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Measurement and Analysis of Crime and Justice: An Introductory Essay

by David Duffee, David McDowall, Lorraine Green Mazerolle,
and Stephen D. Mastrofski

The turn of any century is traditionally seen as a milestone in human development. With the coming of the 21st century, the national media have reflected on the century past with lists of the most significant events and persons of the time. Political, social, and cultural events have welcomed the arrival of the new century—and the new millennium. The birth of a new century brings together celebrations of what the old century has accomplished with what we anxiously await in the new century.

The National Institute of Justice (NIJ) seized on the turn of the century as an opportunity to document 20th-century milestones in criminology and criminal justice and to highlight developments that will shape our justice system in the 21st century. NIJ commissioned a series of volumes that would span the breadth and depth of criminological and criminal justice thinking that has both created our current knowledge base and formed the foundation for our thinking in the 21st century. The fourth of these volumes is *Measurement and Analysis of Crime and Justice*, introduced in the following pages.

The original intent of volume 4 was to identify methodological debates that have shaped the evolution of crime and justice research. Under this broad umbrella, we sought to include papers in this volume that highlighted measurement dilemmas and solutions as well as analytic difficulties and applications that have contributed to what we now know and what we still do not know about crime and justice. In particular, the volume sought to explore the current knowledge, trends, and future directions in the measurement and analysis of crime and the criminal justice system,

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the consequences of such measurement and analyses for justice processes and the research enterprise, and the context in which both crime and justice operate. When we developed the original solicitation for papers, we understood that the set of topics within this domain would be potentially vast: sampling, mathematical modeling, statistical analysis, data visualization, and research design, to list only a few possibilities.

This introduction identifies and interprets the common themes running through the 10 papers included in this volume and indicates other themes not included. We begin our introduction with a review of the substantive topic areas that make up this volume. We then examine four main themes that cut across the papers: theoretical framework, data and measurement, analytic problems, and use of research in decisionmaking. We conclude with a discussion of what these papers highlight as lessons for the future.

Topic Areas

When we began our search for papers to include in volume 4, we hoped to include papers that covered substantive criminological topics (such as sexual assault, drugs, homicide, and disorder) and substantive criminal justice topics (such as agency goal and policy setting and officials' decisionmaking). We also sought papers spanning cutting-edge analytic topics (such as spatial analysis and cost-benefit analysis), dominant methodologies (such as self-report surveys of victimization and offending), and themes that have dominated policy debates in local, State, and Federal arenas (such as fear of crime and victimization). With the limited number of papers that we could commission, we sought to include papers that covered at least one substantive area while also elaborating on at least one measurement or analytic development.

The volume begins with five chapters about general issues in the measurement and analysis of crime and crime control. The next three chapters examine similar issues, but they provide more detailed discussions of measurement and analysis about specific crimes or policy areas. Specifically, these three chapters cover the measurement of sexual victimization, the measurement and control of fear, and the measurement and control of drug abuse. The final two chapters examine measurement of the characteristics of agencies in the criminal justice system.

Chapters 1 and 2 highlight dilemmas and difficulties with self-report surveys: one covering the measurement of delinquency and crime (Terence P. Thornberry and Marvin D. Krohn) and the other covering the measurement of crime and victimization (David Cantor and James P. Lynch). Chapter 3 (Gregory J. Howard, Graeme Newman, and William Alex Pridemore) continues the discussion of the

measurement of crime on a larger scale by examining the problems and progress in cross-national comparisons. Chapter 4 (Luc Anselin, Jacqueline Cohen, David Cook, Wilpen Gorr, and George Tita) maintains the focus on crime but shifts attention from measurement to the problems in analyzing crime data that are spatially and temporally clustered. Cohen's chapter on cost-benefit analysis applied to criminal justice rounds out this set of chapters by asking more generally how to assess policy impacts against the impacts of the social problem.

Chapters 6, 7, and 8 revisit many of the issues covered in earlier chapters but elaborate on measurement and analytical problems and solutions in specific areas. Chapter 6, by Bonnie S. Fisher and Francis T. Cullen, extends the discussion of self-report survey methods of crime and victimization by exploring the difficulties in measuring sexual victimization, one area in which the personal and political sensitivities of the problem complicates measurement. Chapter 7, by Jonathan P. Caulkins, is concerned both with the measurement of the social problem of drug abuse and with the measurement of the effects of interventions.

Like chapter 7, chapter 8, by Mark Warr, is also concerned both with gauging accurately the nature and scope of a problem (fear of crime) and with the dilemmas in policy attempts to control fear, in relation to controlling crime.

The final two chapters cover measurement and analytic issues that dominate key areas in the criminal justice system. Edward R. Maguire and Craig D. Uchida focus on police organizations, and Ingo Keilitz examines standards and measures of court performance. These two chapters, while focusing on measurement within specific domains of the criminal justice system, transcend a potentially narrow orientation and raise issues that are relevant to other aspects of the justice system.

Since all 10 chapters in this volume address substantive issues and methodological concerns, ordering the papers was problematic. Each possible order was bound to highlight some links (such as the survey methods used for measuring crime in Cantor and Lynch, Thornberry and Krohn, and Fisher and Cullen), while separating and perhaps downplaying other links (such as the discussion occurring much later of the police measurement of crime in Maguire and Uchida). In order to indicate the common themes that run across several chapters in this volume, exhibit 1 may be helpful to locate themes across the papers.

Much of the research reviewed throughout this collection of papers is concerned with the dependability or reliability of measures and their accuracy in representing the concepts used in theory.

Theoretical Framework

The inclusion of a “methods and analysis” volume in the National Institute of Justice Criminal Justice 2000 series might lead a reader to think that all discussions of theory and social context would be reserved for the other three volumes. However, volume 4 authors repeatedly emphasize the importance of theory to selecting and evaluating methods.

The editors and authors of volume 4 would appear to agree with Bernard and Ritti (1990, 1): “[T]heory alone is the distinguishing feature of the scientific

Exhibit 1. Topics by chapter in volume 4

Topic	Chapter number									
	1	2	3	4	5	6	7	8	9	10
Acceptance of measures										X
Community policing									X	
Cost of crime					X		X	X		
Cost of public response to crime					X		X	X		
Cost-benefit analysis					X		X			
Cost-effectiveness					X		X			
Crime hot spots				X						
Crime measurement	X	X	X	X	X	X	X		X	
Crime prevention				X	X		X		X	
Crime, violent	X	X	X			X				
Crime/delinquency, self-reports	X		X				X			
Cross-national data			X							
Data analysis				X						
Data collection, history	X	X				X			X	X
Data collection, police									X	
Data integration		X					X			
Data requirements/limits	X	X	X				X			X
Domestic violence		X	X			X				
Drug Use Forecasting/Arrestee Drug Abuse Monitoring	X						X			
Explanation of variation	X			X					X	X
Fear, behavioral indicators							X			
Fear, consequences							X			
Fear, measurement of							X			
Fear of crime							X			
Fear, promoting							X			

Exhibit 1 (continued)

Topic	Chapter number									
	1	2	3	4	5	6	7	8	9	10
Fear, reduction							X			
Fear, regulating							X			
Genocide			X							
Globalization			X							
Historical perspectives/context			X							
International data			X							
Interviewing	X	X				X				
Interviewing, computer-assisted	X	X				X				
Kernel estimation				X						
Law and economics					X					
Local indicators of spatial assoc.				X						
Longitudinal measures	X	X					X		X	
Measurement of police function									X	
Measurement of police structure									X	
Measurement procedures							X		X	X
Meta-theory			X							
Moran scatter plot				X						
National Crime Survey		X				X				
National Crime Victimization Survey		X				X				
National Violence Against Women Survey						X				
National College Women Sexual Victimization Study						X				
National Women's Study						X				
Offenses, seriousness	X						X			
Operational definitions	X	X	X			X				X
Organizational analysis									X	X
Panel effects	X	X								
Performance standards										X
Police discretion									X	
Police functions									X	
Police functions, explanations of									X	
Police organization									X	
Police org., explanations of									X	
Policy analysis			X		X		X	X		
Prediction	X			X						

continued

Exhibit 1 (continued)

Topic	Chapter number									
	1	2	3	4	5	6	7	8	9	10
Program accountability					X		X			
Program effectiveness					X		X			
Quadrant count method				X						
Rape, measurement of						X				
Reliability	X	X	X	X		X			X	
Reliability, internal consistency	X									
Reliability, test-retest	X									
Resistance to measurement										X
Response techniques	X	X				X				
Sample design		X								
Self-reports with adults	X	X								
Self-reports with children	X									
Sexual assault		X				X				
Sexual victimization						X				
Spatial autocorrelation				X						
Spatial data analysis				X						
Spatial modeling				X						
Stalking						X				
Survey methods	X	X				X	X		X	X
Survey of fear							X			
Survey of offending	X									
Survey of sexual victimization						X				
Survey, reference period	X	X				X				
Theory	X	X	X						X	
Theory and data	X	X	X	X	X	X	X	X	X	
Theory, contingency									X	
Theory, institutional									X	
Theory of crime	X	X		X						
Theory, routine activities				X						
Theory, social ecology				X						
Trial court outcomes										X
Use of research										X
Validity	X	X				X			X	X
Validity, construct	X									
Validity, construct continuity	X									
Validity, content	X									
Validity, criterion	X									

Exhibit 1 (continued)

Topic	Chapter number									
	1	2	3	4	5	6	7	8	9	10
Victimization, consequences of		X								
Victimization, measuring		X				X				
Victimization, responses to		X								
Victimization, screening question		X				X				
Victimization, self-reports		X	X			X				
Victimization of women						X				

enterprise. True, some of the [other features] are necessary and desirable, but regardless of measurement precision, quantification, or power of analytical tools, the activity is not science unless it involves an explicit theory.” Theory drives measurement and analysis because it identifies research questions, suggests acceptable methodological approaches, rationalizes the selection of variables and measures, and provides the framework for interpreting results (Bernard and Ritti 1990, 1–2).

This affirmation of the importance of theory in guiding and evaluating measurement and analysis does not contradict the importance of the interplay between methodological developments and the development and revision of theory. As Howard, Newman, and Pridemore point out in chapter 3, a number of cross-national theories are presently untestable because of the absence of relevant data. Anselin and colleagues review some of the problems in analyzing spatially and temporally clustered data. Assessing the impact of such problems on conclusions drawn from prior research is important in evaluating the soundness of our theoretical knowledge and in influencing the future direction of theoretical inquiry.

Much of the research reviewed throughout this collection of papers is concerned with the dependability or reliability of measures and their accuracy in representing the concepts used in theory. Howard, Newman, and Pridemore warn of the haphazard adoption of variables in cross-national research, based in part on the difficulty in obtaining data that have been collected for administrative and political, rather than theoretical, purposes. They also point out that the meaning of a datum or a trend is not self-evident but is connected to the relationship between an observable and its deployment as an indicator of a concept. Different cross-national investigations may use the same data in measuring different variables. This is not necessarily wrong. The same fact may have different meanings in different theories and, indeed, has scientific meaning only in such context.

Similarly, Maguire and Uchida (chapter 9) distinguish between the more common data collection activities that are assumed to “describe” police departments and the less common activities that measure theoretically meaningful aspects of police department function and structure. They indicate that the mountain of data that is now produced by and about many criminal justice agencies contains only some ore. Greater care conceptually might reduce the size of the data mountain, and it would also guide us to additional, sorely needed, data that are not routinely collected.

The importance of theory in guiding measurement and analysis is highlighted in the discussions of many of the important advances in measurement made in the 20th century. Thornberry and Krohn (chapter 1) and Cantor and Lynch (chapter 2) review two of the undeniable measurement advances that have shaped criminological research: survey methods for measuring crime from offender and victim sources. Both chapters stress the critical connection between theory and measurement. We do not have standards for assessing measures without reference to the concepts and connections among concepts for which we employ measures. Fisher and Cullen (chapter 6) then provide more detail on the process of developing measures for one type of crime/victimization. They demonstrate the interplay between anomalies in research findings and the reconceptualization of the meanings of victimization in the development of their national sexual victimization survey. In these discussions of measurement, we witness the process of theory guiding measurement and research revising theory. It is only through this process that researchers have avoided reinventing the wheel.

Many of the challenges for research in the 21st century identified by our authors are, in contrast, connected to the failures of research in the 20th century to take theory seriously enough. Authors have pointed out missed opportunities and poor measurement decisions that have hampered our research abilities. For example, Keilitz (chapter 10) reports that trial court outcome measures have been developed but that no attempt has been made to specify the court processes that might influence these outcomes. If future work begins to propose theoretical linkages between how these courts operate and what they achieve, researchers may determine that the most plausible connections require outcomes to be measured differently or that other likely outcomes have been overlooked in the original development of outcome variables.

One of the broad strategies that might be employed to identify opportunities more quickly and efficiently is greater attention to theory development as a criterion in justifying expenditures on measurement and analytic projects. Part of that strategy would include correcting an imbalance in current research that is more implied than explicit, but visible nonetheless, in the chapters contained in this volume.

There would appear to be greater collective investment in, and therefore more systematic accumulation of knowledge in, criminology than in criminal justice. The terms *criminology* and *criminal justice* are often both vague and synonymous. Snipes and Maguire (1995) suggested distinguishing them based on the dependent variables of interest. They use *criminological theory* to refer to theories that seek to explain variation in crime and *criminal justice theory* to identify theories that seek to explain variations of or in criminal justice systems. Distinguishing theoretical domains in this way, criminological theories are relatively more explicitly stated and pursued than criminal justice theories.

This disparity may be an artifact of different patterns of growth in the various disciplines that concern themselves with these issues. The study of crime seems to be increasingly concentrated among disciplinary specialists who identify themselves as criminologists, while the study of criminal justice remains more widely distributed across disciplines other than criminal justice, such as political science and sociology, and to a lesser extent, psychology and economics. Although criminology can scarcely be characterized at the turn of the century as showing consensus about the nature and causes of crime, it has achieved a lingua franca that clarifies theoretical debates and facilitates measurement and analysis. This is largely due, we speculate, to the tighter patterns of social interaction among scholars and researchers who study crime and its causes. Scholars and researchers who identify with criminal justice as a discipline would seem to place greater emphasis on applied matters, but—as some of our authors demonstrate—theory relevant to the explanation of criminal justice phenomena is available across a wide range of disciplines.

One indicator of this imbalance is the frequent mention in this volume of specific criminological theories and the connections of each to particular measurement and analytic problems. For example, similar theories of delinquency have been used to guide the improvement of reliability and validity both in the cross-national research discussed by Howard, Newman, and Pridemore and in the self-reported victimization and offending discussed by Fisher and Cullen, Cantor and Lynch, and Thornberry and Krohn. In contrast, Maguire and Uchida indicate that almost all the research on police organizations in this century has been guided by a single strain of organizational theory (contingency theory) and that even the deployment of this theory has been more implicit than explicit. Readily identifiable schools of thought, indicating specific theoretical traditions, are rare in criminal justice research. As a result, data gathering and analysis in criminal justice are often guided by implicit program assumptions or current policy concerns. (We will return to the complex relationship between scientific research and policy use of research later.) We will need to rectify this imbalance if knowledge is to be built systematically.

Criminal justice theory building is important in its own right, but it becomes more attractive when we consider the possible connections between criminal justice and criminological theory. These theoretical domains are connected in two important ways: in the potential impact of criminal justice behavior on crime and in the potential impact of crime on criminal justice. The first of these connections, in which criminal justice behavior is the independent variable, includes two quite different approaches. Only the first of these has received much attention.

This first approach is visible in the frequent concern for criminal justice program evaluation. There have been many studies of the effectiveness of criminal justice practices and programs in influencing crime. Most of these are some form of treatment or specific deterrence theory, in which we are interested in the impact of an intervention on repeated crime by someone who has offended at least once. These are most often correctional or treatment evaluations. However, this same approach to the impact of criminal justice programs on crime is also visible in research examining the role of criminal justice in prevention. This research tends to focus on criminal justice impacts on crime rates rather than criminal justice impacts on the future behavior of individuals. Both types of research have consumed the lion's share of criminal justice research dollars, probably because these studies address the primary question of policymakers: Do our criminal justice programs achieve the goals we intend for them?

The attention devoted to this form of criminal justice influence on crime has generally found, with some notable and important exceptions, that criminal justice actions are rarely the most powerful explanatory variables in the fluctuation of crime. As the century turns, one of the more significant data trends is the substantial drop in crime, measured through either official or victim sources. As this decrease has continued, a large number of claims have identified the positive effects of crime control policy as the independent variable. If such claims can be substantiated by more exacting causal analysis than is now available, this discovery of criminal justice impacts on crime would stand in stark contrast to the "nothing works" cynicism of a decade ago. Certainly this is one more example of the need for greater theoretical preparation in research, so that the potential causal influences of policing strategy, drug treatment, community crime prevention, and so on could be compared with the influences of the growing economy and demographic shifts in the population.

The second approach to criminal justice as an independent variable in criminological theory has received less attention than has the program evaluation approach. The relative lack of attention given this approach is ironic, since in this research tradition, criminal justice appears to be the predominant variable in explaining fluctuations in crime. This approach is visible in theories that seek to determine what is or is not to be treated as a crime and in theories that

seek to explain fluctuations in decisions about how much attention different types of crimes might get. Possibly, the potential payoffs in these theories have been ignored in the past because they have often been advanced only in critical or radical theories. These theories generally argue that the criminal justice system operates to deflect attention away from structural inequalities and to concentrate attention on individual-level explanations for street crime.

More recent developments using this approach are more politically neutral. The political science of crime policy and the emerging field of cultural criminology serve as examples. These approaches to criminal justice examine the complex and poorly understood connections among popular culture, media portrayals of crime and justice, the structure and dynamics of crime in political campaigns, and the effect of these on which social harms will receive attention as crimes. Determining what crime is, is perhaps the most fundamental criminal justice decision. But our study of this impact of criminal justice on crime is poorly understood, in comparison to our understanding of specific criminal justice actions on targeted crimes or targeted criminals.

The second connection between criminological and criminal justice theories would be in the examination of the impact of crime on criminal justice behavior. This impact appears to be strong but indirect, as it is interpreted and moderated by fear (see, for example, Warr, chapter 8) and by media and political responses (Scheingold 1984, 1991; Wilkins 1991). We need greater attention to how criminal justice adjusts to crime and to whether the adjustments it makes are to crime or to other forces (such as extremism in political campaigns, as Scheingold and Wilkins suggest, or “moral panics” as Chiricos [1998] describes).

It will be particularly valuable if we begin to think more broadly about the range of criminal justice concepts that are worthy of explanation. For example, one might attempt to test whether the drug wars of the 1980s and 1990s were a response to actual increases in illicit drug use of a particular sort or whether other explanations are more powerful, such as the moral panic perspective. But one might also conceptualize justice in terms of the distribution of punishment, protection, and other benefits, exploring who benefited and who did not by the response of the justice system to the drug problem. One might also measure the practices of the justice system according to a variety of normative standards. Doing this first

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requires an explication of normative theories of justice, which must then be applied to the issue at hand so that proper measurement and analysis can follow.

These issues cannot be addressed systematically until the same care is given to conceptualization and relationships among concepts in criminal justice as is given in criminology. Only with that attention to theory will the development of measurement and analysis in criminal justice advance systematically. In order to pay greater attention to measurement and analysis in the criminal justice domain, we need a research policy that recognizes that fluctuations in criminal justice variables are not trivial, even if they do not have visible connections to crime. Accessibility to the courts, proper treatment of citizens, job satisfaction and turnover of employees, and punishment rates—to name a few criminal justice variables—all merit explanation, whether or not their fluctuation has, in turn, some effect on crime. They are key elements of normative theories of justice that guide, might guide, or should guide the actions of those involved in the administration of justice. But, as Maguire and Uchida point out in chapter 9, the theories that would lead to the measurement and analysis of such fluctuations lag behind the theoretical development, and therefore the measurement and analysis standards, in criminology.

Data and Measurement

The papers in this volume are united by their shared emphasis on data. The authors stress issues in finding, interpreting, and understanding data on crime and criminal justice. They discuss the strengths and limitations of existing data sources and describe how researchers might improve ongoing data collection efforts. They consider basic questions about the types of data useful for criminal justice, and they suggest how researchers might more creatively exploit the data that they gather.

We believe that the authors' emphasis on data and measurement, as opposed to analytic techniques, did not occur by chance and that the focus on data and measurement reflects the general priorities of criminal justice as a field. This is so for two reasons.

First, criminologists and criminal justice researchers depend on analytic methods that they import from other disciplines. As in several other fields of social research (for example, political science and sociology), the analytic methods of criminology and criminal justice originated in statistics, econometrics, epidemiology, and psychometrics. Developments in these areas are occurring at a rapid pace, and a set of papers that concentrated on promising analytical techniques would soon be amusingly obsolete.

We can reasonably predict that the range of analytic methods in criminology and criminal justice will continue to expand during the 21st century. We also can reasonably predict that most of these methods will continue to come from other areas. Because methodological development will respond to issues outside criminal justice, additional predictions would be hazardous.

We believe that the second, and more important, reason for the authors' focus on data and measurement issues is the central role of these topics in understanding crime and justice. More than two decades ago, Hubert Blalock (1979) suggested that the most important challenge to empirical research in sociology was not to develop more sophisticated analytical methods. Instead, according to Blalock, the key element in advancing knowledge about society was a better understanding of data and measurement.

This observation is equally true for inquiry in crime and justice today (e.g., Maltz 1992). Unlike statistical techniques, criminologists and criminal justice researchers play a major role in controlling and shaping the data they use. The form and content of data collection can greatly expand or limit the range of questions that scholars might address. Progress in the field then heavily depends on measurement decisions.

Fifty years ago, data and measurement also posed daunting problems for criminology and criminal justice scholarship. The chapters in this volume show that researchers have made considerable progress in addressing measurement and conceptualization issues. Yet they also show that old problems still vex the field and that other problems, not obvious in the past, now require solution. Innovations in computing and quantitative methods have created new opportunities to explain crime and the justice process. In turn, these new opportunities demand new forms of data.

Most criminal justice textbooks distinguish three major sources of data on crime: the Uniform Crime Reports (UCR), the National Crime Victimization Survey (NCVS), and self-report surveys of criminal offending. In this volume, Cantor and Lynch discuss self-report victimization surveys (primarily NCVS), while Thornberry and Krohn consider self-report surveys of offending. Both sets of authors show how these data collection methods evolved from modest beginnings to reach their current status as standard measures of crime. The authors also emphasize remaining questions about the reliability and validity of

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these methods, and they discuss efforts to improve the methods and extend them beyond their original uses.

The volume does not include a separate chapter on the Uniform Crime Reports. We would have preferred to include such a discussion, and the lack partly reflects our inability to agree on a satisfactory contribution. The Federal Bureau of Investigation is currently transforming UCR from an aggregate count of recorded crimes to a structure that provides information on individual incidents. Future uses of UCR data will depend on this transformation to the National Incident-Based Reporting System (NIBRS). NIBRS is still far from a complete system, however, and predictions about it uses must be largely speculative (see, e.g., the chapters in Maxfield and Maltz 1999).

Still, despite the lack of its own chapter, our authors did not neglect the current version of UCR. Caulkins, for example, examines UCR as a source of data on drug crime. Fisher and Cullen explore the differences between reported and unreported sexual victimization in both UCR and victim surveys. Maguire and Uchida explore UCR as a measure of police function.

One of the most notable characteristics of crime is that it clusters. Criminal acts do not extend evenly over space, and they are not constant over time. The first criminologists noticed these variations, and patterns in space and time were a major concern of the discipline from its beginning.

Beyond the three usual measures of crime and victimization, criminologists and criminal justice researchers, of course, use many other types of data as well. The chapters in this volume cover a wide variety of data forms and sources and discuss problems in defining concepts, obtaining measurements, and assessing reliability and validity. Maguire and Uchida consider data useful for evaluating police performance, while Keilitz describes a program for collecting data to evaluate court systems. Caulkins reviews measures of drug use, and Howard and associates assess problems and progress in collecting data on international crime rates. Cohen and Warr both consider issues in measuring outcomes and costs of crime, pointing out both the difficulties and advantages of these efforts. In a chapter that touches on many of the topics in Cantor and Lynch, Fisher and Cullen review efforts to use survey data to measure violence against women. Finally, Anselin and colleagues consider the data requirements for spatial analysis.

Data Clustering and Analytical Issues

One of the most notable characteristics of crime is that it clusters. Criminal acts do not extend evenly over space, and they are not constant over time. The first criminologists noticed these variations, and patterns in space and time were a major concern of the discipline from its beginning. As Anselin and colleagues note in chapter 4, Quetelet and other 19th-century statisticians closely studied differences in crime across communities. In 1837, Poisson derived his famous count distribution in a time-series study of criminal convictions (Stigler 1986).

At the end of the 20th century, clustering and its implications still play a central role in the study of crime. In this volume, Anselin and his coauthors address these issues in their chapter on geographical data analysis. More generally, however, clustering occurs in both temporal and cross-sectional data and in both individual and aggregate analyses. The two basic forms of analysis and two basic data structures create four possible combinations: individual temporal, aggregate cross-sectional, individual cross-sectional, and aggregate temporal. Although each combination poses special problems of its own, all four generate similar clustering issues. Cluster effects will likely continue to challenge and fascinate criminal justice scholars well into the future.

Currently, the best understood clustering issues involve aggregate temporal analyses, such as trends in drug use or the fear of crime. Here, clustering arises because observations that are close in time tend to be more similar to each other than to observations in the distant past or future. The autocorrelation that this clustering generates is the subject of a large and ever-growing statistical literature (for example, Enders 1995), from which criminologists often draw.

Researchers are also becoming increasingly sophisticated in their understanding of clustering in individual temporal analyses. Data structures of this type include, for example, the developmental studies that Thornberry and Krohn discuss. In these studies, clustering appears as persistent individual differences across study periods. Research on growth and change in criminal careers is profiting from developments in panel data analysis (for example, Diggle, Liang, and Zeger 1994; Hsiao 1986), and it seems likely that important progress will continue into the next century.

Clustering occurs in aggregate cross-sectional studies in “contextual” or “multi-level” analyses. Examples include studies of the effects of neighborhood conditions on victimization risks and sentencing outcomes for defendants in different court systems. Here, researchers examine both individual effects and the aggregate effects of the clusters. Statistical models for this situation were the subject of much attention in the 1990s (for example, Bryk and Raudenbush 1992).

These models have a great deal in common with panel data analysis, and developments in each area will likely enrich the other.

Finally, clustering in individual cross-sectional analyses appears from similarities in nearby units. Anselin and his coauthors provide a comprehensive and detailed review of work in this area. Although Anselin and colleagues are the only authors in the volume who explicitly consider analytic matters, the issues that they raise apply to other clustering situations as well. For example, what types of data arrangements are most helpful in visualizing clusters? How might one estimate the strength of relationships between clusters? When should one regard clustering as a statistical nuisance to avoid, and when should one regard it as a substantive opportunity?

The last question has especially important implications. As Anselin and associates note, researchers who study spatial data usually work with units such as counties, census tracts, or neighborhoods, whose boundaries are defined by others. Crime and victimization tend to overlap these units, creating correlations between crime patterns in adjacent areas.

Researchers studying spatial data must decide whether the geographic correlations are a nuisance that requires correction or a substantive phenomenon that is interesting in its own right. In the first case, the correlations violate the assumptions of conventional methods, and one should adjust the results to remove their impact. In the second case, the correlations are evidence of social interactions between the units, and one should incorporate these effects directly into the analysis.

As Anselin and colleagues point out, each possibility produces a similar data pattern, making it difficult to choose between them on statistical grounds alone. Yet the two possibilities require very different models, and an incorrect model will inevitably harm the conclusions.

In various guises, similar issues arise in the other types of analyses. Researchers studying individual temporal data face problems in distinguishing between heterogeneity and state dependence. That is, do offenders persist in crime because of their personal characteristics or because earlier offenses changed the circumstances of their lives? Similarly, aggregate individual studies must separate compositional effects from contextual effects. Are persons more likely to be victimized in “bad” neighborhoods because of neighborhood characteristics or because more potential victims (and offenders) live in these areas? Finally, aggregate temporal studies present problems in choosing between dynamics and autocorrelated errors. Are the residuals of a time-series regression correlated because of omitted variables or because the effects of the included variables are distributed over time?

Although future statistical developments will likely make it easier to detect the underlying form of clustering, theoretical and data collection efforts also could play major roles in resolving the problems. Stronger theory would be helpful in deciding when to expect one type of clustering instead of the other. Creative data collection could make it possible to eliminate one pattern, leaving the other as the only possibility.

As we suggested earlier, statistical techniques for understanding clustering effects are most likely to come from other areas of study. Yet given criminology's long interest in these effects, the field stands in a strong position to take advantage of this work.

Besides the issues that we have discussed here, other approaches to analyzing clusters might also be useful for research in criminal justice. Procedures for nonlinear modeling that originated in the physical sciences, for example, may yield important insights into crime. Methods such as state-space reconstruction and neural network forecasting (see, e.g., Weigend and Gershenfeld 1994) may be helpful in understanding crime rate changes. Nonlinear models for "small world" networks might be useful in explaining the transmission of criminal behavior (Watts 1999).

These possibilities are entirely speculative, of course. With a few notable exceptions, nonlinear methods have yet to prove their utility in the social sciences (Granger and Teräsvirta 1993). Still, the possibilities illustrate the larger point that criminal justice research will benefit from exciting developments in many fields of study. Rather than being an embarrassment, the eclectic nature of criminal justice methods frees the field to select whatever techniques are most useful.

Uses of Research in Decisionmaking

We examine data against the framework of meaning provided by the concepts we define and connect to each other. Research is careful with processes of collecting data, from developing measurement models that relate observables to concepts, to sampling so that population values can be estimated, to assessing the validity in conceptual and causal models. The quality of data is built into the processes of collecting it. It is also true that the processes for the use of data are also, to a large degree, designed in (or designed out) of our data collection. Data can be collected, or more precisely research can be done, with the intent to use it to produce change in a social system (Hornstein et al. 1971, 257). Characteristics of research with the intent of practical use may differ somewhat from the characteristics of research conducted without this intent. Any discussion of measurement

and analysis in criminal justice would be incomplete without attending to the design-for-use as well as to the design-for-research.

Many chapters in this volume are concerned with the processes that permit use of data by researchers in building knowledge. But another theme in these chapters is the use of data in shaping the everyday affairs of criminal justice: in policymaking, in management, and in individual decisionmaking. Several of the chapters in this volume consider some of the research-use issues directly. For example, Anselin and colleagues discuss spatially organized data about crime in police strategic and tactical choices. Caulkins examines the particular kind of drug-related information most relevant to particular drug control policies. Maguire and Uchida review police agency efforts to describe what they are and what they do (often to permit police managers to make meaningful comparisons of agencies). And Keilitz describes a long-term, ongoing effort to develop outcome measures of trial court performance that practitioners would use on a regular basis to monitor the quality of court services.

Our authors' description of the utilization of research suggests an uneasy alliance between research and practice. In this section, we will review briefly some of the more typical conflicts between research and practice. We will then argue that these tensions, although cause for concern, highlight the interdependence of research and practice about crime and criminal justice. Finally, we explore some recent steps taken to learn more about connecting research and action to reduce the conflicts and increase the cooperation in this interdependent relationship.

The crime and criminal justice research agenda is undoubtedly driven more by political and ideological shifts than by the incremental and developmental process of theory building and theory testing.

Research-practice conflicts

The inherent conflicts between criminal justice research and criminal justice policymaking are probably more often recognized than their possible complementarity. For example, researchers often argue that policy is made without reference to research. Policymakers may select an approach to a problem that implicitly or explicitly contradicts research knowledge about the causes of the problem (e.g., Wilkins 1991). Or policymakers may claim policy results that research findings contradict (e.g., Lerman 1975 on the cost savings of the California Probation Subsidy; more recently, see the political responses to D.A.R.E.[®] evaluations and to evaluations of three-strikes legislation). It is often argued that policymakers use research selectively to marshal support

for a program rather than use research dispassionately to draw balanced conclusions (Ilchman and Uphoff 1983; Fisher and Cullen in this volume).

Policymakers have equally apparent complaints about research and researchers. Research can be too expensive and too slow. Despite a great deal of research, there is never research relevant to the issue at hand. Researchers design research programs to gain understanding of a problem but report that none of the critical independent variables are amenable to intervention. Researchers obfuscate, complicate, and ignore the obvious (Klockars 1999). Many of these policy and practitioner complaints appear to motivate the current “common sense movement” in criminal justice (e.g., Lapp 1998), which appears to reject the use of research in crime policy and criminal justice decisions.

These commonly voiced complaints indicate several types of conflicts, some of which are quite serious. The vexation may be increasing. Nevertheless, these conflicts also serve as indicators that researchers and policymakers are enmeshed in a system on which both are dependent. The majority of criminal justice research dollars are not grants for pure or basic research, competitively awarded on the argument of how and how well the study advances theoretical knowledge. Instead, the available research dollars tend to shift as the policy agenda changes.

Research on officials’ exercise of discretion and the role of nonlegal variables in the implementation of the law blossomed in the 1960s and 1970s. This spawned and was driven by outrage that in fact the law, far from determining the behavior of criminal justice authorities, was only one of many influences, some of which seemed insidious to reformers (such as race or wealth). Despite evidence that some decisions and policies are inequitable (e.g., Tonry 1994), research on decisionmaking and decision control has waned, to be replaced in large part by concerns for control of crime, especially in the control of illicit drugs. Earlier interest in therapeutic, mediating, and conciliatory approaches to matters once considered noncriminal (domestic disputes) has been overwhelmed by victims’ rights groups demanding that spouse abuse be responded to as a crime. Research on victimization of women has followed the policy change and focuses now on measures of spouse abuse and sexual victimization and the effects of arrest and prosecution. Research on providing service to or meeting the needs of offenders in community correctional programs, which was common in the Reintegration Era from 1965 to 1974, virtually disappeared when correctional policy shifted toward retribution and deterrence.

The crime and criminal justice research agenda is undoubtedly driven more by political and ideological shifts than by the incremental and developmental process of theory building and theory testing. Indeed, the differences in style

and direction with which policymakers and researchers use research appear to be one of the main criticisms behind the academic backlash to the “nothing works” conclusion and the dumping of treatment for control-oriented programs. A scientific, theoretically driven approach to correctional treatment would have examined connections between processes and outcomes to improve, incrementally, the achievement of outcomes. The policy approach was not to improve treatment incrementally but, rather, to shift suddenly to another set of strategies for which there was little evidence of effectiveness and little attention to explicit connections between process and outcome. That is, the policy response to research was “all or nothing,” rejecting scientific incrementalism in the collection and use of treatment data and accepting another set of policies for which there were no data.

Many years ago, when considering this problem, a senior researcher who had been quite successful in using policy research to advance basic theory building explained his approach as “learning to hide a theoretical design in a proposal for policy research.” What he meant was that the researcher’s obligation to advance scientific knowledge often had to be added on to a project or hidden in a proposal that would be accepted on the basis of its policy pertinence. At least some portion of the research-policy conflict from the side of researchers is that the research should also have some scientific or theory relevance. Researchers may try to achieve this goal with research funds that have been allocated in a political process. They may often feel they are rushing to find scientific answers before the topic loses policy salience.

The needs of policymakers and practitioners for research are visible in a number of ways. Perhaps the most important of these is that the rationalization of public policy has become an institutionalized value in the public policy environment.

At the same time, it is a fact that most crime and justice research is funded with public dollars on the presumption that their expenditure will achieve practical benefit. How well have the measures, data, and analysis served practitioners and policymakers? What is the researchers’ obligation in the area of crime and criminal justice to meet these goals? How well has research benefited policy, and can it do more?

Research-practice interdependence

There are, of course, examples that, on their face, suggest that research affects policy choices eventually, if not always with the immediacy that researchers might desire or in the direction that the researchers might have predicted. Among the best known of these examples, currently, is the collective impact of the Kansas City Preventive Patrol Experiment (Kelling et al.

1974) and the response time (Tien, Simon, and Larson 1978) and expert investigation studies (Greenwood, Petersilia, and Chaiken 1977) on the professional policing paradigm. *Delinquency in a Birth Cohort* (Wolfgang, Figlio, and Sellin 1972) has had significant effects on investigative, prosecutorial, and correctional policies with the intention of intercepting high-rate criminal careers. The development of victimization reporting (Cantor and Lynch in this volume) appears to have had significant effects on crime prevention policies. The seminal research in parole decisionmaking has spawned guideline approaches to all kinds of criminal process decisions (Wilkins et al. 1976; Knapp 1984; Petersilia and Turner 1987).

Examination of these apparent effects suggests that the linkages between the research and the policy influence are complex and difficult to establish. The policies may have changed anyway, and for reasons other than the research findings. The policies that explicitly allege the paternity of these research findings are, no doubt, using the research findings in a justificatory, rather than a generative, manner.

Nonetheless, just as researchers are uncomfortably dependent on a policy-research system to support research, policymakers and practitioners at all levels are also visibly dependent on the same policy-research system to support policy. The needs of policymakers and practitioners for research are visible in a number of ways. Perhaps the most important of these is that the rationalization of public policy has become an institutionalized value in the public policy environment (Meyer and Rowan 1977). Public agencies of all sorts—and criminal justice agencies are no exception—are expected to justify choices on the basis of evidence (Meyer 1994). One of the public organization responses to the pressure for rationalizing practice is structural: the creation of planning, research, and evaluation units staffed with persons trained in criminology, criminal justice, and policy analysis. The addition of such units can lead to symbolic, rather than technical, uses of research (e.g., Simon 1993; Feeley and Simon 1993). But there is little doubt that criminal justice agencies are better able to understand and perhaps to use research than has previously been the case. Moreover, the appreciation and use of research and research products has not been ghettoized in special units. Line executives in criminal justice are better educated than ever before (e.g., Carter and Sapp 1990) and are more intelligent and demanding consumers of research than previously (Langworthy 1999). Whatever their shortcomings, the various Federal progeny of the President's Commission on Law Enforcement and Administration of Justice and the Omnibus Crime Control and Safe Streets Act of 1968 have had a significant impact on these trends.

In addition to these changes in criminal justice, there is increased pressure on the government generally to be managed by demonstrable results (Osborne and Gaebler 1992). Total quality management, continuous quality improvement, performance-based management, and similar strategies can be hollow exercises (Zbaracki 1998), especially in such areas as criminal justice, where goal ambiguity is as much a political strategy as it is poor management (Lipsky 1980). But done correctly, connecting data interactively to policy and practice decisions has the potential for major benefits to both how well policy is implemented and how much we understand about the connections between outcomes and policy and practice (Senge 1990).

Within criminal justice, there have been some attempts to conceptualize the outcomes that agencies might seek to achieve (U.S. Department of Justice, Bureau of Justice Statistics—Princeton University Study Group on Criminal Justice Performance Measures 1993; Boone and Fulton 1995) and models for connecting practice to outcome measures (Sherman 1998; Maxfield and Przybylski 1999). The Violent Crime Control and Law Enforcement Act of 1994 has had some influence on attempts to document criminal justice effects. Examples are emerging from the field in which agencies or collections of agencies attempt to institute such measures and to manage by them, the largest of which is probably the trial court standards project reviewed by Keilitz in this volume.

Research on the use of research

The mood is right to transform the interdependence of researchers and practitioners into a new collaboration. But how does one avoid the shadow, shallow, or symbolic invocation of research and develop a new system in which research is actually used in practice rather than merely having “implications” for practice? Such a system would have to integrate research into everyday practice, requiring considerable change on the part of practitioners. But such a system also has to integrate practice into the conduct of research, requiring equally striking changes on the part of researchers. That kind of integration implies that the needs of both groups have to be met simultaneously. What practitioners appear to need is not so much information on what works, but a workable strategy for how to make it work. What researchers appear to need is not so much access to data or practitioner cooperation, but a workable strategy for systematically building knowledge while participating in practice decisions. These needs both imply the importance of developing theory and are therefore not so far apart as they may appear on occasion (Bernard and Ritti 1990).

There is a lengthy literature on research about the use of research. Unfortunately, it is an eclectic literature, with roots as dispersed as research and development in agriculture and education (Chin and Benne 1969). But these roots also extend

into mental health practice (e.g., Fairweather, Sanders, and Tornatzky 1974), social work innovation (Rothman, Erlich, and Teresa 1981), and criminal justice (Johnson 1980).

Although it is risky to generalize across this diverse inquiry, a consistent finding in these studies is that new practices are not adopted because researchers can show them to be more effective (measured in some way) than other practices. Adoption is not often contingent on (some researchers' estimate of) the technical or rational need for the data. Instead, policy and practice adoption of research findings come through and are mediated by human networks. Research is used when the proximal agent of change is credible to potential users. The most credible agent is usually a member of the system (Lewin 1947; Hornstein et al. 1971; Fairweather, Sanders, and Tornatzky 1974; Rothman, Erlich, and Teresa 1981).

The importance of the relational network of the agent to the adoption of research does not necessarily indicate that practitioners do not respond rationally to the content of research in determining what to do. But it does suggest that joint participation of the user and researcher in the design, conduct, and interpretation of research is critical to capturing all the elements in the practitioners' criteria for decisionmaking. Commitment to using data is most often obtained when the users meaningfully participate in framing and addressing both the research problem and the practical problem. The research problem has to be related to the practical problem. Lewin (1947) coined the term "action research" to refer to the new information and decision system that can emerge from such collaboration.

In Lewin's view, without connecting explicit goals, practice options, and feedback on their effects, decisions in human groups would be based on "sentiment" (pp. 342–344). In criminal justice, the dominant sentiments are usually of two types (Lipsky 1980). They are either deeply held convictions about what should be done (e.g., probation supervision should involve treatment processes) or deeply ingrained habits that solve significant day-to-day work problems (e.g., what is the best way to process a large number of cases with limited resources). Without feedback about the results of choices, either set of sentiments can be protected with a variety of stock-in-trade rationalizations that may bear no resemblance to actual practice outcomes (e.g., Stageberg 1990).

The field could use more systematic research on the forces that give rise to various social control policy selections and on the political and social contexts in which policies are adopted and rejected.

The National Institute of Justice has begun to work on the development of action research in criminal justice through a variety of partnership programs and has also supported research on the characteristics of more and less viable action research systems (McEwen 1999). As Hornstein and his colleagues (1971) indicated some time ago, there are some real tradeoffs that need to be carefully assessed in building such systems. Among the more problematic are researchers' fears about losing precision and practitioners' fears that the research process cannot match the demands of funding and policy cycles and that research will lead to punishment of poor performance (Keilitz in this volume).

Although there are significant obstacles in initiating such systems, these are probably less severe than the obstacles in maintaining them. There are numerous examples of pilot or demonstration action research systems, and much of the research on the difficulties in implementation has concentrated on getting these up and running. There are far fewer examples of action research programs that have been maintained long enough and have sufficiently diffused through the practitioner-researcher system that they have affected the nature of policymaking rather than of specific programs. In other words, a key long-term question is: Can action research move from front-line innovation to affect policymaking?

We know significantly less about this part of criminal justice decisionmaking than we do about decisions and practices by front-line officials. This deficiency would call for research that is infrequently supported, perhaps because the criminal justice policymaking system has a significant role in determining what to research, as previously discussed. The research that does exist is highly speculative, inductive, and case specific (e.g., Griset 1996; Chiricos 1998; Wilkins 1991; Scheingold 1991). Critical components of the policy system that need examination appear to be the complex interplay of political campaigning, the media, and the shaping and interpretation of public opinion. There is certainly no consensus on how these pieces work separately, let alone how they work together.

As weak as this research is, it suggests that much policymaking is politically opportunistic and heavily affected by extreme positions of various interest groups, especially in more centralized political systems. While policymakers are influenced by the institutionalized value of rationalized practice—of showing results—it also appears that the urge for demonstrable results is largely contained to evaluating isolated programs (and often to those that are falling out of favor). The field could use more systematic research on the forces that give rise to various social control policy selections and on the political and social contexts in which policies are adopted and rejected. This research is probably more threatening to policymakers than research on whether particular programs work or not, or how they work. Nevertheless, determining whether an action research

system can be maintained will require more attention to this level of decision-making to determine if control of sentiment at the line level may be supported by controlling the use of sentiment at the policy level. A recent survey of probation officers in New York about the use of outcome measures in guiding probation practice indicates that officers are doubtful about the ability of county and State policymakers to support research-driven changes in practice (Duffee et al. 1999). The officers expressed cynicism that policymakers would adhere to findings about probation effectiveness in future funding and program decisions.

Lipsky (1980) and Braithwaite and Mugford (1994) argue that one potentially powerful force for maintaining action research, once it is initiated, is the natural curiosity of front-line staff to determine the effects of their actions and their commitment to be effective. If this speculation is correct, one might ask whether sufficient proliferation of action research at the bottom could tip the balance toward more rational action at the top. Will front-line staff champion a theory-driven action research system as a means of doing business? For example, would they object to the cancellation of programs that they knew to be efficacious?

The available research on the policymaking system might suggest that commitments from front-line practitioners to action research may be insufficient. Greater involvement of citizens in criminal justice and criminal justice research may also be necessary. Can the current means of assessing and shaping public opinion about what to do be altered through greater involvement of citizens in action research? The greatest potential for such involvement probably is located in the current practice of problem solving in the various forms of community justice (Karp 1997). However, the involvement of citizens in action research, other than as subjects or respondents, appears limited. Very few resources go into training citizens to participate actively in this process (Friedman 1994; Duffee 1998). Promoting such citizen involvement may be a more effective way to engage them in criminal justice than urging them to support police efforts or to mobilize for crime control (Buerger 1994). If citizens and practitioners were engaged in the same action research system, this coupling could provide the reconnection of street-level bureaucrats and their "clients," which Lipsky (1980) placed at the centerpiece of public organization reform.

The trick in linking researchers more closely to the development of crime policy and the administration of justice is in maintaining the degree of independence necessary to produce a disinterested analysis, one not biased by the need to advance a particular political ideology or goal. This is not the place for a disquisition on this classic dilemma, but the risks and costs of researchers selling out or becoming invested in a policy or practice, rather than in what the best evidence shows, are both significant. We also note that research needs to

lead as much as it needs to follow the agenda of policymakers and practitioners. When researchers conduct projects on topics that are not in vogue and seem irrelevant to the issues confronting those who must deal with crime and administer justice, they nonetheless may illuminate new areas worthy of attention and refresh debate about what matters.

Conclusions

The chapters in this volume cover a wide range of issues under the umbrella of data and methods. The authors define the current state of methodology in studies of crime and the justice system, and they provide a foundation for improving research in the 21st century. In this introductory essay, we have sought to identify a few themes common to the papers and to consider in a more general context the issues that they raise. We conclude by summarizing these major themes and by noting the lessons that they provide for future progress in data collection and analysis efforts.

The first message from the authors is that theory plays a central role in methodology. Collectively, the authors argue that measurement and analysis decisions should not merely be data driven or opportunity driven. Instead, they must be guided by theory, and they should contribute to theoretical knowledge. Our authors point to missed opportunities for collecting theoretically important data in the past, and they describe how data collection efforts in the next century may enhance theory. Implicit in their arguments is a desire to use theory development as a criterion for justifying expenditures on research. In practical terms, this means that granting agencies should ensure that project proposals, the review process, and funding decisions heavily weigh possible theoretical advances.

Second, the authors stress the need for more careful attention to measurement and data collection. Improvements in analytical methods and computing power are certain to continue into the 21st century, perhaps at an exponentially increasing rate. Yet the authors raise a sobering point: Without advances in data collection and measurement, we will be ill equipped to take full advantage of the new opportunities. While researchers in criminology and criminal justice can profit from methodological work in diverse fields of study, ultimately they alone are responsible for the quality of their data.

The third theme that runs through the papers is the challenge of analyzing clustered data. Although few authors consider the issues directly, the opportunities and difficulties that clusters present are implicit in many of their discussions of measurement efforts. Clustering patterns are important in understanding offending, victimization, sentencing outcomes, and spatial variations in crime, to name

but a few topics. Even when researchers are not explicitly concerned with clusters themselves, clustering issues arise naturally from the data that they analyze. Clustering is therefore tied to theoretical concerns through attempts to understand clustering phenomena and to measurement concerns through efforts to gather data that exploit the information that clusters provide.

The fourth general theme of the papers is the use, abuse, and frequent disregard for research in criminal justice decisionmaking. Many of our authors provide examples of how research has helped resolve difficult policy decisions. At the same time, they also point to opportunistic abuses of criminal justice research that have hindered, rather than helped, the pursuit of justice. We examined several factors that influence the use of research in policymaking, and we noted that the adoption of research findings most often comes through human networks. Designing networks that simultaneously serve the needs of both researchers and practitioners, although difficult, is possible.

The themes of theory, measurement, data clustering, and uses of research connect all of the chapters in this volume. Yet no introduction of this size can do justice to the diversity of issues raised by the authors. Readers will doubtless find other commonalities among the papers as they proceed through the volume. We encourage them to do so, and we believe that they will find the trip useful.

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