical approach.

*Growth Curve Models*

Although growth curve models are very useful, they provide a view of individual change that is restricted in a way that has important conceptual ramifications.

*Beyond  
Growth  
Curves*

- Growth curves reflect only a portion of within-individual change because a polynomial function is constrained to be smooth.
- It is highly unlikely that the typical growth curve model will capture all meaningful change.

NOTE: This limitation is not really a shortcoming of these useful methods, but understanding it is critically important for properly interpreting results and seeing the need for additional conceptual approaches and analytical tools.

There is more to explaining change than accounting for individual differences in growth curves.

- If much of the variation around those curves represents genuine change, then it is worthy of attention.
- The short-term variations cannot be explained by the type of theory often offered for growth curves.
- Because growth curves summarize the entire pattern of change over an extended period, many find it appealing to explain them in terms of early experiences or unchanging characteristics.
- Statistical models of growth curves are well suited to this approach because they permit unchanging individual characteristics to serve as explanatory variables for the parameters of the growth curves.

*Other Methods*

Available theory gives good reason to study the effects of changing experience on offending.

- If growth curve models are not adequate for studying effects of life experience, what methods are needed?
  - Multilevel regression methods used for growth curve analysis are well suited to the task.
  - There is only the need to loosen the growth curve conceptual framework by adding time-varying explanatory variables.
  - The statistical model used provides a means to study what accounts for the age-crime curve.

*Conclusions*

Osgood offers a few summary comments of his views about how to best enhance the ability to make sense of crime and the life course.

- We must strive for cohesive and unifying theory that integrates various aspects of offending over time.
- We must keep in mind the possibility that there are not just a few types of criminal careers but rather that differences in offense patterns over time vary continuously—we must appreciate the shades of gray.
- We will make better sense of crime and the life course if we recognize that growth curve models of all types present a simplified and incomplete picture of individual change over time.
- The discrepancies between growth curves and short-term change point to the need for research on the effects of changing life experience.
- Models with time-varying covariates enable us to address one of the interesting and important challenges—explaining the age-crime curve.

## Explaining Patterns of Offending across the Life Course: Comments on Interactional Theory and Recent Tests Based on the RYDS-RIS Data

Janet L. Lauritsen, University of Missouri–St. Louis

### *Interactional Theory*

According to Thornberry and Krohn (2005), three fundamental aspects of interactional theory are as follows:

- The theory takes a life-course perspective—the belief that delinquency involvement “unfolds over time.”
- Delinquency and many of its causes often become involved in mutually reinforcing casual loops as delinquent careers unfold—ineffective parenting may be causal and parents’ responses to delinquent behavior may further increase that behavior.
- Multiple causes of delinquency vary in magnitude across persons due to the presence of offsetting assets or protective factors.

### *Other Theory Assertions*

Interactional theory includes other assertions and hypotheses.

- Early involvement in antisocial behavior is the result of the intense coupling of structural, individual, and parental influences at a time when the causal force associated with childhood antisocial behavior is near a maximum.
- Childhood delinquency is strongly associated with families and neighborhoods in poverty and disorganization.
- Onset of offending appears to be a reflection of increased peer influence, decreased parental supervision, and rebelliousness.
- Late starters are hypothesized to have lower intelligence and academic competence but to have had a supportive family and school environment keeping them from delinquent behavior in their early years.

NOTE: In many ways, interactional theory is very ambitious in that it attempts to provide a comprehensive understanding of crime across the life course and to organize knowledge about delinquency and its consequences.

### *Is It Really a Theory?*

The author of this article believes that in its current formulation, interactional theory is not a theory per se but rather a broader orientation to studying crime across the life course.

- The theory needs greater formalization—without attention to structure, it is very difficult to use the theory to organize data collection, test specific hypotheses, or examine logical coherence and assumptions.
- It is not clear how a researcher should determine what behaviors do or do not need to be included.
- Greater clarification is needed for determining how some hypotheses might be falsified.
- Greater clarification is needed to determine what kinds of evidence would falsify key hypotheses involving the relationships between various factors and offending.

*Rochester Study*

RIS

Interactional theory is most closely associated with the Rochester Youth Development Study (RYDS) that began in 1988. (It continued as the Rochester Intergenerational Study [RIS].)

- The generalizability of the study's findings to other families and children must be made very carefully because
  - the study involves high-risk youth from one city,
  - the sample cannot assess potentially important period effects, and
  - the third-generation sample is not random (the cases on which these analyses are based are selected according to the correlates of teen childbearing).
- the authors of the Rochester study agree that more work needs to be done and that understanding the causal mechanisms underlying intergenerational continuity is a complex task.

*Conclusion*

The author of this article finds it difficult to use the theory and findings to develop a subsequent research agenda because of the following:

- It is very difficult to know what kinds of models the RYDS and RIS data can assess because the data are not accessible to many researchers.
- The theory is a broad attempt to integrate a variety of theories under one life-course framework.
- There is a lack of formalization of the theory.
- There is a broader concern about how researchers decide when enough data have been gathered.

NOTE: It is important to understand the limitations of longitudinal data. This would permit more sound interpretations of our findings and theories and help determine how much data we should ask subjects to provide in the name of further research.

## Response—Notes on Theory Construction and Theory Testing: A Response to Osgood and Lauritsen

Terence P. Thornberry,  
University of Colorado at Boulder

*Response to Osgood*

Thornberry's response to Osgood includes four issues.

- He agrees with Osgood to avoid a risk factor approach.
- He agrees that he did argue that extreme levels of causal factors are more stable than moderate levels. That is, for extreme deficits, even if change occurs, it is unlikely to move the person out of the portion of the distribution that causes delinquency.
- The most challenging issue Osgood raises concerns the definition of offending. Thornberry responds, "We extended interactional theory to account for behavior at younger ages and this led to a stronger focus on general antisocial behavior in childhood, followed by delinquency in adolescence."
- He concurs with Osgood that focusing on shades of gray and on continuous conceptions of offending are good things for developmental criminology.

*Response to Lauritsen*

Thornberry responds to three issues that Lauritsen raises.

- Theoretical issues:
  - Lauritsen claims that interactional theory is a broad attempt at theoretical integration and then critiques it for not satisfying some of the conditions of theoretical integration. Thornberry argues that interactional theory is not an integrated theory and that integration diverts attention from the fundamental purpose of theory construction. In its place he argues for theoretical elaboration.
  - She says interactional theory shares common premises, propositions, and hypotheses with other theories and is therefore not unique.
    - Thornberry states that theories are distinguished by how their theoretical propositions are bundled, not by the inclusion of any particular proposition.
    - Second, he says the concern over uniqueness is logically flawed as a criterion for judging the adequacy of any theory.
  - Lauritsen claims interactional theory is not falsifiable, whereas Thornberry says it is presented as a probabilistic theory of behavior and does not differ from any of the other criminological theories presented by Lauritsen. Furthermore, Thornberry points out the examples she presents are misleading.
  - She comments on the definition and measurement of delinquency, crime, and antisocial behavior over the life course. He agrees it is a difficult issue and needs to be considered more fully.
- Empirical issues:
  - Lauritsen contends that the empirical tests are not complete because they do not control for all possible predictors of the outcome. Thornberry agrees that these investigations test only part of the overall model and lists two fundamental problems with her approach:
    - It is entirely atheoretical.
    - To include all the variables in one analysis would be statistically impossible.
  - She criticizes the use of the child's other caregiver and teacher as the measurement source for antisocial behavior. He says the literature shows she misses the mark.
  - She says it is difficult to assess the effect size of the coefficients since means and standard deviations for the original measures are not provided. He says he did not include them due to space limitations, but they are available in his article from 2003 (Thornberry, Freeman-Gallant, et al. 2003, 178).
- Data sharing and data collection:
  - Lauritsen says that the instruments have never been published. Thornberry responds that the volume is enormous but that he has always shared his instruments and continues to do so.
  - Lauritsen argues for the release of the data. Thornberry responds that release of collected data is limited due to how much of it is deemed sensitive data that can easily be linked to participants, which violates the pledge of confidentiality.
  - Another concern is about deciding when too much data have been collected. He feels her concern is misplaced given that the Rochester project is no different from a host of other longitudinal projects in scope and duration.

- She is also concerned that probing interviews and observations might contaminate the studies and affect the subjects in positive but also negative ways. Thornberry disagrees.

## Final Thoughts— An Overview of the Symposium and Some Next Steps

Alfred Blumstein, Carnegie Mellon University

*Nagin and  
Tremblay*

The Nagin and Tremblay article focuses primarily on the group-based trajectory method that has provided insights into trajectories of offending patterns by being applied to richly developed longitudinal data collected on multiple cohorts by Tremblay.

- The strength of the method is that it approaches a set of individual trajectories in a statistically rigorous way, finding groups that resemble each other closely and then assigning each of the others to the group that it most closely resembles.
- This identifies a handful of aggregate groups that are easier to deal with analytically than hundreds of individual trajectories—then one can seek to identify what characteristics distinguish the individuals comprising each of the groups, with a focus on the most troublesome.

*Thornberry*

The Thornberry article reports on his research as part of one of the most innovative government ventures in supporting longitudinal research.

- Three projects were set up that proceeded in different ways to draw their samples, investigate origins of delinquency, and study the delinquency and criminal careers of their subjects.
- His work has emphasized his “interactional theory” and the insights it brings to understanding phenomena by looking across the offending patterns of his subjects.
  - He explores the intergenerational transmission of delinquency.

*Longitudinal  
Strength*

The strength of the longitudinal approach is the continuity of the same individuals tracked over time.

- This permits analysis of the developmental processes within particular individuals—each serving as his own control.
- The longitudinal study allows one to examine in detail the connections among onset, course, and desistance.
- In terms of shaping policy, it allows one to examine the duration of a criminal career, especially the residual duration after an individual is arrested, convicted, and awaiting sentencing.

*Meaningful  
Theories*

Phenomena associated with crime and antisocial behavior are so diverse that theories that explain one aspect may be found wanting when applied to others.

- The different sequence of phases of a criminal career from early childhood into adulthood can have very different antecedents, which are difficult to bring under one umbrella.
- If one tries to put a grand framework over all of the associations between individual characteristics, their parents’ characteristics and their peer’s

characteristics, and how each of these affects propensity to engage in different kinds of crime, one is left with lots of correlations, but nothing as concise as one would like in a theory.

- Any theory must be structured differently if it is to help describe the initiation of offending, reflecting the draw of offenders from a general population, compared to termination of offending, which reflects the distinction among offenders of those who stop from those who go on.
  - The factors that contribute to initiation may be quite different from those that contribute to termination.

*Empirical Observation*

A theory must comport with empirical observation.

- In this case, the theory must help explain the classic age-crime curve.
- That relationship usually shows a rapid rise from an early age to a peak, usually in the late teens, and then a relatively slower decline.
- There are many age-crime curves, one for each crime type, and those relationships could change dramatically over time.
  - Some argue all of these curves are invariant—whether they are seen as the same or different depends on whether one is trying to put many phenomena into a single box or is interested in identifying which factors contribute to the differences.
  - The Sampson and Laub article is in the former category, and Thornberry is in the latter—we need to find an optimum mixture.

*Falsifiability*

Lauritsen raises the entirely reasonable use of falsifiability in the context of Thornberry's formulation of his interactional theory.

- It is hard to find any theory in criminology or criminological development that could survive this test.
- The various theories must be seen as conjectures or descriptions that are often or mostly correct, but one could always find counterexamples where they do not hold.

*Labeling versus Homogeneity*

One important theme that pervades much theory development is the iterative effects that result from various experiences.

- Thornberry highlights such effects in the self-reinforcing effects of early onset of delinquency and of prosocial activities.
- This opens the question of whether the intervention by the criminal justice system labels an individual as “criminal,” causing him to act that way, or whether his criminality is a manifestation of heterogeneity (he had a greater proclivity toward criminal behavior).
- The above issue warrants pursuit in any longitudinal data analysis.

*Career Length*

The data that Sampson and Laub collected on the Glueck men into their seventies is an opportunity to study the duration of their careers.

- An important feature of this perspective on career length is the desirability of distinguishing the factors contributing to the decline of the age-crime curve following its peak.
  - How much of the decline is due to termination of the career and how much to slowing down of offending frequency?
  - Different factors may affect the termination rate than those that affect the slowing down.
- There is a need for much more detailed analysis of career patterns not yet available in the data.

*Offender  
Groups*

One of the continued debates is the value of grouping.

- We can find an inherent value in grouping if we can identify which groups are amenable to one or more interventions and others that are not. This would be helpful in making group assignments.
- Grouping could be done on theoretical grounds if there is some distinction between groups beyond the quantitative distinction of some small number of observable factors.
- Grouping could be done on empirical grounds as in the trajectory analysis developed by Nagin in Nagin and Land (1993).
- The ultimate test of grouping should be based on whether we find benefit in aggregating individuals into groups, and that will depend on the context of the analysis to be done.
- Identifying useful groupings could lead to theoretical insights that would be more precisely formulated for each group.
- Finding such groupings provides the means for analyzing interactions with various predictor variables or intervention approaches that may be high for one group and low for another.
- The value will inevitably lie in the degree of homogeneity within the group in terms of some conceptual or operational similarity that does not prevail with other groups.

*Improvements*

The introduction of richer multivariate regression models is an important methodological improvement.

- There is an appeal to being able to introduce an additional variable into the model that enables the claim that that factor is “controlled for.”
- But this ignores the possibility of a nonlinear effect of that variable and the interaction effects with other included variables—there is important benefit in being able to identify subgroups of a population because the appropriate model could be different with each group.
- The introduction of theoretically different groups or empirically based groups offers an even richer possibility because one such group may differ from others in terms of multiple observables and interactions with other covariates.
- There is a reasonable possibility that insights would be revealed that are not evident in the normal course of analysis by applying a single model to all members of a sample.

NOTE: There is a continuing need for new and diverse methodological approaches to address the rich array of the already collected longitudinal data.

*Access to Data*

An issue raised by Lauritsen is the need to provide access to the rich array of longitudinal data to a wider community of researchers.

- This will help with the replication needed to validate observations.
- It would be a more efficient use of resources.
- The challenge is finding ways that resolve competing concerns among researchers.

NOTE: It would be very reasonable to seek means of requiring the original researchers to provide greater access to the longitudinal data they collected, at least after some reasonable time period.

*Working  
Together*

These important streams of research should join up in some ways so that the results would be stronger than those resulting from each of the authors alone.

- We see some joining in Thornberry’s use of trajectory methods, but it would be even better to see some greater mixture of integration across the various investigators.

*The Future*

- It would be desirable to see some culmination by building on each other's and other investigators' work.
- We must seek means to build an interacting research community that will share ideas and data and critique each other's work.

One approach would be to organize under government sponsorship a "developmental criminology forum" to propose new approaches to addressing some agreed upon key questions that will resolve controversies in the field. Some proposed issues are as follows:

- The Moffitt proposal for an adolescent limited and life-course persistent grouping.
- The disaggregation of the effects of slowing down compared to career termination after the peak age of offending as shown in the age-crime curve.
- A focus on the nature of crime-type choice over the course of a criminal career.
- The issue of marriage serving to change the propensity or reduce the opportunity for offending.

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