RESEARCH REPORT

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Hiring and Retention Issues in Police Agencies: Readings on the Determinants of Police Strength, Hiring and Retention of Officers, and the Federal COPS Program

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Key Findings at a Glance

This report presents a series of papers addressing a number of staffing issues in policing: determinants of police staffing levels; the processes of hiring and training officers; and retention patterns associated with individual officers and staff positions. The papers are the result of an Urban Institute project funded by the National Institute of Justice to develop baseline data and knowledge that could prove useful in managing and assessing the federal Community Oriented Policing Services (COPS) program (the federal government's initiative to put 100,000 additional police on the streets through hiring grants and other means) as well as inform other research and policy issues in policing.

Most findings are based on results from a telephone survey with a nationally representative probability sample of 1,270 police agencies. The survey analyses are supplemented by analyses of national data on police employment and reviews of prior studies on the determinants of police strength. We present many findings separately for small jurisdictions (those with populations smaller than 50,000 persons) and large jurisdictions (those with 50,000 or more persons). Key findings from the study include the following.

DETERMINANTS OF SWORN FORCE STRENGTH

Factors influencing police strength (measured in terms of officers or expenditures) are not well understood. A review of 55 empirical studies on the determinants of police strength across places and/or over time revealed inconsistent findings for variables commonly used to predict police strength.

New survey analyses measuring the perceptions of police suggest that grant money, crime, calls for service, and population were some of the leading contributors to police growth from 1996 to 1999. Fiscal constraints and the lack of qualified recruits were two of the leading factors associated with police decline during this same period. Some factors linked to police staffing may be differentially associated with police growth and decline; most notably, crime may contribute to growth in staffing but not have much influence on reductions in staffing.

HIRING AND TRAINING OFFICERS

The process of screening and training new officers takes an average of 31 weeks in small agencies and 43 weeks in large agencies. Ninety-two of every one hundred new hires in small agencies and eighty-nine of one hundred in large agencies successfully complete all training.

Slightly less than 60% of agencies reported that the length of the training process has increased in recent years due to new training requirements, some of which involve training for community policing.

Over half of small agencies and two-thirds of large agencies reported that a lack of qualified applicants caused difficulties in filling recent vacancies. Close to half of small agencies and over half of large agencies also reported modest staffing problems caused by unanticipated vacancies.

OFFICER ATTRITION AND TENURE

Officers serve for shorter periods in small agencies than in large agencies. Half of officers leaving large agencies but only a fifth of those leaving small agencies are retirees. Further, two-thirds

of departing officers in small agencies and about a third of those in large agencies leave after five or less years of service. It is estimated that nearly half of officers departing small agencies and about a quarter of those leaving large agencies go on to other law enforcement work.

RETENTION OF COPS-FUNDED POSITIONS

Based on short-term (1-2 years) follow-up data, approximately three-quarters of agencies with expired COPS grants have retained their COPS-funded positions (to this point, virtually all retaining agencies have kept all of their COPS positions). About two-thirds of grantees expect to keep all of their non-expired COPS positions, while 74% of small grantees and 80% of large grantees expect to keep at least some of their non-expired COPS positions. Most of these agencies expect to retain the COPS positions for 5 or more years.

Overall, observed and expected retention rates among COPS grantees appear to be fairly consistent with historical retention patterns, based on a national analysis of twenty years of police employment data which examined retention of new positions by police organizations following periods when the organizations grew substantially.

CHAPTER 1.

Introduction and Summary

Christopher S. Koper

1.1. INTRODUCTION: STUDY BACKGROUND AND SCOPE

This report contains a collection of readings that examine various staffing issues in policing. These readings address three broad issues: determinants of police staffing levels; the processes of hiring, training, and deploying officers; and retention patterns associated with individual officers and staff positions. The papers are the result of an Urban Institute research project funded by the National Institute of Justice to, in large part, answer questions of interest to policymakers in the Office of Community Oriented Policing Services (i.e., the COPS Office), the agency that administers the federal Community Oriented Policing Services program. Passed by Congress as part of the *Violent Crime Control and Law Enforcement Act of 1994*, the COPS program is the federal government's initiative to add 100,000 officers to the nation's police agencies through grants for hiring new officers and other means (see Roth et al. 2000a for an in-depth description and evaluation of the COPS program).

COPS Office staff sought answers to a number of questions that would assist them in planning, managing, and assessing the COPS program. However, direct evaluation of the COPS program was not the focus of this research effort. Instead, the project emphasized the development of baseline data and knowledge that could prove useful in managing and evaluating various aspects of the COPS program, such as grantees' progress in hiring and deploying officers and grantees' retention of COPS-funded positions. Based on discussions with COPS Office staff and additional considerations, we identified a series of general research questions covering a range of loosely related police staffing issues.

- What factors determine the size of police agencies, i.e., what factors influence variation in agency size across places and over time? Are these factors similar for large and small police organizations? Are the factors contributing to police growth different from those leading to reductions in police?
- How long does it typically take to hire, train, and deploy police officers? What are the attrition rates in this process? What problems do agencies encounter in hiring and training officers?
- How long do officers serve with their agencies and under what circumstances do they leave?
- How long do agencies maintain new positions following periods of growth, irrespective of the particular officers filling those positions? How do current and expected retention rates for COPS-funded positions compare to historical norms of staff retention?

Though these questions are clearly relevant to the administration and assessment of the COPS program, they have broader relevance to several research and policy issues.

In order to address these issues, project staff utilized a number of methods: critical synthesis of literature, analysis of secondary data sources, and collection and analysis of survey data. The largest part of the research effort involved the development of a telephone survey that was administered during the summer of 2000 to a nationally representative sample of nearly 1,300 police agencies. The survey,

referred to hereafter as the Police Hiring and Retention (H&R) Survey, is described in the Methodological Appendix. Most of the chapters in this volume are based on analyses of the H&R survey data.

Due to the range of topics explored in this project, the style of this report is more like that of an edited book volume than a report with tightly integrated chapters. The remaining chapters of the report are divided into two parts. Part I consists of chapters Two and Three which examine the determinants of police agency size using, respectively, critical assessment of existing literature and survey data analysis. Employing these complementary approaches, these chapters investigate the factors, many of them external to police agencies, which cause variation in the size of police organizations across places and over time.

The determinants of sworn force levels investigated in Chapters Two and Three influence policymakers as they establish target levels of policing for their jurisdictions. Once those target levels of policing are established, however, the processes of hiring, training, and retaining officers affect both the speed with which agencies can reach these target staffing levels and their ability to maintain them. Hiring and retention issues are the subjects of chapters Four and Five, which constitute Part II of the report. Using the H&R survey data, Chapter Four provides descriptive analyses of various aspects of police hiring and retention patterns, including the length of time it takes agencies to hire and train new officers and the length of time that officers serve with their agencies. Finally, employing both the H&R survey data and analysis of national police employment data, Chapter Five examines retention rates for police positions funded through the COPS program and compares these retention rates to historical retention norms in police agencies.

1.2. SUMMARY OF FINDINGS

1.2.1. Determinants of Sworn Force Strength

Scholars have used three theoretical frameworks to explain variation in police strength. Rational public choice theory links variation in police strength to variables such as crime and population, which reflect demand for police services. Conflict theory holds that governments increase their police forces in response to growth in populations that dominant groups deem to be threatening. Threatening populations may be defined in racial terms (e.g., non-white groups) or in economic terms (e.g., the poor and unemployed). Finally, organizational theory stresses internal organizational factors that influence the size of police agencies. Empirically, scholars typically approximate these factors by using yesterday's police strength to predict today's police strength.

However, the factors influencing police strength are not well understood. Chapter Two reviews 55 empirical studies on the determinants of police strength, revealing that with the exception of the prior (i.e., lagged) size of the police force, none of the factors commonly studied have been shown to influence police levels on a consistent basis. Consider, for example, the impact of violent crime on police strength. Though one would expect that increases in violent crime lead to police growth, only 48% of the studies examining the impact of violent crime on police found the expected positive association. Forty-five percent of the studies found no statistically meaningful effect of violent crime on police, and seven percent found a significant inverse relationship between these variables (suggesting that increases in violent crime lead to reductions in police strength). The mixed findings of prior research are largely attributable to a number of methodological points, such as variation in the definition of police strength across studies (some studies measure police strength in terms of personnel while others measure it in terms of expenditures), variation in the unit of analysis across studies (e.g., cities, states, etc.), poor and/or inconsistent model specification, and complexities involved in disentangling the mutual effects which variables like crime and police levels have upon each other.

Chapter Two concludes with recommendations for improving research in this area. Among these is the call for more research on the interpretations and assessments of actors who make decisions about police strength. Indeed, prior studies have generally treated the decision-making process as a black box, using aggregate-level correlations between police strength and other factors to make indirect inferences about the process. Chapter Three takes a modest step towards rectifying this by using the H&R survey data to examine police officials' perceptions about factors that caused changes in the size of their agencies from 1996 through 1999. An advantage to studying the determinants of police strength in this way is that it taps into the perceptions of people who have insight into the actual process by which staffing levels are set.

Overall, the study period was characterized by police growth. Slightly over half of police agencies grew during this period, while only 11% of large agencies (defined as those serving jurisdictions of 50,000 or more persons) and 22% of small agencies (defined as those serving jurisdictions with fewer than 50,000 persons) decreased in size. Respondents' perceptions supported some of the leading theories about influences on police staffing: among both large and small agencies, changes in crime, calls for service, and population had important influences on growing agencies, while changes in government revenue and fiscal constraints (including generally declining economic conditions) had notable impacts on shrinking agencies.

As the preceding statement suggests, however, some of the factors associated with changes in police staffing may have differential effects on growth and decline in police agencies. If true, this may help to explain some of the conflicting findings of past research. Most notably, police perceptions suggest that crime fuels growth in staffing but that it has little or no influence on reductions in staffing. Rather than causing cutbacks in police, perhaps the potential impact of declining crime rates on police staffing is mitigated by organizational inertia and the political difficulties of reducing police forces. This implies that rising crime rates have more impact on police agencies than do declining crime rates. Consequently, the results of any given study of crime and police staffing could be highly contingent on crime trends during the study period and assumptions about the functional form of the relationship between the variables.

Two additional factors that had strong influences on recent trends in police staffing were grant money and the availability of qualified recruits. Police in both growing and shrinking agencies rated the availability of grant money as the first or second most important factor affecting changes in the size of their agencies (for shrinking agencies, the findings suggest that the availability of grant money prevented the agencies from declining further and/or that the absence of grant money facilitated reductions in force). The importance of grant money to both growing and declining agencies suggests that the federal COPS program has perhaps been the single most important factor both facilitating growth and slowing reductions in police strength during the latter 1990s, though we should temper this conclusion by noting that the study did not distinguish between the effects of COPS hiring grants and other federal or state hiring grants available during the study period. The availability of qualified recruits, or the lack thereof, was an important factor cited by respondents in agencies with declining staff, a finding echoed elsewhere in the report. This finding would seem to be linked to the strong economy of recent years; ironically, strong economic times may boost funds available for policing but make it more difficult for police organizations to attract and retain recruits.

1.2.2. Hiring, Training, and Retention of Officers

As noted above, police staffing levels are also affected by the success of agencies in hiring, training, and retaining officers. The H&R survey provided a descriptive snapshot of hiring and retention patterns in police organizations as of the summer of 2000.

The process of screening and training new officers takes an average of 31 weeks in small agencies and 43 weeks in large agencies. Ninety-two of every one hundred new hires in small agencies and eighty-nine of every one-hundred new hires in large agencies complete all training successfully. Nearly 60% of agencies reported that their training time had increased in recent years

(only 4% reported a decrease in the length of training). Among agencies reporting an increase in training time, about a third reported that new training requirements associated with community policing had contributed to the increase.

Over half of small agencies and two-thirds of large agencies reported that a lack of qualified applicants caused them at least some difficulty in filling vacancies during 1999. Indeed, this problem caused much difficulty for a quarter of small agencies and nearly a third of large agencies. While we do not have historical data to show whether this problem has become worse over time, the findings lend credence to anecdotal accounts suggesting that the supply of good police recruits is down throughout the nation.

Although overall attrition rates in police agencies did not seem unusually high during 1999 (the rates were 5% for large agencies and 7% for small agencies), there were some indications that unanticipated vacancies may have exacerbated recruitment difficulties. Unanticipated vacancies caused at least some degree of difficulty in maintaining staffing levels for 56% of large agencies and 44% of small agencies. Retirements by baby boom officers are a likely contributor to this pattern, but substantial numbers of departing officers are leaving their agencies after only a few years of service. An estimated two-thirds of officers who left small agencies and a third of those who left large agencies during 1999 had served for 5 or fewer years. As with the recruitment findings, however, we lack the historical data to say whether or not this pattern represents a new development. Further, these officers did not all leave the policing profession; overall, an estimated 45% of officers who left small agencies and 24% of those who left large agencies continued in other law enforcement work.

Nevertheless, the findings on officer recruitment and retention could be a warning flag for law enforcement. It is likely that the strong economy of recent years has aggravated recruitment and retention problems by luring some potential and new recruits away from law enforcement and into better paying jobs in the private sector. Current criticism of police over matters such as racial profiling and excessive use of force could be discouraging some from the profession as well. Further, the recent hiring binge in law enforcement, fueled by the COPS program, may have significantly drained the pool of potential applicants, thereby increasing competition between agencies for good officers. These problems could become worse as larger numbers of baby boom officers enter their retirement years. This raises the danger that some agencies may feel pressure to lower their standards in order to fill positions, a move which has had demonstrably negative consequences in some places. Hence, strengthening methods for recruiting and retaining qualified officers could be emerging as one of the major contemporary challenges facing law enforcement administrators.

Another implication of the findings is that efforts by the COPS Office and other agencies to increase police staffing through grants for hiring new officers may be approaching a saturation point, at least for the present. Hence, COPS grants that attempt to put more officers in the field through efficiency gains from newly funded civilians and technology, rather than through funding new sworn officers, could begin to assume a more prominent role in OCOPS' funding efforts. Of course, it remains to be seen whether the nation's changing economic conditions will alter the patterns of hiring and retention observed in this study.

1.3. RETENTION OF COPS-FUNDED POSITIONS AND HISTORICAL PATTERNS OF STAFF RETENTION

Chapter Five deviates somewhat from the earlier chapters by examining an issue of direct relevance to the performance of the federal COPS program – post-grant retention of COPS-funded positions. As noted above, the COPS program represents the federal government's recent effort to add 100,000 additional police to the nation's communities. Grants to state and local agencies for hiring new officers represent the largest part of this effort. When the COPS Office reached the milestone of funding 100,000 officers in May 1999, about 61,000 of these officers had been funded through COPS hiring grants.

A key factor that will shape the long-term legacy of the COPS program is the extent to which COPS grantees retain COPS-funded *positions* (irrespective of the individual officers filling those positions) after fulfilling COPS programmatic requirements mandating that grantees keep these positions for one full budget cycle following the expiration of the three-year grants. In other words, how much of the police expansion funded by COPS will prove to be only temporary?

To investigate this issue, we examined retention experiences and projections among a subsample of agencies in the H&R survey sample. The selected agencies, all 1995 COPS hiring grantees, were among the earliest COPS hiring grantees and, therefore, represent grantees most likely to have positions that are, or are close to being, programmatically expired (i.e., positions which have been expired for more than one full budget cycle). Note, however, that even among this group of early grantees, less than half had programmatically expired COPS positions. Based on the timing of the survey, moreover, the positions that were programmatically expired had been so for only 1 or, at most, 2 years. Therefore, the reported retention rates reflect only short-term experience.

Nearly three-quarters of COPS grantees having expired positions reported having kept all of their positions without using cuts or attrition of other positions, at least in the short term. (Note that the retention figures reported here refer to the percentage of agencies retaining positions rather than the specific number of positions that the agencies are retaining; the latter issue will be the subject of a forthcoming report.) Virtually all grantees reported having kept either all or none of the COPS positions.

When asked about expected retention of non-expired COPS positions, about two-thirds of grantees anticipated keeping all of the positions, but 74% of small agencies and 80% of large agencies expected to keep at least some of the positions. However, a small group of agencies, particularly in small jurisdictions, may retain their COPS positions for only a few years. Whereas 74% of small agencies expected to keep at least some COPS positions after expiration, only about 68% expected to retain the positions for as long as five years.

Overall, therefore, it appears that retention rates among COPS grantees will be far from perfect. On the other hand, a substantial majority of COPS grantees will keep some or all of their COPS-funded positions. Most agencies expecting to retain COPS positions anticipate retaining them all, and most expect to keep them for the long term.

Should we view these retention rates as evidence of success or failure? One way that we might begin to address this question is to put COPS retention rates into an appropriate context. To this end, project staff analyzed twenty years of national data (1975-1994) on police employment to determine how long agencies typically retained new positions following significant staffing increases (defined as an increase of 20% or more in small agencies and 5% or more in large agencies) in the years prior to the COPS program. The historical analysis revealed that it is not uncommon for agencies to fail to retain new positions, particularly in the long term (i.e., 5 or more years). Following a period of staffing growth, small agencies tended to retain at least some of the new positions on a short term basis (i.e., 1-2 years) in 72% to 81% of cases while retaining new positions for as long as five years in only 59% of cases. For large agencies, the short-term retention rates (for keeping at least some of the positions) were 87% to 92%, and the 5-year rate was 79%. These numbers are quite comparable to the observed and expected retention rates reported by COPS grantees for expired and non-expired positions.

Overall, it seems that putting an additional 100,000 officers on the street on a permanent, or at least indefinite, basis will require the federal government to fund more than 100,000 officers, perhaps substantially more. OCOPS has continued to fund new officers since May of 1999, so the goal of putting 100,000 officers on the street may still be met. Some might consider the need to fund more than 100,000 officers to be evidence of program failure. On the other hand, the data available at this point provide tentative indications that retention rates for COPS funded positions will be comparable to historical norms. Therefore, it seems that money spent raising police staffing levels through COPS hiring grants will produce a return on investment very comparable to the typical return on investments to increase police staffing.

CHAPTER 2.

Research Evidence on the Factors Influencing Police Strength in the United States

Edward R. Maguire

2.1. INTRODUCTION

Over the past 30 years, there have been more than fifty empirical studies on the "causes" of police strength. These studies have used a variety of theories, data sources, and statistical methods to explain variation in police strength over time and across jurisdictions. Some of the studies are methodical, careful and precise, while many use faulty methods and bad data. Although there has been some progress made in the statistical methods used, overall there has not been much effort devoted to the incremental development of a scientific body of knowledge. Researchers routinely ignore the cautions and findings of previous research. As a result, it is difficult to synthesize the results of this large body of research into a succinct summary of the causes and correlates of police strength. Nevertheless, by carefully sorting through the research, it may be possible to distill a set of robust findings. That is the aim of this chapter.

In section 2.1, I introduce the major pieces in the police strength puzzle. I begin by discussing the term police strength and how it has been operationalized by researchers. Next, I discuss theories that have been used to frame analyses of police strength. Unlike some areas of police scholarship, studies of police strength tend to be well rooted in one of at least three strong theoretical traditions, each with a growing mass of research evidence (Nalla, 1992). Finally, we conclude this section with a brief discussion of the methods used in this line of research. Researchers have clearly established the simultaneity between police strength and crime, and special methods are needed to disentangle this complex relationship. To truly understand this long line of research, it is necessary to understand these three components: the meaning and measurement of police strength, theories used to explain variations in police strength, and the methods used to test these theories.

2.1.1. What is Police Strength?

Police strength is an imprecise term. Researchers have operationalized it in a number of ways, the three most common being the number of sworn police officers, the number of police employees, and the amount of police expenditures. Researchers using police expenditures justify it on the basis that policing is a personnel intensive industry, and there is an almost perfect correlation between the number of police personnel that a jurisdiction employs and the amount it spends on police protection (later in this report we will examine the validity of this argument). A handful of researchers have also discussed the difference between absolute and relative police strength (Chamlin and Langworthy, 1996; Slovak, 1986). Absolute strength is the raw number of officers or employees or amount of expenditures in a jurisdiction, while relative strength expresses these variables as a ratio (usually per capita or per unit area). Thus, if we multiply the three potential measures of police strength by the two

ways they can be expressed - as a ratio or a raw number - there are roughly six dependent variables in this line of research. In addition, other researchers have pointed out that explaining variations in police strength across jurisdictions is very different than explaining *changes* in police strength (growth and decline) within a jurisdiction (or sample of jurisdictions) over time. Several researchers have recently suggested that one reason for disparate research findings is that these three choices about how to measure police strength–to use employees, officers or expenditures, to use rates or raw numbers, and to use differences or levels - matter greatly (Chamlin and Langworthy, 1996; Marvell and Moody, 1996; Nalla, Lynch and Leiber, 1997; Slovak, 1986; Snipes, 1993).

2.1.2. Theories Explaining Variation in Police Strength

One area in which this body of research is more developed than other lines of research on police organizations is the use of theory (Eck and Maguire 2000). Studies of police strength are typically based (at least implicitly) on one or more of the following three theoretical foundations: (1) rational public choice (or consensus) theory, (2) conflict theory, and/or (3) some form of organizational theory (Nalla, Lynch, and Leiber, 1997).

Rational public choice (also known as consensus or economic) theory implies that police organizations grow in response to citizens' consensual requests for increased public service and protection, often in the face of rising crime rates. This theory implies that local governments and police administrators dole out resources systematically. For decades, communities have relied on various methods for determining the appropriate amount of police resources in given times and places. These methods range from informal rules of thumb, such as the need to have at least two officers per thousand residents, to more complex mathematical models implemented in computer software packages (Bayley, 1994; Chaiken, 1975; Larson, 1978; O'Boyle, 1990; Stenzel, 1993). The kinds of variables that have typically been included in these formal and informal systems are the usual suspects: crime rates, population, calls-for-service, and other correlates of police workload. These various methods reflect an implicit theory of administrative rationality, suggesting that police strength is a function of a few simple workload variables. Research evidence on the strength of this theory is thoroughly mixed. Most rigorous tests of this theory have concluded that it alone is incapable of explaining variations in police strength (Chamlin and Langworthy, 1996). As Loftin and McDowall (1982:400) conclude, rational choice or economic models are "too simple to account for the relationship between crime and police strength." They suggest that models of police strength need to account for other factors in the social and political environment of police organizations.

If police strength is not based on a rational adjustment to variations in crime rates, then what other factors are important? Conflict theory posits that racial and economic inequality lead the powerful members (elites) in a community to exert political influence over social control institutions. Such conflict processes would lead to increases in social control over the powerless. Tests of conflict theory have concentrated on racial and/or economic sources of conflict. These tests are usually done by examining whether variations or changes in the size of "threatening" populations produce differences in police force strength. Research on social threat or conflict theory is also overwhelmingly mixed, although there is evidence to support both racial conflict (e.g., Jackson and Carroll, 1981; Liska et al., 1981; Snipes, 1993) and economic or class conflict explanations (e.g., Jacobs, 1978, 1979).

Finally, organizational theories examine the effect of processes within police organizations in producing increases or decreases in police strength. This class of theories is the least developed of the three discussed in this report. Typically, the only explanation offered in this line of research is organizational inertia: that changes in police strength are incremental and that the best predictor of police strength in a given year is its value in the prior year (known as a "lag"). Thus, unlike other perspectives, organizational explanations assume that changes in police strength are based on conditions internal to the organization. According to Nalla and his colleagues (1997:120):

this theoretical perspective assumes that organizational strength, as measured by annual budgets, is explained by incremental specification models whereby the present year's budget is influenced by appropriations in the previous year.

Numerous studies have found evidence to support the organizational inertia explanation (Nalla, 1992; Nalla, et al., 1997). This explanation has at least two shortcomings: (1) it is banal in the sense that the lag value of any variable in a time series is nearly always the best predictor of the current value, and (2) it is useful for understanding stability in police strength, but it is not useful for understanding growth and decline over time.[1] Overall, the organizational explanations in this literature tend not to be well-specified, treating police organizations as a "black box." Further developing this class of explanations will require researchers to open up the box and look inside.

In all, the studies drawn from these three theoretical perspectives have examined the effects of many different variables on police strength. In section 2.2, we examine the universe of variables thought to explain variations in police strength, assessing the weight of research evidence for each.

2.1.3. Methods

The methods used in examining the determinants of police strength continue to grow more sophisticated, with recent refinements suggesting some excellent reasons for the mixed findings obtained in the past (Brandl, Chamlin, and Frank, 1995; Snipes, 1993). The relationship between police strength and crime rates is known as a "simultaneous" or "reciprocal" causal relationship because each one is known to cause the other. A variety of specialized methods have been devised by researchers to disentangle simultaneous causal effects. Since economists have a classic chicken-and-egg problem of their own - supply and demand - they have developed many of the statistical methods for dealing with simultaneity. While some of the early studies relied on improperly specified cross-sectional models that ignored the simultaneity issue, most of the studies done over the past two decades have relied on increasingly sophisticated cross-sectional and longitudinal models (Fox, 1981). For this and other reasons, economists have done the bulk of the research on police strength. The findings from this research are not widely known for at least two reasons: (1) many of the articles appear in economic journals, and (2) the methods used are probably difficult for criminologists and policy makers to understand without advanced training in econometrics. Because these methods are crucial to the interpretation of research on police strength, we discuss them throughout this chapter.

2.2. THE EVOLUTION OF RESEARCH ON POLICE STRENGTH

Research on the causal forces that shape police strength was initiated in the 1950s by economists. Their interest in the police was generally indirect; only one part of a broader focus on public expenditures, economies of scale, and other economic issues. The earliest economic research on this topic examined policing as just one of a host of municipal expenditures, including fire, roads and highways, recreation, sanitation, education, and public welfare (Brazer, 1959; Hirsch, 1959). Brazer's National Bureau of Economic Research working paper, *City Expenditures in the United States*, seems to be the earliest study cited in this area of research. Hirsch (1959) examined several causal explanations for expenditure patterns in St. Louis area police departments. However, because his focus was on whether city growth or consolidation produces economies of scale, he only reports findings for the effect of population variables. Dye's (1969) study examined the effect of income inequality on a number of public policy outcomes, including police expenditures, but does not report all of his findings. A handful of other studies appeared throughout the 1960s, but these generally

[1] As Chamlin and Langworthy (1996:181) conclude, "once one controls for prior levels of police force size, there is little variance to be explained by any theoretically derived predictors."

reported bivariate correlations between measures of police strength and crime using cross-sectional data. Some of these early studies drew incorrect inferences from such correlations, concluding that either police or crime had a causal effect on the other. As numerous researchers have pointed out, however, it is not possible to disentangle the simultaneous causal relationship between police strength and crime rates using correlations computed from cross-sectional data. Therefore these studies are not reviewed here.

With this foundation established, the study of police strength began in earnest in the early 1970s. Table 2.1 reviews 55 studies that have sought to explain variation in police strength over time or place using statistical methods. To be included in this table, a study had to meet several criteria: (1) the dependent variable is a measure of police strength, (2) there is at least one independent variable, (3) the effect of the independent variables is assessed using inferential statistics other than simple bivariate correlations computed from cross-sectional data, and (4) enough information is reported to determine the strength or significance of the effects of the independent variables. Within these 55 studies are 75 separate sets of analyses. I present multiple sets of analyses separately only if they rely on either different samples, different dependent variables, or very different methodologies.

2.2.2. Methodological Issues

Because methodological issues are so important to understanding this line of research, I discuss some of these issues prior to moving on to the substantive findings. Reviewing some of the research design issues appearing in table 2.1 is a good place to start. The studies are presented in chronological order so that it easier to detect trends in the evolution of research. We begin with the general research designs used to examine the causes of police strength. Of the 75 separate sets of analyses, 32 (43%) used cross-sectional designs, basing their analyses on data from a sample of jurisdictions at one point in time. Ten of the analyses (13%) used two or three-wave panel designs based on data from a sample of jurisdictions at two or three different points in time. Five (7%) used pooled time-series cross-sectional designs based on data from a sample of jurisdictions at multiple points in time. The study with the shortest number of time points in these analyses contained data from 10 years. Finally, 28 of the analyses (37%) used time-series designs based on data from a single jurisdiction at multiple points in time. A quick glance at table 2.1 shows how this research has evolved from mostly cross-sectional designs to one of the three other types of longitudinal designs. If we split this nearly three decades of research in half, we find that prior to 1985, 45% of the studies used longitudinal designs, compared with 83% since 1985.

The defining methodological issue in research on the causes of police strength is simultaneity. As mentioned earlier, there are good reasons to suspect that police (P) and crime (C) have a simultaneous causal effect on the other. Disentangling this simultaneity represents an enormous challenge for two bodies of research: the causes of police strength, as discussed in this report (the effect of C on P), and some of the research on general deterrence (the effect of P on C). For two decades, Fisher and Nagin (1978; Nagin, 1978, 1998) have pointed out that one of the most serious problems in previous research on the deterrent effects of criminal sanctions was inadequate model identification. Model identification is a technical matter beyond the scope of this report, but the following example illustrates the general concept. Suppose we were to collect data from 100 cities on the crime rate (C) and the number of police (P). Given the results of previous research, we would most likely find that these two variables are highly (and positively) correlated. The problem of course, when using cross-sectional data, is that we would not know whether the correlation was due to the effect of P on C, C on P, the influence of a third variable on both P and C, or the simultaneous effect of each one on the other. Thus, given only these two variables, we would not be able to estimate the effect of C on P because there is insufficient information in the model to produce unique estimates.

Table 2.1. Empirical studies seeking to explain variation in police strength

Authors	Design[a]	Time[b]	Location	Simultaneity[c]	Dependent Variable(s)[d]	Independent variables[e]
Bordua & Haurek (1970)	TS	1902-1960	United States (National)	NA	Police Expenditures	Inflation (+), Population Growth (+), Motor Vehicle Registrations (+), Urbanization (+)
Morris & Tweeten (1971)	Panel	1967 & 1968	754 U.S. Cities	Lag	Police Employees	Lag Police Employees (+), Crime (+), % Nonwhite (0), Median Age (0), Median Income (0), Density (-), % Male (0), Region (0/3), City Size (0/8)
Weicher (1971)	CS	1959	38 Chicago Police Districts	NA	Police Officers	Population (- 3/3), Retail Sales (+ 3/3), Absolute Median Family Income (- 3/3), Relative Median Family Income (+ 1/2), Interquartile Range of Income (+)
Walzer (1972)	CS	1958 & 1960	31 Illinois Cities	NA	Police Expenditures	Scale of Operations (- 2/2), Scale of Operations^2 (+ 1/2), Density (+ 2/2), Police per Capita (+ 2/2), Arrest (+ 1/2), Recruit Wages (0/2), Area (+ 2/2)
Carr-Hill and Stern (1973)	CS	(a) 1961	64 British Police Districts	2SLS	Police Officers	Clearance Rate (0), % Middle Class (-), % Violent Offenses (0)
		(b) 1966	66 & 110 British Police Districts	2SLS	Police Officers	Clearance Rate (+ 1/2), % Middle Class (- 2/2), % Violent Offenses (- 2/2), % Urbanized (+), Density (0)
Greenwood & Wadycki (1973)	CS	1960 & 1962	199 SMSAs	3SLS	(a) Police Expenditures	Property Crime (+), Violent Crime (+), Median Family Income (+), Property Taxes (+)
					(b) Police Employees	Police Expenditures (+)
Jones (1974)[g]	TSCS	1950-1968	155 U.S. Cities	Lag	Police Expenditures	Murder (+ 6/6), Violent Crime (+ 6/6), Total Crime (+ 6/6)
McPheters & Stronge (1974)	CS	1970	43 U.S. Cities	2SLS	Police Expenditures	Crime (+), Municipal Budget (+)
Swimmer (1974a)	CS	1960	118 U.S. Cities	2SLS	Police Expenditures	Violent Crime (0), Property Crime (+), Median Income (+), Population (+), Population2(-), Region (-), Property Tax Revenue (+), Area (-)
Swimmer (1974b)	CS	1960	119 U.S. Cities	2SLS	Police Expenditures	Violent Crime (0), Median Income (0), Population (+), Population2(-), Property Crime (+), Region (0), Property Tax Revenue (+), Area (-)
Phillips & Votey (1975)	CS	1966	50 California Counties	None	Police Employees	Median Income (0/2), Ratio Nonviolent/Violent Crime (0/2), Total Crime (+1/2), Police Wages (0/2)

Authors	Design[a]	Time[b]	Location	Simultaneity[c]	Dependent Variable(s)[d]	Independent variables[e]
Chapman (1976)	TSCS	1960-1970	147 CA Cities	2SLS	Police Officers	Patrolmen Wages (-), Property Crimes (+), Violent Crimes (0), Property Values (+), % Blue Collar (-), Public Transportation Use (0)
Dye (1976)	CS	N/A	245 U.S. Cities	None	Police Manpower	Population (+), Income (0), Race (+), Homeowning (-), Crime (+), Revenue (+)
Land & Felson (1976)	TS	1947-1972	U.S. National	Lag	Police Expenditures	Property Crime (+1/2), Violent Crime (0), Consumer Price Index (+2/2), GNP (0)
Mathieson & Passell (1976)	CS	1971	NYPD Precincts (N not Reported)	2SLS	Police Officers	Robbery (+), Homicide (+), Population (+ 2/2), Street Miles (+ 1/2), Business District (+ 1/2), Presence of Parks/Airports (0/2), Manhattan (+ 2/2)
Carr-Hill and Stern (1977)	CS	1971	41 British Police Districts	None	Police Officers	Crime (+2/2), Clearance (+1/2), % Middle Class (0/2), % Violent Offenses (+2/2), % Urban (0/2)
Victor (1977)	Panel	1960 & 1962	130 U.S. Cities	Lag	Police Expenditures	Violent Crime (+)
Bahl, Gustely & Wasylenko (1978)	CS	1972	79 U.S. Cities	2SLS	Police Employees	Police Compensation (+), Price of Private Goods (0), Income (+), Grants in Aid (+), Crime (+), Population (+), Median Education Level (-), % Nonwhite (+)
Fox (1978)	TS	1950-1974	United States	(a) Lag	Police Expenditures	Total Crime (+)
				(b) 2SLS	Police Employees	Police Expenditures (+)
Wilson & Boland (1978)	CS	1975	35 Cities	(1) N/A	Patrol Units	Police Officers (+), % Two-officer Cars (-), Housing Density (0), Population (-)
				(2) 2SLS	Police Officers	Property Crime (0), Personal Crime (+), Tax Base (+), Officers' Salary (0), Region (0)
Wolpin (1978)	TS	1894-1967	England & Wales (National)	Lag	Police Officers	Property Crimes (0), Personal Crimes (+), Lag Police Officers (0), Local Expenditures (-), Motor Vehicles (0)
Cloninger & Sartorius (1979)	TS	1960-1975	Houston	Lag	Police Officers	Auto Thefts (+), Area (-), Bank Debits (+), Growth (0), Density (0)
					Police Expenditures	Auto Thefts (+), Area (0), Bank Debits (+), Growth (-), Density (0)
Hakim, Ouadia, Sage & Weinblatt (1979)	CS	1970	94 New Jersey Suburbs	2SLS	Police Expenditures	Property Crime (+), Total Crime (+), Population (-2/2)

Authors	Design[a]	Time[b]	Location	Simultaneity[c]	Dependent Variable(s)[d]	Independent variables[e]
Jacobs (1979)	CS	(a) 1960	96 SMSAs	None	Police and Corrections Employees	Economic Inequality (+ 5/8), Resource Level (0/8), % Black (0/8), % Unemployed (0/8), Drug & Liquor Stores (+ 8/8), South (0/8), Crime (0/4), Log Population (0/4)
		(b) 1970	121 SMSAs	None	Police and Corrections Employees	Economic Inequality (+ 8/8), Resource Level (0/8), % Black (+ 7/8), % Unemployed (1/8), Drug & Liquor Stores (+ 8/8), Riots (0/8), South (0/8), Crime (4/4), Log Population (+ 2/4)
Mehay (1979)	CS	1968-1969	71 Los Angeles Area Cities	Lag	(a) Patrol Officers	Property Valuation (+), Injury Traffic Accidents (0), Violent Crime (+), Density (0), Contract Agency (-)
					(b) Police Expenditures	Property Valuation (+), Injury Traffic Accidents (0), Violent Crime (+), Density (0), Contract Agency (-)
Fujii & Mak (1980)	CS	1975	25 Hawaii Districts	2SLS	Police Employees per Acre	Crime (0), Median Income (0), Density (+), Hotel Rooms per Acre (+), Hotel Rooms per Acre^2 (-)
Hakim (1980)	CS	1970	66 New Jersey Suburbs	NA	Police Expenditures	Wealth (+6/6), Density (+4/4), Violent Crime (+2/4), Property Crime (-1/6, +1/6), % Single or Dual Family Dwellings (+2/4)
Huff & Stahura (1980)	CS	1970-1972	252 U.S. Suburbs	2SLS	Police Employees	% Low income (+2/2), % Black (+2/2), Violent crime (+), Property crime (0)
Furlong & Mehay (1981)	CS	1973	38 Montreal Police Districts	2SLS	Police Officers	Major Crimes (0), Median Home Value (0), Retail Sales (0), Income (0), Density (-), Calls for Service (+)
Jackson & Carroll (1981)	CS	1970	90 U.S. Cities	2SLS	Police Expenditures	Population (0), Density (0), % Black (0), % Black^2 (0), % Black^3 (0), Poverty (0), Black/White Income (0), Protest (+), Riot (+), Region (+), Household Activity Ratio (+)
Liska, Lawrence & Benson (1981)	(a) CS	1952, 1957, 1962, 1967 & 1972	109 U.S. Cities	None	Police Employees	Population (+ 7/10), Segregation (- 3/10), % Nonwhite (+ 5/10), Property Crimes (+ 4/10), Personal Crimes (0/10)
	(b)Panel	1957, 1962, 1967 & 1972	109 U.S. Cities	Lag	Police Employees	Population (+ 2/8), Segregation (+ 1/4, - 1/4), % Nonwhite (+ 3/8), Property Crimes (+ 2/8), Personal Crimes (0/8), Lag Police Size (+ 8/8)
Greenberg & Kessler (1982)	Panel	1960 & 1962	130 U.S. Cities	Lag	Police Expenditures	Lag Police Expenditures (+4/4), Lag Violent Crime (-1/3), Violent Crime (+1/3)
Lizotte, Mercy & Monkkonen (1982)	TS	1947-1970	Chicago	Lag	(a) Police Expenditures	Property Crime (+), Business Failures (-), Traffic Citations (+), % under 21 (-), Lag Police Expenditures (+), Taxes (+)
					(b) Police Officers	% Black (+), % Professional (-), Average firm size (+), Business failures (+), Police Expenditures (+)

Authors	Design[a]	Time[b]	Location	Simultaneity[c]	Dependent Variable(s)[d]	Independent variables[e]
Loftin & McDowall (1982)	TS	1926-1977	Detroit	Granger	Police Employees	Total Crime (0), Violent Crime (0), Property Crime (0)
Greenberg, Kessler & Loftin (1983)	Panel	1960 & 1970	(a) 252 U.S. Suburbs	Lag	Police Employees	Violent Crime (+ 2/2), Property Crime (0/2), Lag Police Employees (+ 2/2), Density (- 2/2), Population (+ 1/2), % Black (0/2), % Low Income (- 2/2), % Age 15-30 (+ 2/2)
			(b) 269 U.S. Cities	Lag	Police Employees	Violent Crime (+ 2/2), Property Crime (- 2/2), Lag Police Employees (+ 2/2), Mean Income (+ 1/2), Inequality (0/2), % Nonwhite (+ 2/2)
Hakim, Spiegal & Weinblatt (1984)	CS	1970	401 New Jersey Cities	2SLS	Police Expenditures	Violent Crimes (+), Municipal Expenditures (+), Auto Thefts (0), Robberies (+), Burglaries (+), Larcenies (+)
Surette (1984)	TS	1873-1969	Chicago	NA	Police Employees	Value Added by Manufacturers (0/2), Wage Workers (0/2), Manufacturers (0/2)
Bayley (1985)[h]	TS	1946-1976	Multiple Cities, Multiple Nations	Lag	Police Employees	Total Crime (2/38), Murder (3/40), Robbery (8/38), Rape (7/32), Riots (4/12)
Greenberg, Kessler & Loftin (1985)	Panel	(a) 1950-1960	259 cities	Lag	Police Employees	Lag Police Employees (+2/2), Violent Crime (-1/2), Property Crime (0/2), Population (+1/2), City Revenue (+1/2), Mean Income (0/2), Inequality (0/2), % Nonwhite (+2/2), % Nonwhite^2 (-2/2)
		(b) 1960-1970	260 cities	Lag	Police Employees	Lag Police Employees (+2/2), Violent Crime (+1/2), Property Crime (0/2), Population (+1/2), City Revenue (+1/2), Mean Income (0/2), Inequality (0/2), % Nonwhite (+2/2), % Nonwhite^2 (-1/2)
		(c) 1970-1980	252 cities	Lag	Police Employees	Lag Police Employees (+2/2), Violent Crime (0/2), Property Crime (0/2), Population (0/2), City Revenue (0/2), Mean Income (0/2), Inequality (0/2), % Nonwhite (0/2), % Nonwhite^2 (0/2)
McDowall & Loftin (1986)	TS	1928-1976	Detroit	Lag	Uniformed Police Officers	Lag Police Employees (+), Crime (0), Registered Vehicles (+), Revenue (+), Government Aid (0), % Nonwhite (0), Workers on strike (0), 1967 Riot (+)
Corman, Joyce & Lovitch (1987)	TS	1970-1984 (monthly)	New York City	Granger	Police Officers	% Young Males (0), Unemployment (0), Police Officers (+), Arrests (0), Crime (0)
Craig (1987)	CS	1972	79 Baltimore Police Beats	3SLS	Police Officers	% Residents Owing Homes (0/2), % over 65 Years Old (-1/2), Mean Income (-2/2), % Whites (-1/2), Reported Crime (-2/2)

Authors	Design[a]	Time[b]	Location	Simultaneity[c]	Dependent Variable(s)[d]	Independent variables[e]
Corman & Joyce (1990)	TS	1970-1986 (monthly)	New York City	Granger	Police Officer	Lag Police Officers (+4/4), Home Relief (+2/4), Unemployment (0/4), Robbery (0), Robbery Arrests (0), Assault (+), Assault Arrests (+), Rape (+), Rape Assaults (+), Murder (0), Murder Arrests (0)
Chamlin (1990)	TS	1904-1958	Chicago	N/A	Police Expenditures	Lag Police Expenditures (0/2), City Revenues (-2/2), % Black (+2/2), Unemployment (0/2), Arrest (0/2), Thompson Administration (-2/2)
Jackson (1992)	Panel	1970 & 1980	563 U.S. Cities	None	Police Expenditures	City Revenues (+), Index Crime (+), % Poor (-), Population (0), Density (+), % Unemployed (+), Black/White Income (0), % Black (+), % Hispanic (0), Wholesale/Retail Change (-), Residents Born in State (-)
	CS	1981	52 U.S. Cities	None	Police Expenditures (as a proportion of City Expenditures)	Perceived Gang Problem (+), Black/White Income (0), Index Crime (+), Density (0), % Black (+), % Hispanic (0), Population (0), City Revenues (-), % Poor (-)
Nalla (1992)	TS	1948-1984	U.S. National	Lag	Police Expenditures	Lag Police Expenditures (+), Income Inequality (-), Nonwhite arrests (0), % Nonwhite (0), Crime (+), Motor Vehicles (0)
Snipes (1993)	TS	1904-1957	Chicago	Lag	Police Expenditures	Lag Expenditures (0/3), City Revenues (+ 3/3), % Black (+ 3/4), % Italian (+ 1/2), Unemployment (0/3), Arrests (0/3), Mayor Thompson Era (- 3/3)
					Police Employees	Lag Size (+ 3/3), City Revenues (+ 1/3), % Black (+ 2/4), % Italian (- 1/2), Unemployment (0/3), Arrests (0/3), Mayor Thompson Era (0/3)
Niskanen (1994)	CS	1991	50 states & D.C.	2SLS	Police Employees	Avg Monthly Earnings (-), Avg Annual Income (+), Avg Annual Federal Aid (+), Violent Crime (+), Property Crime (0)
Sollars, Benson & Rasmussen (1994)	CS	1987	296 Florida Jurisdictions	Lag	Police Officers	Property Crime (+), Violent Crime (0), Property Value (+), Income (0), # of Local Agencies (-), Government Revenue (0), Drug Arrests (+)
Brandl, Chamlin & Frank (1995)	TS	1934-1987	Milwaukee	Lag	(a) Police Employees	Police Expenditures (0), Population (0), Registered Vehicles (0), Total Crime (0), % Black (+), Riot (0)
					(b) Patrol Officers	Police Expenditures (0), Population (0), Registered Vehicles (0), Total Crime (0), % Black (+), Riot (0)
					(c) Detectives	Police Expenditures (0), Population (0), Registered Vehicles (0), Total Crime (-), % Black (0), Riot (0), Union Initiative (0)
Chamlin & Langworthy (1996)	TS	1930-1987	Milwaukee	Granger	(a) Police Employees	Total Crime (0/2), Property Crime (0/2), Personal Crime (0/2)
					(b) Patrol Employees	Total Crime (0/2), Property Crime (0/2), Robberies (0/2)

Authors	Design[a]	Time[b]	Location	Simultaneity[c]	Dependent Variable(s)[d]	Independent variables[e]
					(c) Detective Employees	Total Crime (-1/2), Property Crime (-2/2), Robberies (-1/2)
Marvell & Moody (1996)	TSCS	(a) 1968-1993	49 States	Granger	Police Employees	Total Crime (+9/15), Homicide (+3/14), Rape (+1/14), Robbery (+9/14), Assault (0/14), Burglary (+9/14), Larceny (+5/13), Auto Theft (+13/14), Lag Police (+,-)
		(b) 1971-1992	56 U.S. Cities	Granger	Police Employees	Total Crime (+11/16), Homicide (+11/14), Rape (+5/14), Robbery (+8/14), Assault (0/14), Burglary (+10/14), Larceny (+3/14), Auto Theft (+11/14), Lag Police (+1/2)
Jacobs and Helms (1997)	TS	1952-1991	United States	Lag	Police Employees	Economic Inequality (+ 9/9), Economic Inequality^2 (- 9/9), Crime (+9/9), Crime^2 (- 9/9), Real GDP (+ 4/4), % Unemployed (0), Nonwhite/White Median Income (0), Republican Strength (+), Ford Presidency (+), % Nonwhite (0), Mean Family Income (+), Median Family Income (+ 4/4)
Levitt (1997)	TSCS	1970-1992	59 U.S. Cities	NA	Police Officers	Mayoral Election Year (+ 3/3), Gubernatorial Election Year (+ 3/3), Public Welfare Spending (0/2), Education Spending (+ 2/2), State Unemployment (0/2), % Age 15-24 in SMSA (0/2), % Black (0/2), % Female Headed Households (0/2)
Nalla, Lynch & Leiber (1997)	TS	1950-1988	Phoenix	Lag	(a) Police Officers	% Minority (-4/4), Violent Arrests (0/2), Property Arrests (0/2), Violent Crime (0/2), Property Crime (+2/2), Surplus Value (+4/4), Lag Police Officers (+8/8), Density (-4/8)
					(b) Police Expenditures	% Minority (-3/4), Violent Arrests (+2/2), Property Arrests (+2/2), Violent Crime (+2/2), Property Crime (+2/2), Surplus Value (+4/4), Lag Police Expenditures (+8/8), Density (-4/8)

Notes

(a) CS = cross sectional model, TS = time series model, Panel = 2 or 3 wave panel model, TSCS= pooled time series-cross sectional model.

(b) All longitudinal data are yearly unless otherwise noted.

(c) Procedures used for dealing with the simultaneity between police and crime: None = no attempt to deal with simultaneity, Lag = lagged measure of crime is included in the police strength equation, 2SLS/3SLS=two or three stage least squares regression, Granger = Granger causality test (Granger, 1968), NA = not applicable (for instance, if crime is not included in the equation).

(d) Unless otherwise indicated, all police strength measures are per capita except Mathieson and Passell (1976), Corman and Mocan (1996), and some estimates by Chamlin and Langworthy (1996). Walzer (1972:318) expresses the "average cost" of police services as police expenditures divided by a service index, which is the sum of offenses cleared, miles traveled by police vehicles, and accidents investigated. Though Cloninger and Sartorius (1979) express expenditure and officer measures in three ways (per capita, per square mile, and per capita mile), we report only the per capita findings.

(e) The following symbols are used to summarize the effect of each independent variable on police strength: positive relationship (+), negative relationship (-), non-significant relationship (0). Fractions are used when more than one model is estimated. Each fraction shows the number of significant coefficients over the total coefficient estimates. Lag specifications are only reported for lagged dependent variables.

(f) Carr-Hill and Stern present results from four samples: 1961 urban, 1966 urban, 1966 urban and rural, and a pooled 1961 and 1966 sample. So that their entry would not occupy an inordinate amount of space in the table, we present only two sets of results, including one for urban districts in 1961, and one combining the urban-only and urban-rural estimates from 1966. We ignore the pooled 1961 and 1966 findings.

(g) Statistical significance levels were not reported, so I computed them. All were statistically significant, though the authors interpret the small effects as evidence that crime has "next to nothing" to do with how much money cities spend on police protection (Jones, 1994: 523).

(h) Direction of effects not reported. This summary excludes a subset of Bayley's findings that are based on correlation coefficients computed on cross-sectional data or on time series data with no lag.

Numerous techniques have been developed to address the problem of simultaneity. One solution that has been frequently used in the studies listed in table 2.1 is to estimate the model in stages, adding an outside variable (known as an instrument) to the model that is a known cause of C, but has no causal effect on P.[2] By providing this additional information (known as an "identification restriction"), we provide sufficient information into the system of equations to disentangle estimates of the effects of P and C on one another. Several researchers have argued convincingly that prior research has paid too little attention to these identification restrictions, choosing instrumental variables that are based on unrealistic assumptions (Fisher and Nagin, 1978; Marvell and Moody, 1996; Nagin, 1978, 1998). Nagin (1978:118) showed that when the assumptions regarding identification restrictions are incorrect, the resulting analysis "can be completely misleading."[3] Unfortunately, many researchers have failed to heed this advice. As a result, the findings from many of the studies listed in table 2.1 are suspect. Recent research continues to fan the flames of the debate, with some studies paying careful attention to the selection of unique instruments (Levitt, 1997), and others ignoring all of the cautions raised over the past two decades and choosing unrealistic instruments (Niskanen, 1994).[4]

One increasingly popular way of dealing with the simultaneity issue is to use longitudinal data. This presents a whole new set of theoretical and methodological issues, but probably represents a much better solution than trying to work within the limitations of cross-sectional data. The most popular method of dealing with simultaneity in longitudinal research is simply to use the lag value of a variable. For example, if we are using data collected yearly, we could estimate the effect of crime rates in one year on police strength in the following year. In this case, we would be using a "lagged" value of crime rates. Since intuitively we would not expect police strength in, say, 1990 to affect crime rates in 1989, this is one popular method for eliminating the simultaneity issue. While this appears, on its surface, to be a reasonable strategy, it has some problems. Many of these studies do not place a great deal of thought into the choice of the appropriate lag period, and there is little theory to suggest how long it might take changes in crime to affect levels of police strength. All of the panel studies use lags of one year, as do most of the remaining longitudinal studies. Some of the time series studies use lags measured in months, though there is little reason to expect changes in police strength to adjust so quickly to changes in crime (Corman, et al., 1987; Corman and Joyce, 1990). In fact, Fox (1978) models police expenditures as a function of crime rates "with a lag structure that begins at two years, that contains geometrically declining coefficients, and that has a mean lag of 3.9 years" (also see McDowall and Loftin, 1986). Finally, as Marvell and Moody (1996) point out, lagging may not actually address simultaneity at all in the presence of autocorrelation, thus it is not a panacea.[5]

The simultaneity column in table 2.1 shows the method used in each study to deal with the simultaneity between police strength and crime. While there may be the potential for other variables in this table to be simultaneously related, this is the only one I address. Of the 75 separate sets of analyses in table 2.1, eight (listed as N/A) do not include measures of crime as independent variables, and therefore do not address the simultaneity between police and crime. An additional eight analyses (listed as None) include measures of crime but do not use any procedure to address simultaneity. Thus, overall, 16 of 75 sets of analyses (21%) ignore the simultaneity between police and crime. Twenty analyses

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[2] Many of the economic articles only estimate models of police strength among larger systems of equations with other endogenous variables of interest (see Carr-Hill and Stern, 1973). However, since police strength is included in the system of equations, these models often implicitly produce findings on the factors influencing police strength.

[3] When weak instruments are used that violate these assumptions, parameter estimates will be inconsistent and frequently biased.

[4] Much of the information presented in the last two paragraphs relies on my contributions to a recent chapter on the effects of police on crime (Eck and Maguire 2000).

[5] This is because current year police strength may have an effect on lagged values of crime through a common correlation with lagged police strength "which is not in the regression, and, thus, is in the error term" (Marvell and Moody, 1996:617).

(27%) use 2 or 3 staged least squares with instrumental variables to identify the model (listed as 2SLS or 3SLS). Many of the studies using this method have been criticized numerous times for using poor instruments, and there is good reason to doubt the findings from many of them (Fisher and Nagin, 1978; Marvell and Moody, 1996; Nagin, 1992). An additional 31 (41%) use single or distributed lag structures to deal with simultaneity. Finally eight sets of analyses (11%) use the Granger causality test to explore causal direction and determine the proper lag length. According to Marvell and Moody (1996), this is the best procedure for addressing the simultaneity between police and crime.

2.2.2. Summarizing the Results of Prior Studies

The dependent variables listed in table 2.1 vary widely. Police officers, police employees, and police expenditures are the most commonly used measures of police strength, accounting for the majority of studies. Other measures include uniformed officers, patrol officers, detectives, and patrol units. These measures are nearly always expressed as rates per unit population, though a handful of studies have used rates per unit area or raw levels. Moreover, though these different measures of police strength are consistently treated as interchangeable, recent research shows that the choice of a measure is an important specification decision that affects the findings greatly (Chamlin and Langworthy, 1986; Snipes, 1993).

The independent variables listed in table 2.1 also vary widely. While many are drawn from one or more of the theories discussed in section 2.1, others appear to have been selected as a matter of convenience rather than theory. A quick look at table 2.1 reveals how difficult it is to summarize the results of these studies easily. The tremendous number of research designs, data sources, methods for addressing simultaneity, measures of police strength, independent variables, and inconsistent findings make it nearly impossible to spot trends in the findings very easily.

Because the sheer volume of information in table 2.1 makes it difficult to weigh the evidence for the many explanations of police strength, table 2.2 lists the effects of each independent variable separately. I have excluded from table 2.2 all 16 sets of analyses in which the researchers made no attempt to deal with the simultaneity between police and crime. Even after dropping the studies with the most obvious flaws, there remain substantial variations in the quality of the studies. Overall, after combining similar variables (such as mean and median family income), table 2.2 contains 89 separate variables. Furthermore, to facilitate interpretation, I have made a crude attempt to classify each variable into seven broad dimensions, six of them in the external environment of the police organization, and one having to do with the organization itself. The criminal environment contains 11 separate variables having to do with general and specific categories of crime. The demographic environment contains 13 variables having to do with the demographic makeup of the population. The economic environment contains 20 variables having to do with the economic characteristics of the jurisdiction, including such items as the volume of local business, the tax base and other sources of revenue. The political environment contains 5 variables having to do with the political structure or culture of the jurisdiction. The socioeconomic environment contains 11 variables having to do with the socioeconomic features of the populace. The "other" environment contains 14 variables unable to be otherwise classified, such as the presence of airports and parks, or the number of hotel rooms. Finally, the police organizational dimension contains 15 variables having to do with the structure and productivity of the agency, including arrests and clearances for various offenses. This crude classification system demonstrates the many kinds of variables thought to influence police strength.

What can we learn from table 2.2? Aside from demonstrating the enormity of the literature, this table is useful for quantifying the appearance of different variables in studies and models explaining police strength. Using this information, we can examine the frequency with which particular independent variables have been included in models predicting police strength. In addition, we can weigh the strength of the evidence for any given independent variable. Thus, the summary information in table 2.2 is a good resource for examining the evidence in favor of various explanations for police strength. Even this format, however, makes it difficult to get a quick "snapshot" of the

factors influencing police strength in the United States. For this reason, table 2.3 lists the 15 independent variables appearing most frequently in studies of police strength. Like table 2.2, this table excludes the 16 (out of 75 total) sets of analysis that made no attempt to deal with the simultaneity between police and crime. For each variable, the table lists the number of separate sets of analyses in which the variable is presented. In addition, for each set of analyses, we conclude that the effect of the variable is zero if fewer than half of the coefficients are significant, positive if half or more are positive and significant, and negative if half or more are negative and significant. This results in a rather simple snapshot of the effects of these 15 variables.

I set out in this chapter to determine whether it was possible to extract a set of robust findings from this large and fragmented body of research. Despite numerous hurdles, table 2.3 represents my best efforts to that end. The 15 explanatory variables in table 2.3 are the ones most frequently represented in models of police strength. For instance, three of the variables with the highest percentage of positive effects are the lag value of police employees, police expenditures, and government revenue. Thus, places that are wealthier or provide greater resource allocations to police agencies have higher levels of police strength. This is a rather banal finding, and is to be expected. The only other two variables with positive findings in at least half the studies are murder and auto theft.[6] Four other categories of crime (violent crime, property crime, total crime, and robbery) have positive effects in at least 40% but less than 50% of the studies. While this suggests that crime is an important variable in the production of police strength, the lack of consistency needs to be addressed. It may be that mis-specification in other parts of the model (such as the measurement of police strength or the types of data used) are responsible for the inconsistencies. Nearly half of the studies that included percent nonwhite as an explanatory variable found a positive effect on police strength, though 15% also found a negative effect. This suggests that racial conflict explanations for police strength are worth further examination. On the other hand, as some researchers have noted, the effect may be nonlinear, which may account for some of the inconsistency in these findings. Jackson and Carroll (1981) and others have found some evidence that the size of threatening populations has a curvilinear (quadratic) effect; that communities with either a small or large percentage of minorities may not feel "threatened," while those with a moderate proportion of minorities may respond to feelings of social threat by increasing the size of their police forces.[7] Population and average family income each have a relatively small positive effect on police strength, with the majority of studies finding a zero effect. Nevertheless, there are enough studies reporting positive effects to suggest that larger and wealthier communities may be more heavily policed. Finally, the presence of riots had a positive association with police strength in 1/3 of the studies examined.

Only two of the variables listed in table 2.3 demonstrate strong evidence for null or negative effects on police strength. The number of motor vehicles, which is presumably used as a proxy for police workload, has been found to have no effect in 5 of 6 studies. The density of a community (population per unit area) is the only variable with convincing evidence of a negative effect on police strength. It was included in 12 studies, with 5 finding a negative effect and 6 finding no effect. Overall, even though some of the findings in table 2.3 are readily interpretable, they demonstrate a general lack of consistency that is probably due to the methodological issues discussed earlier: poor model specification, poor measurement, and a failure to adequately address simultaneity.

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[6] Interestingly, both of these variables have very high reporting rates. This might suggest the possibility that crime trends influence police strength, but that these effects are not captured as well for other categories of crime with lower reporting rates. At this point there is no evidence to this effect, but this is a testable hypothesis that is worth examining in future research.

[7] Furthermore, as Greenberg and colleagues (1985) have found, the effect may be even more complex. Their research found that percent nonwhite has stronger linear and quadratic effects on police strength in the south and from 1950-1970 (but not from 1970-1980).

Table 2.2. Independent variables used to explain police strength

Dimensions	Independent variables	# Coefficients	# Studies[k]	Findings
Criminal Environment	Assault	29	3	(0/14), (0/14), (+)
	Auto Theft	31	5	(+13/14), (+11/14), (+), (+), (0)
	Burglary	29	3	(+), (+9/14), (+10/14)
	Larceny	28	3	(+5/13), (+3/14), (+)
	Major Crime	1	1	(0)
	Murder	76	6	(+6/6), (3/40)[j], (0), (+3/14), (+11/14), (+)
	Property Crime	42	24	(+), (0), (+), (0), (+2/8), (+), (0), (-2/2), (0), (+), (0/2), (0/2), (0/2), (0/2), (0), (0/2), (0/2), (-2/2), (+2/2), (+2/2), (+), (+), (+), (+1/2)
	Rape[b]	62	5	(7/32)[j], (+), (+), (+1/14), (+5/14)
	Robbery	72	7	(0/2) (-1/2), (+9/14), (+8/14), (+), (8/38)[j], (0)
	Total Crime[c]	115	24	(+9/15), (-1/2), (0/2),(-), (0), (0), (2/38)[j], (0), (0), (-2/2), (+), (0), (0), (+11/16), (+9/9), (-9/9), (+), (+6/6), (+), (0/2), (+), (+), (+), (+)
	Violent Crime[a]	54	29	(+), (0/8), (+), (0/2), (0), (-2/2), (+2/2), (+), (+), (+), (+), (-1/3), (+1/3), (0), (+2/2), (+2/2), (+), (-1/2), (+1/2), (0/2), (+), (0), (0/2), (+), (+6/6), (0), (0), (0), (0)
Demographic Environment	Density	27	12	(0), (-), (0), (0), (0), (0), (-2/2), (+), (0), (-4/8), (-4/8), (-)
	Growth	2	2	(0), (-)
	Median Age	1	1	(0)
	Median Education Level	1	1	(-)
	Percent Over 65 Years Old	2	1	(-1/2)
	Percent Nonwhite[e]	55	27	(-3/4), (-4/4), (0), (0/2), (0), (0), (0), (+2/4), (+), (+), (0), (0/2), (-2/2), (+2/2), (-2/2), (+2/2), (0/2), (+), (+3/8), (+2/2), (0), (+), (+), (+), (+3/4), (+2/2), (+)
	Percent Italian	4	2	(+1/2), (-1/2)
	Percent Young[d]	4	3	(-), (0), (+2/2)
	Percent White	2	1	(-1/2)
	Percent Urban	1	1	(+)
	Percent Male	1	1	(0)
	Population	37	17	(+2/2), (-), (+), (+), (0), (0), (0/2), (+1/2), (+1/2), (-), (-2/2), (0), (+2/8), (0), (+1/2), (0/8), (+)
	Region	7	5	(0/3), (-), (0), (0), (+)
Economic Environment	Average Firm Size	1	1	(+)
	Avg Annual Federal Aid	1	1	(+)
	Business Failure	2	2	(-), (+)
	Business District	2	1	(+1/2)
	Consumer Price Index	2	1	(+2/2)
	Economic Inequality	18	2	(+9/9), (-9/9)
	GNP/GDP	5	2	(0), (+4/4)

Dimensions	Independent variables	# Coefficients	# Studies[k]	Findings
	Government Revenue	14	7	(0), (+1/3), (+3/3), (+1/2), (+1/2), (0/2), (+)
	Government Budget/Expenditure	3	3	(-), (+), (+)
	Median Home Value	1	1	(0)
	Non-white/White Median Income	2	2	(0), (0)
	Poverty	1	1	(0)
	Price of Private Goods	1	1	(0)
	Property Valuation	4	4	(+), (+), (+), (+)
	Property Tax	3	3	(+), (+), (+)
	Retail Sales	1	1	(0)
	Revenue	1	1	(+)
	Surplus Value	8	2	(+4/4), (+4/4)
	Tax	2	2	(+), (+)
	Unemployment	20	5	(0), (0/14), (0/3), (0/3), (0)
Other Environment	Airports/Presence of Parks	2	1	(0/2)
	Area	4	4	(-), (0), (-), (-)
	Hotel Rooms Per Acre	2	2	(+), (-)
	Household Activity Ratio	1	1	(+)
	Injury Traffic Accidents	2	2	(0), (0)
	Manhattan	2	1	(+2/2)
	Motor Vehicles	6	6	(0), (0), (+), (0), (0), (0)
	Number of Local Agencies	1	1	(-)
	Protest	1	1	(+)
	Public Transportation Use	1	1	(0)
	Segregation	8	2	(+1/4), (-1/4)
	Street Miles	2	1	(+1/2)
	Union Initiative	1	1	(0)
	Workers on Strike	1	1	(0)
Police Organization	Arrests	7	3	(0), (0/3), (0/3)
	Assault Arrests	1	1	(+)
	Calls for Service	1	1	(+)
	Clearance Rate	3	2	(0), (+1/2)
	Contract Agency	2	2	(-), (-)
	Drug Arrests	1	1	(+)
	Murder Arrests	1	1	(0)
	Nonwhite Arrests	1	1	(0)
	Officers' Salary	2	2	(0), (+)
	Police Employees[f]	41	15	(+), (0), (+8/8), (+2/2), (+2/2), (+2/2), (+2/2), (+2/2), (+), (+), (+4/4), (+3/3), (+,-), (+1/2), (+8/8)
	Police Expenditures[g]	26	13	(+), (0/2), (-), (+), (+4/4), (+), (+), (+), (0/3), (0), (0), (0), (+8/8)

Dimensions	Independent variables	# Coefficients	# Studies[k]	Findings
	Property Arrest	4	2	(0/2), (+2/2)
	Robbery Arrest	2	2	(0), (+)
	Traffic Citation	1	1	(+)
	Violent Arrest	4	2	(0/2), (+2/2)
Political Environment	Ford Presidency	1	1	(+)
	Government Aid	2	2	(0), (+)
	Mayor Thompson Era	6	2	(-3/3), (0/3)
	Republican Strength	1	1	(+)
	Riot	17	6	(0), (0), (0), (+), (4/12)[j], (+)
Socioeconomic Environment	Average Family Income[h]	24	16	(+), (+), (+), (0), (+1/2), (0/2), (0), (-2/2), (0/2), (0/2), (0), (+4/4), (0), (+), (0), (0)
	Average Monthly Earning	1	1	(-)
	Average Annual Income	1	1	(+)
	Bank Debit	2	2	(+), (+)
	Home Relief	4	1	(+2/4)
	Inequality[i]	9	5	(0/2), (0/2), (0/2), (0/2), (-)
	Percent Residents Owing Homes	3	2	(0/2), (-)
	Percent Professional	1	1	(-)
	Percent Middle Class	3	2	(-), (-2/2)
	Percent Low Income	4	2	(+2/2), (-2/2)
	Percent Blue Collar	1	1	(-)

Notes

(a) Violent Crime includes Personal Crime.

(b) Rape includes Rape Assaults.

(c) Total Crime includes Crime and Reported Crime.

(d) Percent Young includes Percent Young Males, Percent aged 15-30, and Percent under 21.

(e) Percent Nonwhite includes Percent Black and Percent Minority.

(f) Police Employees includes Police Size. In each of the sets of findings reported in this row, the lag value of police employees was used in an equation predicting the current value.

(g) Police Expenditures includes Police Wages and Patrolman Wages. Of the 13 sets of findings reported in this row, six included the lag value of police expenditures in an equation predicting the current value and seven included police expenditures as a control in equations predicting the number of officers or employees.

(h) Mean Family Income includes Mean Income, Median Family Income and Income.

(i) Inequality includes Income Inequality.

(j) Direction of effects not reported.

(k) For the purposes of this table, a single research project or journal article might contain more than one "study" if it: (1) reports results from different samples, (2) uses two or more vastly different methodologies (e.g., cross-sectional or longitudinal), or (3) estimates models for different dependent or sets of independent variables.

Table 2.3. A snapshot of the major factors thought to influence police strength

Independent variables	# Studies	+	0	-
Violent Crime	29	48%	45%	7%
Percent Nonwhite	27	48%	37%	15%
Property Crime	24	42%	50%	8%
Total Crime[a]	24	46%	33%	17%
Population	17	41%	41%	18%
Average Family Income	16	38%	56%	6%
Lag Police Employees[b]	15	93%	7%	7%
Police Expenditures	13	54%	38%	8%
Density	12	8%	50%	42%
Robbery[a]	7	43%	29%	14%
Government Revenue	7	57%	43%	0%
Motor Vehicles	6	17%	83%	0%
Murder[a]	6	50%	33%	0%
Riot[a]	6	33%	50%	0%
Auto Theft	5	80%	20%	0%

Notes

(a) One finding (direction of effect) not reported.

(b) One study reported both a negative and a positive effect.

(c) For the purposes of this table, a single research project or journal article might contain more than one "study" if it: (1) reports results from different samples, (2) uses two or more vastly different methodologies (e.g., cross-sectional or longitudinal), or (3) estimates models for different dependent or sets of independent variables.

2.3. DISCUSSION AND CONCLUSIONS

Research on police strength has not progressed in an incremental and orderly fashion, though certainly some improvements have occurred. Careful, meticulous studies are rare, but when they occur they frequently make important substantive contributions. Snipes (1993), for instance, found that the effect of threatening populations varies by time period and by the measure of police strength used: either size or expenditures. While the size of the black population had a significant positive effect on police expenditures in two time-series equations containing data from 1904-1957, further analysis revealed that this effect was primarily concentrated from1918 to 1933. Moreover, from 1918 to 1933, the size of the Italian population was considered more threatening and had a significant positive effect on police expenditures. This is the first piece of evidence in this line of research to suggest an "ethnic succession" explanation for variations in police expenditures. Snipes also found that these findings were different for police size. He concluded that "until now, scholars have assumed that police size and police expenditures are interchangeable measures of police strength. It is possible that police size is determined more by the police organization, whereas police expenditures are mostly determined by city government" (1993:27).

In another fascinating study, Hakim (1979) and his colleagues estimate a simultaneous equation model of police strength and crime rates. They find that crime affects police expenditures, but that crime is affected by a number of exogenous variables including police expenditures in neighboring communities. This effect propagates through the system of equations so that expenditures in a given community affect expenditures in neighboring communities (through crime– with stronger effects through property crime than violent crime). They conclude that "a $1 increase in police expenditure per capita in neighboring communities generates a $.05 increase in police expenditure per capita in the

given community" (p. 211). They interpret this as evidence of a "spillover" of crime and police in neighboring communities. Furthermore, this finding suggests the need to control for spatial autocorrelation in police expenditure models.

One thing that is clear from this line of research is that simplistic analyses of the causes of police strength are no longer useful. As late as 1986, researchers were still using bivariate and partial correlations on cross-sectional data to draw inferences about police strength (Slovak, 1986). As late as 1994, researchers were still ignoring two decades of commentary on the consequences of haphazard identification restrictions (Niskanen, 1994). As Marvell and Moody (1996) and numerous other researchers have pointed out, the factors that structure police strength in the United States are extremely sensitive to specification error (Chamlin and Langworthy, 1996). They demonstrate how subtle changes in statistical modeling strategies can have an enormous effect on the findings. Making further progress in this line of research will require meticulous studies that build carefully on prior research, testing new model specifications, introducing new controls and methodologies, and using new and better data sources.

After three decades of research on the causes of police strength in the United States, we are left with a rather weak and inconsistent set of findings. Nalla and his colleagues (1997:140) offer at least one potential remedy:

> ...although quantitative analysis captures some dimensions of those forces which shape policing, qualitative assessments and data may further clarify police growth patterns. For instance, we need further research on the actors' interpretive processes and the organizational contexts in which they make decisions about increases in police personnel and budgets.

Careful qualitative research may complement the large body of quantitative research reviewed in this report. Collecting this kind of information will shed new insights about the forces shaping the growth and decline of American police organizations.

CHAPTER 3.

A Survey-Based Assessment of Factors Causing Changes in Sworn Force Size: Examining the Perceptions of Police

Christopher S. Koper and Gretchen E. Moore

3.1. INTRODUCTION

Chapter Two reviewed prior research on the determinants of police strength. This chapter compliments Chapter Two in two ways. First, we examine factors that have influenced changes in police strength during the late 1990s, a period of particular interest to federal policymakers who invested billions of dollars in expanding the nation's police forces through the Community Oriented Policing Services (COPS) program. Between 1994 and 1999, federal authorities funded upwards of 60,000 new officers for state and local law enforcement agencies. In this chapter, we examine the role of grant money and other factors in fueling police growth during the late 1990s, while also examining potentially offsetting forces that slowed police growth and/or contributed to reductions in police strength.

The second aim of the chapter is to extend the existing research on the determinants of police strength both methodologically and substantively. Chapter Two's review of prior studies on the determinants of police strength demonstrated that these factors are not well understood. As was discussed in that chapter, scholars have used three theoretical frameworks to explain variation in police strength, measured in terms of officers or expenditures. Rational public choice theory links variation in police strength to variables such as crime and population size, which reflect demand for police services. Conflict theory states that governments increase their police forces in response to growth in populations that dominant groups deem to be threatening. Threatening populations may be defined in racial terms (e.g., non-white groups) or in economic terms (e.g., the poor and unemployed). Finally, organizational theory stresses internal organizational factors that influence the size of police agencies. Scholars have not developed this theory as fully as the others, generally relying on the notion that change in bureaucracies tends to be incremental. Hence, the size of today's police force should be a good predictor of tomorrow's police force.

However, Chapter Two's review of over 50 empirical studies on the determinants of police strength showed that variables derived from these theories have not proven to be consistent predictors of police strength. With the exception of lagged values of sworn officers (i.e., using the size of yesterday's police force to predict the size of today's police force), virtually nothing has been shown to predict police staffing as predicted on a consistent basis. Chapter Two's review attributed the mixed findings of prior research in large measure to a number of methodological points, such as variation in the definition of police strength (i.e., officers or expenditures) across studies, poor and/or inconsistent model specification, and the complexities involved in disentangling the mutual effects which variables like crime and police levels have upon each other (i.e., the problem of simultaneity that arises in many correlational studies of crime and police strength).

While we cannot attempt to resolve all of these issues in one study, the research presented in this chapter attempts to modestly extend the literature on this topic in a number of ways. Building on Chapter Two's recommendation for further research into the interpretations and assessments of actors who make decisions about police strength, this chapter utilizes data from a national police survey to examine police officials' perceptions about factors influencing sworn force levels in their agencies. Whereas prior studies have generally treated the decision-making process behind changes in police strength as a "black box," using aggregate-level correlations between police strength and other factors to make indirect inferences about the process, the use of survey data allows us to tap into the perceptions of people who have insight into the actual process by which staffing levels are set.

In the process, we also examine whether the determinants of police strength are similar or different for police agencies of different sizes. Prior studies have employed a wide range of analysis units, ranging from national police counts to subdivisions within agencies, and this may partially explain the mixed findings of prior research.

Finally, we consider the possibility that the factors leading to growth in police forces differ from those leading to decline in police forces. To elaborate, consider the relationship between violent crime and police strength. As shown in Chapter Two, the results of prior studies assessing this relationship have been pretty evenly split between those finding a positive relationship and those finding no statistically meaningful relationship. A few studies even showed an inverse relationship. If one assumes that crime is related positively to police strength, this implies that increases in crime cause increases in police strength and, conversely, that decreases in crime cause reductions in police strength. An alternative hypothesis, in contrast, is that crime tends to affect police strength more clearly when crime increases. Faced with rising levels of crime and citizen fear, policymakers may choose to boost police strength. Once the new officers are on board, however, organizational inertia may tend to hold the agency at its new, higher level even if crime begins to decline (i.e., the organization will attempt to maintain its higher resource levels). Political pressure may also sustain the agency at its higher level, particularly if the growth in police is perceived to have reduced crime. A reduction in crime might eventually cause shrinkage in the police force, but the effect may tend to be more gradual. If this reasoning is correct, it may help to explain the conflicting findings of past research, especially in studies examining changes in police strength over time. With these possibilities in mind, we separately examine factors perceived by police to be associated with growth and decline in police strength.

3.2. DATA AND METHODS

The data for this study come from the Police Hiring and Retention (H&R) survey, a telephone survey conducted during the summer of 2000 with a nationally representative sample of 1,270 police agencies of all sizes and types. The H&R sample is described in the Methodological Appendix. As discussed in Chapter One and the Methodological Appendix, the H&R survey was used to collect to data on a wide range of police staffing issues. One portion of the survey was dedicated to an exploration of factors affecting recent staffing changes in the sampled agencies. During the course of the interviews, project staff identified agencies that had experienced increases or decreases of five percent or more in sworn officers from 1996 through 1999 and asked respondents for these agencies about the role of several factors in causing these changes.[8]

Each interview was conducted with the chief of police or an agency representative designated by the chief. Due to the myriad of organizational titles held by the respondents, we could not make a detailed assessment of the organizational positions of all the respondents. Based on an informal

[8] The 1996 sworn force levels are based on those reported by the agencies in earlier interviews conducted in the fall of 1996 (see the Methodological Appendix).

examination, it appears that nearly 60% of the respondents were chief or deputy/assistant chief law enforcement officers. About three-quarters of the respondents appeared to be top-level law enforcement officers, middle management officers (i.e., lieutenants and above), administrative assistants to chief law enforcement officers, or directors of various sorts. The remaining respondents held a variety of titles, such as sergeant, administrative or budget analyst, grant manager/coordinator, planning and research coordinator, and community policing supervisor. In a few cases, the interviews were conducted with municipal officials such as the mayor. Overall, it seems reasonable to treat the respondents as a group who were knowledgeable about police budgets and staffing decisions.

However, we should note a few points that may limit the generalizations that we can draw from the results. As discussed in the last chapter, previous studies have measured police strength in a variety of ways (e.g., sworn officers, police expenditures). Further, some studies have emphasized changes over time in police strength, while others have emphasized differences between places. This study utilizes sworn officers as the measure of police strength,[9] and our focus is on describing changes over time in police strength at the agency level. In addition, we focus on recent changes in agency size (years 1996 through 1999); therefore, some of the results may be particular to the context of recent years - a period of declining national crime rates, a strong economy, and plentiful federal money for police expansion - and may not generalize well to other time periods.

Each respondent whose agency had grown or shrunk by 5% or more was asked to judge whether each of 11 different items had "little or no" influence, "some" influence, or "much" influence on the staffing change.[10] A number of the items are similar to those tested in previous research: crime, calls for service, population, and government revenue/fiscal conditions. However, the use of survey data enabled us to probe some of these dimensions of citizen demand in further detail than have other studies. In particular, we asked about the distinct influences of crime and calls for service, demands from citizens' groups, public reaction to dramatic, highly publicized crimes or crime sprees (e.g., school shootings) that may have shocked the community, and decisions by or changes in political leaders.[11]

We also incorporated a number of items that have not been studied extensively but which seemed particularly relevant to the context of recent years: the availability of grant money and qualified recruits, the acquisition of new technology, and changes in policing strategy. Federal grant money for hiring new officers has been plentiful since the mid-1990s due to the enactment of the COPS program, the federal government's effort to add 100,000 officers to the nation's police forces. As of May 1999, the federal government had provided grants for the hiring of approximately 61,000 officers (Koper and Roth 2000), a factor which has undoubtedly facilitated recent growth in policing.

At the same time, there are some indications that police have begun to experience difficulty finding qualified recruits (Butterfield 2001; Law Enforcement News 2000a), a development which, if real, may have inhibited growth or caused decline in some agencies. This condition, which is also discussed elsewhere in this volume (see Chapter Four), would seem to be linked to the strong economy of recent years and has perhaps been aggravated by, among other things, retirements among baby boom officers and heightened competition for recruits stemming from the recent hiring boom fueled by COPS.

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[9] Some budgetary information was collected from these agencies in a 1996 survey, but these figures were not updated in the H&R survey.

[10] These questions were not administered to agencies that changed as a result of merging with or separating from other law enforcement agencies.

[11] Some of these factors, most notably crime, are thought to both affect and be affected by police strength. In this study, we focus on the former effects by examining police officials' views of how marginal changes in these variables affect police staffing decisions. We did not ask the respondents to estimate any reciprocal effects that police staffing might have on the variables under study.

The growing adoption of new technology by police departments is another development that may have affected recent staffing trends in police agencies. Between 1990 and 1997, for instance, growth in the use of in-field computers and terminals by local police departments ranged from 52% in agencies serving 250,000 or more residents to 850% in agencies serving fewer than 10,000 residents (Reaves and Goldberg 2000, p. 26). The COPS program has also facilitated the adoption of new technology by police. In addition to providing grants for hiring new officers, COPS has attempted to raise the level of policing in the United States with grants to improve officer productivity through the acquisition of technology and civilian hires. Federal authorities had awarded about 40,000 officer equivalents through COPS grants for technology and civilians as of May 1999 (Koper and Roth 2000). As of mid-1998, about three-fourths of the officer equivalents awarded through these types of grants were linked to new technology. In light of these developments, we inquired about the impact of technology acquisition on staffing levels based on the speculation that acquisition of new technology has made manpower allocation more effective, potentially slowing the need for growth in some agencies and making others more likely to reduce staff.

We inquired about the possible effects of changes in police strategy due largely to the growing adoption of community policing and zero tolerance (alternatively, quality of life or order maintenance policing) strategies among the nation's police agencies. By 1999, for example, 17% of all local police departments and a majority of those serving jurisdictions with populations of 50,000 or more persons had formal, written community policing plans (Hickman and Reaves 2001, p. 9). Earlier survey research with a subsample of local agencies in the H&R survey found that large majorities of local agencies in large jurisdictions (i.e., those with 50,000 or more persons) were using problem solving, crime prevention, and community partnership tactics that are common to community policing (Roehl et al. 2000). Indeed, one of the major goals of the COPS program has been to encourage the adoption of community policing. By the same token, nearly 40% of the agencies in the H&R survey adopted zero tolerance-style crackdowns on public order offenses between 1995 and 2000. These and other strategy changes might place more strain on police, leading to the need for more officers. In some cases, changes in strategy might prove popular or unpopular with citizens, affecting political support and resources for police.

Finally, we inquired about the contributions of changes in budgeted or authorized force levels to changes in staffing. We used this item to get a sense of the extent to which observed staffing changes represented purposeful decisions by police or other public officials, as opposed to fluctuations caused by things like turnover, unexpected attrition, and/or delays in hiring and training new officers.

Overall, the questionnaire items fit most clearly into the rational public choice perspective, generally reflecting demands on police and the availability of resources for policing. Acquisition of new technology and changes in police strategy reflect internal organizational decisions and fit better into the organizational theory perspective, though these decisions may also be influenced by resource availability, demands for service, and political considerations. The technology and strategy items enable us to go beyond the concept of inertia in examining organizational factors that may influence staffing, particularly during periods of innovation.

However, some of the other items may lend themselves to more complex interpretations. More specifically, citizens' demands and decisions by political leaders may be affected by elements of racial or economic conflict. For example, tension and fear arising from racial turnover in a community could conceivably lead to demands for more police protection. In such a case, citizen demand would represent the mechanism through which racial conflict operates.

We felt that our ability to examine conflict explanations of police strength was limited in a survey study of this sort. In the latter part of the analysis, however, we tentatively offer some indirect evidence on conflict-based explanations of police strength, investigating briefly whether reported changes in the racial composition and economic conditions of respondents' jurisdictions were related

to changes in police strength and assessing police officers' views on whether such social changes affect citizens' demands for police service.

3.3. RECENT PATTERNS OF CHANGE IN THE SIZE OF POLICE AGENCIES

In general, the study period was characterized more by police growth than by police decline. As shown in table 3.1, a little over half of both large and small agencies grew during the study period (in the H&R survey design, large agencies consist of those serving jurisdictions with 50,000 or more persons, and small agencies consist of those serving jurisdictions with populations of fewer than 50,000 persons). The median increase was 13% in large agencies and 20% in small agencies. About 11% of large agencies and almost 22% of small agencies decreased in size. The median decreases were 14% and 15% for large and small agencies, respectively.

Table 3.1. Changes in sworn force size

Change in sworn force	Large agencies (n=552)	Small agencies (n=706)
Force increased	51.5%	51.5%
Force decreased	11.4%	21.6%
Force remained same*	37.1%	26.9%
Median increase**	13%	20%
Median decrease**	14%	15%

* i.e., agencies whose staffing levels remained constant or that changed by less than plus or minus 5%.

** Median increase calculated for agencies which increased by 5% or more. Median decrease calculated for agencies which decreased by 5% or more.

3.4. FACTORS CAUSING INCREASES AND DECREASES IN SWORN FORCE STRENGTH, 1996-1999

Tables 3.2 and 3.3 display the results of the staffing influence questions for large and small agencies that grew during the reference period. For each item, the tables show the percentages of respondents who judged the items to have had, respectively, little or no influence, some influence, and much influence on changes in staffing. In each table, the items are listed in rank order based on their average scores on a three-point scale (1=little or no influence, 2=some influence, 3=much influence).

Most of the items had at least some influence on agency growth for roughly half or more of both large and small agencies. Overall, respondents for large and small agencies ranked the items quite similarly. For both groups, the four most important factors influencing agency growth were the availability of grant money, changes in the budgeted or authorized force, levels of crime and calls for service, and changes in population. The availability of grant money appeared to be the single most important factor affecting agency growth. Grant money ranked first for large agencies and second for small agencies, and it was the item most likely to have had much influence on staffing growth for both groups of agencies. Note also that while respondents ranked levels of crime and calls for service relatively highly, they gave relatively little weight to sensational crimes, perhaps in part because relatively few jurisdictions experienced such crimes.

Decisions by or changes in political leaders and changes in police strategy were mid-ranking items among both large and small agencies, each having much influence on staffing changes for

roughly around 20% or more of both groups.[12] In contrast, sensational crimes, the availability of qualified recruits, and the acquisition of new technology ranked low on each list, having little or no influence on staffing changes for half or more of the agencies in each size category.

Table 3.2. The perceived influence of selected factors on increases in police staffing: Large agencies which grew from 1996 to 1999 (n=270)

	Little / none	Some	Much	Average score
Availability of grant money	14.8%	28.4%	56.8%	2.42
Change in agency's budgeted or authorized force	22.5%	38.0%	39.2%	2.17
Levels of crime of volume of calls for service	21.5%	42.0%	36.5%	2.15
Changes in population size in your jurisdiction	35.9%	31.1%	33.0%	1.97
Decision by elected officials or changes in your jurisdiction's political leadership	35.1%	36.7%	28.2%	1.93
Change of police strategy	37.4%	41.1%	21.5%	1.84
Demands from business groups, citizen activists, or community groups	40.9%	44.3%	14.7%	1.74
Changes in tax revenues or fiscal constraints	45.5%	38.9%	15.6%	1.70
Acquisition of new technology	50.8%	33.6%	15.6%	1.65
Availability of qualified recruits	56.4%	27.4%	15.9%	1.59
Dramatic, highly visible crime or crime sprees	61.8%	28.4%	9.8%	1.48

Table 3.3. The perceived influence of selected factors on increases in police staffing: Small agencies which grew from 1996 to 1999 (n=340)

	Little / none	Some	Much	Average score
Levels of crime of volume of calls for service	22.3%	37.8%	39.9%	2.18
Availability of grant money	34.4%	23.1%	42.5%	2.08
Change in agency's budgeted or authorized force	31.4%	39.8%	28.7%	1.97
Changes in population size in your jurisdiction	42.8%	32.8%	23.7%	1.81
Decision by elected officials or changes in your jurisdiction's political leadership	52.4%	24.5%	23.0%	1.70
Change of police strategy	49.9%	32.3%	17.8%	1.68
Changes in tax revenues or fiscal constraints	52.7%	32.5%	14.8%	1.62
Acquisition of new technology	58.0%	31.3%	10.6%	1.53
Demands from business groups, citizen activists, or community groups	60.0%	31.0%	8.9%	1.49
Dramatic, highly visible crime or crime sprees	64.2%	25.3%	10.5%	1.46
Availability of qualified recruits	67.1%	23.0%	10.0%	1.43

Results for declining agencies are presented in tables 3.4 and 3.5. Again, there was substantial similarity in the way large and small agencies viewed the influence of these factors. In general, the

[12] Interviewers did not inquire about the specific types of strategy changes that influenced sworn force levels; consequently, the responses may reflect a wide variety of strategy changes. Elsewhere in the survey, however, interviewers inquired about the agencies' use of community policing and zero tolerance (alternatively, order maintenance or quality of life) policing. Supplemental analyses suggest that zero tolerance strategies may necessitate staffing increases more often than other forms of community policing. Almost 78% of respondents in expanding agencies that adopted order maintenance initiatives between 1995 and 2000 reported that a change in strategy influenced staffing trends. In contrast, only 43% of growing agencies that adopted community policing between 1995 and 2000 indicated that a change of police strategy had at least some influence on staff expansion.

questionnaire items had less influence on police reduction than on police expansion. Most items were judged to have had little or no influence on staffing reductions by 50% or more of respondents from declining agencies.

Changes in budgeted or authorized force levels, the availability of grant money, changes in fiscal conditions, and the availability of qualified recruits (or lack thereof) ranked as the top four items for both groups. Roughly 20% or more of respondents in each group ranked these items, as well as political decisions and turnover, as having had much influence on staffing changes. The high ranking of grant money suggests that the absence of grant money (or the inability to obtain grant funds) facilitated staff reductions in some agencies while the availability of grant money probably slowed the rate of decline in other agencies.[13] One notable difference between the agencies was that crime had a relatively stronger role in facilitating, or slowing, decline in large agencies than in small agencies.[14]

Table 3.4. The perceived influence of selected factors on reductions in police staffing: Large agencies which declined from 1996 to 1999 (n=63)

	Little / no	Some	Much	Average score
Change in agency's budgeted or authorized force	41.8%	32.2%	25.9%	1.84
Availability of grant money	47.2%	26.7%	26.0%	1.79
Changes in tax revenues or fiscal constraints	49.9%	25.2%	24.9%	1.75
Availability of qualified recruits	46.3%	33.4%	20.3%	1.74
Levels of crime of volume of calls for service	55.1%	21.4%	23.5%	1.68
Decision by elected officials or changes in your jurisdiction's political leadership	57.1%	21.5%	21.5%	1.64
Acquisition of new technology	63.1%	24.5%	12.3%	1.49
Change of police strategy	58.0%	36.6%	5.3%	1.47
Demands from business groups, citizen activists, or community groups	66.1%	21.9%	11.9%	1.46
Changes in population size in your jurisdiction	67.2%	20.9%	11.9%	1.45
Dramatic, highly visible crime or crime sprees	72.0%	21.1%	6.8%	1.35

[13] A cautionary note on interpreting the questionnaire results is that it is possible that some of the factors under study may have caused changes in staffing or slowed the rate of staffing changes. In general, it seems that we can make reasonable intuitive judgments about the nature of the effects, but the data do not permit us to clearly disentangle these possibilities.

[14] Respondents were also given the opportunity to offer other reasons for the increases or decreases in their agencies. Several issues emerged from these verbatim responses, including the following: jurisdictional or geographical changes, salary issues, particularly the inability of some agencies to offer a competitive salary to new recruits; the offering of new services (sometimes linked to community policing); high quantities of retirees; and discrepancies in the way people were tallied from year to year.

Table 3.5. The perceived influence of selected factors on reductions in police staffing: Small agencies which declined from 1996 to 1999 (n=146)

	Little / no	Some	Much	Average score
Availability of grant money	52.5%	23.3%	24.2%	1.72
Change in agency's budgeted or authorized force	57.7%	17.0%	25.2%	1.67
Availability of qualified recruits	56.6%	22.1%	21.3%	1.65
Changes in tax revenues or fiscal constraints	58.5%	20.2%	21.3%	1.63
Decision by elected officials or changes in your jurisdiction's political leadership	58.6%	21.1%	20.2%	1.62
Changes in population size in your jurisdiction	66.8%	18.5%	14.6%	1.48
Change of police strategy	58.6%	34.9%	6.3%	1.48
Acquisition of new technology	72.2%	18.3%	9.6%	1.37
Levels of crime of volume of calls for service	73.4%	20.3%	6.2%	1.33
Demands from business groups, citizen activists, or community groups	77.9%	19.0%	3.0%	1.25
Dramatic, highly visible crime or crime sprees	79.4%	17.0%	3.5%	1.24

Based on the perceptions of police, therefore, it seems that the most and least important factors causing recent staffing changes were similar for large and small agencies.[15] At the same time, however, the results suggest that there were some notable differences in the factors causing expansion and decline in police agencies.

To illustrate the differences more starkly, table 3.6 compares the perceived influence of each factor on large increases and large decreases in police agencies. We defined large increases as those greater than the median increase for all growing agencies. Likewise, we defined large decreases as those greater than the median decrease among agencies in decline. All of the factors we investigated had statistically different effects on police growth and decline, though the measures of association in the far right column show that most of these differences were modest in magnitude (measured on a scale of zero to one).

The most dramatic difference was that crime and calls for service played a much larger role in causing police agencies to grow than in causing them to decline. To illustrate, respondents in 46.8% of agencies experiencing large increases in size felt that crime and calls for service had much influence on their agency's change in size. The same was true among only 5.6% of respondents in agencies experiencing large staff reductions. Even among those agencies experiencing decreases in both size and crime (n=75 for the full sample), 77% reported that crime and calls for service had little or no influence on the agency's change in size.[16] Less than 4% of these agencies reported that crime and calls for service had much influence.

[15] To further explore similarities and differences between large and small agencies, we conducted chi-square tests of the relationships between agency size and the perceived influence of the survey items (the tests are not shown in the text but are like those shown in table 3.6, which contrasts expanding and shrinking agencies). Though sometimes statistically significant, contingency coefficients showed that the relationships between agency size and the perceived influence of the survey items were small in magnitude. For expanding agencies, the largest association was 0.09 (for the grant money item) on a 0 to 1 scale. For declining agencies, the largest contingency coefficient was 0.115 (for crime and calls for service). Overall, therefore, it seems that these factors had quite comparable influences on staffing in large and small agencies.

[16] The change in crime measure is based on respondents' perceptions as measured by a five point scale (increased a lot, increased a little, no change, decreased a little, decreased a lot). Most respondents in this group reported modest decreases in crime.

Table 3.6. The comparative influence of selected factors on large increases and large decreases in agency size
(n's=302 agencies with large increases in size and 115 agencies with large decreases in size)

	Little / none		Some		Much		Strength of assoc.*
	Decrease	Increase	Decrease	Increase	Decrease	Increase	
Levels of crime or volume of calls for service	70.8%	19.8%	23.5%	33.4%	5.6%	46.8%	.458
Dramatic, highly visible crime	72.5%	56.6%	23.5%	28.7%	4.0%	14.7%	.175
Decision by elected officials or political changes	61.8%	48.5%	21.5%	27.4%	16.7%	24.1%	.122
Demands from business and citizen groups	80.8%	58.6%	17.5%	30.0%	1.8%	11.4%	.221
Availability of grant money	46.8%	33.2%	18.4%	26.2%	34.8%	40.5%	.131
Change in population size in jurisdiction	70.9%	47.7%	17.0%	31.0%	12.0%	21.3%	.210
Change in tax revenue / fiscal constraints	65.5%	51.9%	13.8%	36.0%	20.7%	12.1%	.224
Change in agency's budgeted or authorized force	60.5%	32.5%	17.0%	32.2%	22.5%	35.4%	.254
Availability of qualified recruits	62.0%	70.1%	14.6%	19.2%	23.5%	10.7%	.166
Acquisition of new technology	65.7%	54.0%	20.2%	34.9%	14.1%	11.1%	.144
Change in police strategy	59.9%	49.9%	31.2%	33.4%	8.8%	16.7%	.115

* The associations were measured with contingency coefficients, nonparametric measures of association which vary between 0 and 1 (used here because the data do not have interval or ratio level measurement). Chi-square tests of association showed all contingency coefficients to be significant at $p<.05$ with the exceptions of the elected official/political decisions item ($p=.05$) and the police strategy item ($p=.07$).

These findings lend support to the hypothesis stated in the introduction – rising or steady rates of crime and calls for service may tend to prompt expansion of police forces (conditional on the effects of other causal factors), but the potential impact of declining crime rates might often be mitigated by organizational inertia and the political difficulties of reducing police forces. Similarly, note that demands by citizens' groups and the reverberations of sensational crimes, though not ranked as very powerful influences on police staffing in general, were about three and a half to six times as likely to have had much influence on the growing agencies in table 3.6 than on the declining agencies. Changes in budgeted or authorized force levels, to provide another example, were leading causes of both growth and decline in police agencies, but they were about twice as likely to have some or much influence on staffing increases than on staffing reductions (see table 3.6). Thus, in general, demand-related variables may have stronger effects on police expansion than on police reduction. On the other hand, variables reflecting the availability of resources for policing (e.g., grant money, government revenues/fiscal conditions, the availability of qualified recruits) may tend to have more equal effects on increases and decreases in staffing or to have larger effects on reductions in force.

3.5. RACIAL / ECONOMIC CONFLICT AND POLICE GROWTH

Racial and economic conflict perspectives state that the dominant racial and economic groups in a community will tend to increase levels of formal social control (e.g., deploying more police) in response to perceived threats posed by, respectively, other racial groups and economically marginalized groups. As noted earlier, we felt that our ability to test these theories with survey data was limited. Asking respondents directly about the impact of economic and, especially, racial change on the size of their agencies seemed unlikely, in our view, to yield valid data. Therefore, we did not

undertake a detailed evaluation of these theories. However, we did conduct some tentative, indirect inquiries into these issues.

First, respondents were asked whether there had been much change in the racial/ethnic composition of their jurisdiction since 1995. In addition, they were asked to assess whether economic conditions had changed for the better or the worse since 1995. Though we do not have explicit measures of the magnitude of racial or economic changes, these items convey the perceptions of social change held by key actors in police agencies. Therefore, the responses give us an indication of whether people in the jurisdiction regarded social changes as meaningful. In the section below, we examine the bivariate relationships between these perceived social changes and changes in the size of police agencies.

A second test was based on the hypothesis that racial and economic conflict might influence police strength through multiple mechanisms. One mechanism is that reported crimes and calls for service might rise with racial turnover and economic decline. During periods of social change, fear and distrust might rise, lessening citizens' tolerance for minor crime and disorder while also eroding informal social controls in the community. This pattern would put more pressure on formal institutions of social control, including the police. To test this notion, we asked police to judge the impact of several factors on citizens' demands for police service. The list included items reflecting racial change and economic conditions.

3.5.1. Perceptions of Racial and Economic Change and Changes in the Size of Police Agencies, 1996-1999

For the sample overall, racial change was not related to police growth.[17] About 47% of agencies in jurisdictions experiencing racial change increased in size, as did 53% of agencies in jurisdictions without racial change. Small jurisdictions with racial change were somewhat less likely to have experienced police growth and somewhat more likely to have experienced a reduction in police (table 3.7). Though not a statistically significant difference (chi-square p level = .2), large jurisdictions experiencing racial change were somewhat more likely to have an increase in police and less likely to have a decrease in police than were places with no racial change.[18] The pattern in large agencies does not appear to have been linked to crime trends: virtually identical proportions of large agencies reported crime increases (based on respondents' perceptions) in jurisdictions with and without racial turnover (18% and 19%, respectively).

Table 3.7. Changes in police force size by racial change of jurisdiction and agency size*

	Racial change		No racial change	
	Large (n=207)	Small (n=180)	Large (n=341)	Small (n=523)
Increase in force	55.3%	45.9%	49.8%	52.9%
No change in force	36.3%	29.0%	37.2%	26.4%
Decrease in force	8.4%	25.1%	13.1%	20.7%

[17] Our analysis assumes that racial change in any direction (i.e., an increasing proportion of non-whites, an increasing portion of whites, or a change in the distribution of the non-white population) may create tensions that could lead to police growth.

[18] Examination of the mean rates of change in jurisdictions with and without racial turnover revealed no consistent pattern, and the results were sensitive to the inclusion or exclusion of outlier cases. The median rates of change for small jurisdictions with and without racial change were 6% and5%, respectively. For large jurisdictions, the corresponding numbers were 7% and 5%.

To explore this issue further, we selected large agencies that increased during the study period and compared those in places experiencing racial change to those in places without racial change on the staffing influence items discussed in the earlier part of the chapter. We hypothesized that the impact of some items might vary with the social context within which the agencies operated. For example, police and citizens might view crime trends with more alarm and be more likely to seek additional police in a jurisdiction experiencing racial change.

As shown in table 3.7, however, respondents in places with and without significant racial change gave comparable rankings to most items. Perhaps the most notable difference between the groups is that decisions by elected officials and changes in political leadership had much influence on staffing increases in 38.5% of agencies in jurisdictions with racial change and only 21.5% of agencies in jurisdictions without racial change. Interpretation of this finding is ambiguous. While it might represent the reactions of elites in a dominant racial group, it might also represent gains in political power for less powerful racial groups. That is, a change in the balance of political power in some jurisdictions might lead to the election of more politicians from less powerful groups. These politicians might then seek more police protection for disadvantaged communities. At any rate, this tentative finding may suggest a need for more explicit research into the links between racial turnover, politics, and police staffing.

Table 3.7. The perceived influence of selected factors on increases in police staffing by the occurrence of racial change in the jurisdiction: Large agencies which grew from 1996 to 1999

	Racial change (n=107)			No racial change (n=163)		
	Little	Some	Much	Little	Some	Much
Levels of crime or volume of calls for service	21.7%	44.3%	34.0%	21.4%	40.4%	38.3%
Dramatic, highly visible crimes or crime sprees	56.5%	35.2%	8.3%	65.3%	23.9%	10.7%
Decision by elected officials or changes in political leadership	28.9%	32.6%	38.5%	39.2%	39.4%	21.5%
Demands from business groups, citizen activities, or community groups	43.7%	40.3%	16.1%	39.2%	47.0%	13.9%
Availability of grant money	15.7%	23.5%	60.8%	14.3%	31.6%	54.2%
Changes in population size in your jurisdiction	39.6%	31.7%	28.7%	33.5%	30.7%	35.8%
Changes in tax revenues or fiscal constraints	44.5%	40.4%	15.1%	46.3%	37.8%	15.9%
Change in agency's budgeted or authorized force	24.2%	38.6%	37.2%	21.5%	37.8%	40.7%
Availability of qualified recruits	50.5%	30.3%	19.2%	60.6%	25.6%	13.9%
Acquisition of new technology	47.8%	33.9%	18.4%	52.9%	33.4%	13.8%
Change of police strategy	38.2%	42.8%	19.0%	36.9%	39.9%	23.2%

Relatively few respondents reported any economic decline in their jurisdictions during the past few years. As shown in table 3.8, small agencies in places with deteriorating economic conditions were more likely to decrease in size than were small agencies in other jurisdictions. Large agencies were less likely to increase and more likely to decrease under worsening economic conditions.[19] Note, moreover, that economic decline appeared to reduce police strength despite increases in crime. Sixty-four percent of all agencies reporting worsening economic conditions also reported increases in crime

[19] Respondents were asked whether economic conditions in their jurisdiction had improved a lot, improved a little, remained the same, worsened a little, or worsened a lot. The counts of places with economic deterioration presented in the text are based on agencies that experienced any worsening of economic conditions. Very few respondents reported conditions that had worsened a lot.

(based on respondents' judgments) in contrast to forty-seven percent of agencies in places without economic deterioration.

Table 3.8. Change in police force size by economic change and agency size

	Economy: Same or better (n=1130)		Economy: Worse (n=121)	
	Large (n=507)	Small (n=623)	Large (n=39)	Small (n=82)
Increase in force	53.4%	51.8%	32.7%	49.6%
No change in force	36.4%	28.2%	38.5%	17.6%
Decrease in force	10.2%	20.0%	28.8%	32.8%

The perceptions of police do not support the view that worsening economic conditions lead to police growth. On the contrary, it seems that the fiscal pressures created by economic decline are more likely to cause reductions in police (note again that respondents considered government revenue and fiscal conditions to be important determinants of changes in agency size). One implication of this finding is that studies using general economic measures like unemployment to test the association between economic conflict and police strength should use modeling strategies that can account for the possibility that economic deterioration has multiple direct and indirect effects on police strength which may operate in opposite directions. That is, growth in the poor and unemployed may create pressure for more police protection, while, simultaneously, declining government revenues decrease the availability of resources for policing. The results also imply that economic measures designed to capture inequality, such as surplus value added (e.g., see Nalla et al. 1997), might be better measures to use in testing economic conflict theories.

3.5.2. Racial Change, Economic Conditions, and Citizen Demand for Police Service

We also examined police officers' views on whether racial turnover and economic conditions affect citizens' demands for police service. Respondents were asked to judge the influence of several factors on demands for police service, including items reflecting racial change and economic conditions. As shown in table 3.9, large agency respondents gave more weight to racial and economic factors than did small agencies. Respondents from both groups of agencies felt that economic conditions have substantially greater impacts than racial turnover. Roughly half of large agencies and a third of small agencies indicated that economic conditions influence demands for police service. About a quarter of large agencies and ten percent of small agencies reported that racial/ethnic turnover influences demands for police service.'

Table 3.9. Influences on citizens' demands for police service (in percentages)

	Small agencies (n=497)			Large agencies (n=333)		
	Little or none	Some	Much	Little or none	Some	Much
Levels of serious crime	42.6%	36.8%	20.6%	19.1%	49.0%	31.9%
Economic conditions like unemployment	63.3%	28.5%	8.2%	49.5%	38.8%	11.6%
Tension regarding racial / ethnic turnover in neighborhoods	91.6%	7.3%	1.2%	72.8%	23.0%	4.2%
High profile crimes or rashes of crime	58.6%	33.7%	7.8%	36.8%	46.2%	17.1%
Population growth	46.1%	34.9%	19.1%	27.2%	39.5%	33.3%
Adoption of different call response system	82.2%	13.7%	4.1%	74.3%	19.4%	6.3%

Tables 3.10 and 3.11 compare the assessments of respondents whose jurisdictions were experiencing racial turnover or economic decline with those of respondents whose jurisdictions were not having such changes. Respondents regarded tensions associated with racial turnover to be minor influences on calls for service regardless of whether their jurisdictions were experiencing such turnover.[20] In general, respondents regarded economic conditions to be a more important influence on demands for police service. Moreover, respondents judged economic conditions to be more important if their own jurisdictions were experiencing economic difficulty. Approximately 55% of respondents in jurisdictions experiencing some level of economic decline felt that economic conditions had some or much influence on citizen demand, while 35% of those in other jurisdictions felt that this was true. We did not assess the direction of these perceived effects, but it seems most likely that deteriorating economic conditions would lead to more crime, disorderly conditions, and, consequently, citizen fear.

Table 3.10. Influences on calls for service*

	Racial change (n=249)			No racial change (n=579)		
	No	Some	Much	No	Some	Much
Levels of serious crime	36.9%	35.7%	27.4%	43.6%	38.3%	18.1%
Economic conditions like unemployment	53.5%	34.2%	12.4%	66.3%	26.5%	7.2%
Tension regarding racial / ethnic turnover	88.8%	10.6%	.6%	92.5%	5.9%	1.5%
High profile crimes or rashes of crime	50.9%	43.6%	5.5%	60.4%	31.8%	7.8%
Population growth	29.8%	42.2%	28.0%	49.2%	33.4%	17.4%
Adoption of different call response system	80.8%	15.6%	3.7%	82.0%	13.7%	4.4%

Table 3.11. Influences on calls for service*

	Economic decline (n=81)			No economic decline (n=749)		
	No	Some	Much	No	Some	Much
Levels of serious crime	41.5%	25.9%	32.6%	41.6%	39.1%	19.3%
Economic conditions like unemployment	45.3%	41.9%	12.8%	65.3%	27.0%	7.6%
Tension regarding racial / ethnic turnover	81.4%	12.7%	5.9%	92.2%	7.2%	.6%
High profile crimes or rashes of crime	61.6%	25.0%	13.4%	57.0%	35.6%	7.4%
Population growth	74.2%	19.4%	6.4%	40.8%	37.5%	21.7%
Adoption of different call response system	64.8%	27.9%	7.3%	84.5%	11.9%	3.7%

[20] A caveat to this finding is the possibility that respondents' answers on this topic were contaminated by views considered to be socially desirable.

3.6. DISCUSSION

Notwithstanding the caveats offered throughout this chapter, what sorts of generalizations might we draw from the preceding results? For one thing, police perceptions support some of the leading theories about the determinants of police staffing: changes in crime, calls for service, and population were leading influences on growing agencies during recent years, while government finances and fiscal constraints were among the leading factors cited by shrinking agencies. The availability of both grant money and qualified recruits are additional resource-related factors that, while not often studied in the past, have had important influences on staffing changes during the last few years. The importance of grant money to both growing and declining agencies suggests that the federal COPS program has perhaps been the single most important factor both facilitating growth and slowing reductions in police strength during the latter 1990s, though we should temper this conclusion by noting that we did not distinguish between the effects of COPS hiring grants and other federal or state hiring grants available during the study period. Furthermore, it seems that the determinants of police staffing examined in this study had similar influences on staffing changes in small and large police agencies.

Some of the determinants of police strength may have differential effects on growth and decline in police agencies, a finding that may help to explain some of the conflicting results of prior research on this topic. Most notably, police perceptions suggest that crime fuels growth in staffing but that it has little or no influence on reductions in staffing, due perhaps to the mitigating effects of organizational inertia and the political difficulties of reducing police forces. This implies that rising crime rates have more impact on police agencies than do declining crime rates. Consequently, the results of any given study of crime and police staffing could be highly contingent on crime trends during the study period and assumptions about the functional form of the relationship between the variables. The same may also be true for other variables reflecting demands for police services.

This study focused primarily on explanations of police strength consistent with rational public choice theory. However, we also examined organizational innovations reflecting the adoption of both new policing strategies (e.g., community policing and zero tolerance policing) and new technologies and found that they had relatively modest or small effects on police staffing. Likewise, our examination of racial and economic conflict theory explanations was limited. Although racial change did not appear to be linked to recent changes in police staffing, economic conditions seem to affect police strength in complex ways.

Police perceptions suggest that deteriorating economic conditions increase citizens' demands for service, probably by intensifying criminal and disorderly conditions and citizen fear (a phenomenon consistent with both rational public choice and conflict theory predictions). At the same time, however, declining economic conditions and fiscal constraints on government spending appear to be linked to reductions in police staffing. Strong economic conditions, on the other hand, increase the resources available for policing but, ironically, may also make it more difficult for police organizations to attract and retain good recruits, thereby potentially slowing growth or causing reductions in some agencies.

Hence, changing economic conditions may have multiple and contrary effects on police strength, as may other forces. Though tentative, perhaps these findings can also help to explain some of the mixed results of prior research on the determinants of police strength and stimulate thinking about ways to improve studies of this issue.

CHAPTER 4.

Hiring, Training, and Retention of Police Officers: A National Examination of Patterns and Emerging Trends

Christopher S. Koper and Gretchen E. Moore

Employing survey data collected from a national sample of police agencies, this chapter provides an exploratory examination of a number of issues pertaining to the hiring, training, and retention of police officers. The aim of the chapter is to produce a snapshot of hiring and retention patterns as of the year 2000 and to identify contemporary problems and challenges in these areas. The first part of the chapter discusses the length and attrition rates of common steps in the police hiring and training process and attempts to identify emerging trends in this area, focusing on recent changes in the length of the training process and assessing difficulties which agencies have experienced in filling recent vacancies. The chapter then investigates attrition in police agencies, focusing on the length of service of departing officers and the officers' reasons for leaving their agencies. An appendix to the chapter provides a brief look at the allocation of officers between field and support units and between command and line staff.

As stated in the introduction to this volume, the primary purpose of this research was to gather baseline data and knowledge that could prove useful to federal policymakers in managing and evaluating various aspects of the Community Oriented Policing Services (COPS) program, the federal government's initiative to add 100,000 officers to the nation's state and local police agencies through grants for hiring new officers and other means. Understanding the typical length of the hiring and training process, for example, can help federal authorities in forecasting and monitoring the progress of COPS grantees in hiring and deploying COPS-funded officers. Likewise, understanding typical attrition patterns could prove useful in assessing post-grant retention of COPS-funded officers and predicting periods when grantees are at greatest risk of cutting positions funded by expired COPS grants. At the same time, however, the information contained in the chapter has much broader relevance to police management in general and may prove useful to police administrators in efforts to improve forecasting, recruitment, and retention in their organizations.

The data source for this research is the Police Hiring and Retention (H&R) Survey, a telephone survey conducted in the summer of 2000 with a nationally representative sample of 1,270 police organizations (see the Methodological Appendix). We present findings separately for small agencies (i.e., those serving jurisdictions with fewer than 50,000 residents) and large agencies (i.e., those serving jurisdictions with 50,000 or more residents). Note that this examination of hiring and retention patterns is very general and brief due to both the difficulties of investigating these issues in depth through a telephone survey and the overall scope of research presented in this volume.

4.1. HIRING AND TRAINING OFFICERS

4.1.1. The Hiring and Training Process

The process of hiring and training officers most commonly involves three basic steps: screening and testing of applicants (e.g., background checks, oral interviews, written tests, psychological tests, and the like[21]), basic/academy training, and field training.[22] Table 4.1 presents the typical length of these steps, as reported by the H&R survey respondents. For officers required to go through all training steps, the full length of the screening and training process is approximately 31 weeks (7 to 8 months) in small agencies and approximately 43 weeks (10 to 11 months) in large agencies.[23]

Table 4.1. Average length of hiring and training steps (in weeks)

	Screening	Academy training	Field training
Small agencies (n=717)	6.84	15.17	9.18
Large agencies (n=553)	11.51	17.65	13.37

However, developing a more precise model of the hiring and training process requires consideration of additional factors. First, agencies do not require all new hires to go through each of the training steps. New hires with prior experience as sworn officers, for example, may be exempted from much of the training required for new police officers. Second, not all new hires complete their training successfully. Therefore, we inquired about agencies' experiences with hiring new officers during the previous year, asking them to report the number of hires and the numbers of those prospective officers who attended and successfully completed basic/academy training and field training.

A total of 999 agencies (479 large and 520 small agencies) reported hiring officers during the prior year (about 4.4 officers per agency on average). Figures 4.1 and 4.2 depict the progress of large and small agencies in training and deploying these officers. Using large agencies for illustration (see figure 4.1), 88% of the hired officers attended training academies, while the remaining 12% of hires were exempt from academy training due to reasons like prior experience or pre-service training. Eighty-one out of every eighty-eight (92%) academy entrants completed academy training successfully.[24] Hence, 93% of hires made it to the field training stage. About 3% of these officers were hired by agencies that did not require field training. Almost 96% of those who received field training (86 of 90) completed it successfully. In sum, 89 of every 100 new hires completed all training successfully.

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[21] The 1973 National Advisory Committee on Criminal Justice Standards and Goals recommended that police agencies use oral interviews, background checks, physical examinations, and psychological tests (for cognitive ability and personality) in selecting officers (Langworthy et al. 1995).

[22] We assume that the reader is familiar with the content of police training and do not discuss this matter in any detail.

[23] These findings appear to be broadly consistent with findings from the Bureau of Justice Statistics' Law Enforcement Management and Administrative Statistics (LEMAS) survey, a periodic survey of nationally representative samples of local police departments and sheriffs' agencies. According to the 1997 LEMAS survey of local police departments (Reaves and Goldberg 2000), the average training time for agencies serving jurisdictions of 50,000 or more persons ranged from 537 to 878 classroom hours (13-22 weeks) and from 374 to 501 field hours (9-12.5 weeks). For agencies serving jurisdictions with fewer than 50,000 persons, the average classroom hours ranged from 321 to 518 (8-13 weeks), and the field training hours ranged from 101 to 401 (2.5 to 10 weeks).

[24] We did not inquire as to whether the other academy entrants failed the academy or left voluntarily.

The process for small agencies worked similarly, though a higher fraction of hires in small agencies were exempt from academy training (see figure 4.2). In small agencies, 92 of every 100 new hires completed all training requirements successfully.

These results imply that for every 100 new positions created in police agencies (say, for example, by COPS grants), between 89 and 92 are filled by fully trained officers (i.e., officers who have completed both basic/academy and field training) within a year, based on the typical length of hiring and training processes and the normal rate of attrition among trainees.[25] The rate at which agencies fill the remaining positions is likely to depend upon a number of factors such as the pace of agencies' recruitment activities (e.g., periodic or continual), the number and timing of classes at the training academies used by the agencies, and the number of officers departing the agencies during the course of the year.

Figure 4.1. The hiring and training process in large agencies

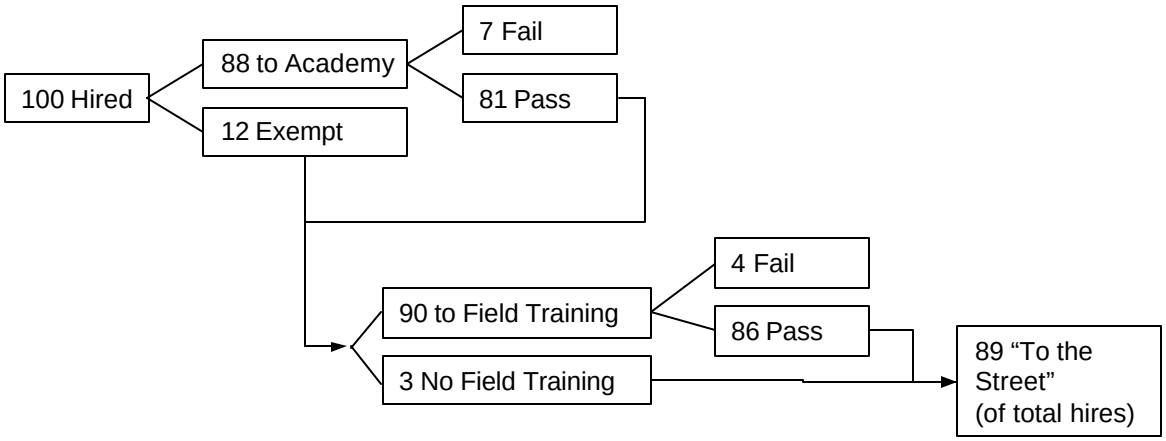
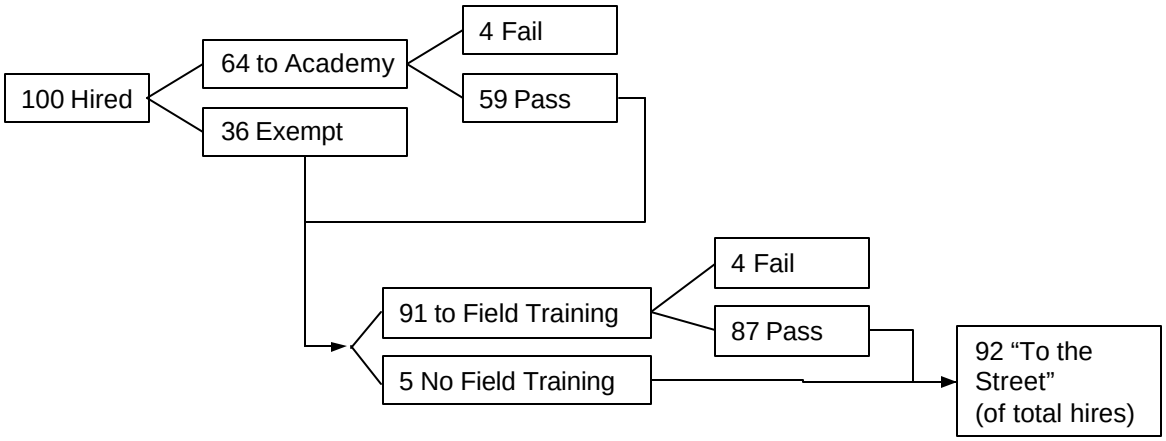


Figure 4.2. The hiring and training process in small agencies



[25] This statement assumes that funding is in place for hiring the new officers. The local budgetary and/or grant application procedures involved in acquiring funds for new positions add more time, of course, to the hiring process. We did not feel that it was practical to explore the details of these processes with a telephone survey. However, the steps and time involved in acquiring COPS hiring funds have been discussed elsewhere (Roth et al. 2000b).

4.1.2. Recent Changes in the Length of the Training Process

There have been important changes in police work during recent years that have ramifications for police training. Perhaps the most prominent change has been the growing adoption of community policing, a philosophy that shifts more emphasis to various means of proactive crime prevention and community partnership building. Community policing means different things in different places, but many activities commonly associated with community policing (e.g., structured problem solving) require skills falling outside the scope of more traditional police training. Accordingly, many police departments are incorporating community policing components into their training regimens. As of 1999, for example, more than half of the nation's local police departments employing nearly 90% of all officers trained at least some of their new recruits in community policing skills (Hickman and Reaves 1999, p. 9). One of the primary goals of the COPS program has been to facilitate the spread of community policing, and earlier research conducted with a subsample of agencies in the H&R survey suggested that COPS grants have sped transitions to community policing among grantees (Roehl et al. 2000).

In light of these developments, we inquired about changes in the length of police training (academy/basic and field) since 1995, the first full year of the COPS program. Overall, 57% of agencies reported an increase in the length of their training process (as shown in table 4.2, this figure was virtually the same for small and large agencies). One-third of agencies reported that the process had increased by up to 3 weeks, while a quarter reported that the process had increased by a month or more. Only 3.6% of agencies reported a decrease in the length of training.[26]

Agencies that experienced an increase in training time were asked about the sources of this change. As shown in table 4.2, changes in the required hours of academy or field training requirements were each cited by roughly 40% to 50% of both large and small agencies. However, our primary focus was on the contribution of community policing to this trend. Community policing training requirements contributed to increases in training time for just under a third of both small and large agencies that reported an increase in training time. Overall, therefore, roughly 18% of all police agencies (57% * 31%) have increased their training time since 1995 in order to, at least in part, provide training in community policing.[27]

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[26] Other research has provided conflicting indications on this point. Langworthy et al. (1995) found increases in the length of both academy and field training from 1990 to 1994 among agencies having more than 500 officers. LEMAS surveys (see footnote 3) showed no increase from 1993 to 1997 in the average number of required training hours for local police departments or Sheriffs' agencies, but they did show increases in training time from 1990 to 1997 for Sheriffs' agencies (see Goldberg and Reaves 2000; Reaves 1996; Reaves and Goldberg 2000; Reaves and Smith 1996). Reports from the 1999 LEMAS (Hickman and Reaves 2001; Reaves and Hickman 2001) do not address possible changes in training time since 1997, so the difference between the H&R and LEMAS results could be due to very recent changes in training requirements. Another possibility is that the increases in training time reported by H&R respondents have been slight (the H&R response categories cover very broad ranges of time) and were not detected by the earlier LEMAS surveys. Or, perhaps some agencies have increased training time, or even the length of time over which training occurs, without official changes in department or state policies regarding training hours (for example, Langworthy et al. [1995] reported that the probationary field training period required by very large police agencies did not increase from 1990 to 1994, but the number of days that new recruits were paired with field training officers did increase significantly).

[27] In verbatim responses collected from a small group of agencies, other causes for training increases included the need to cover more topics and skills, such as driving techniques, CPR, radar use, school resource officer training, foreign languages, and other issues. Several agencies reported that a general increase in the complexity of police work means that there is more to cover in training. Other responses included state requirements and/or internal department factors like a new chief or administration that chose to increase the training time.

Table 4.2. Reasons for increase in length of training process

	Large agencies (n=553)	Small agencies (n=717)
% Reporting increase in length of training process	58.4%	57.3%
Causes of increase for those reporting increase:		
New community policing training requirements in the academy	31.0%	31.0%
An increase in the required hours of academy training	44.8%	53.3%
An increase in the required hours of field training	43.4%	43.3%

4.1.3. Difficulties in Filling Vacancies

Some accounts suggest that the national pool of qualified police candidates does not meet current demand (Law Enforcement News 2000a). If true, a number of factors may be contributing to this phenomenon. First, the strong economy of recent years may have lured many good officer candidates and experienced officers away from law enforcement and into better paying jobs. Second, some departments may be experiencing or facing unusually high levels of attrition as baby boom generation officers reach retirement age (e.g., see Law Enforcement News 2000b). A third factor may be the COPS program. As of mid-1998, COPS grantees had hired approximately 39,000 officers funded through COPS grants (Koper and Roth. 2000). By May of 1999, approximately 61,000 officer positions had been funded through COPS. The creation of so many additional positions may be aggravating candidate shortages. Further, there is the possibility that COPS-funded officers have placed additional strain on training academies, creating problems of overcrowding and delayed entry.

With these possibilities in mind, we asked agencies whether they had experienced difficulties in filling recent vacancies. We administered these questions to all agencies that had hired officers in the previous year, as well as those that had unfilled vacancies during the previous year (19% of the agencies which had not hired officers in the previous year indicated having had vacancies during that time).

As shown in table 4.3, a lack of qualified applicants was the primary difficulty faced by agencies trying to hire officers. Over half of small agencies and approximately two-thirds of large agencies reported that a lack of qualified applicants caused some or much difficulty in finding officers. Overall, a quarter of the agencies reported that this factor caused much difficulty.

Over 40% of small agencies and over 50% of large agencies indicated that unanticipated vacancies caused at least some difficulty in filling positions. Crowding at academies and failures by academy entrants caused serious problems for very few agencies, though they caused some difficulty for a notable fraction of the agencies.

Overall, agencies that experienced difficulty in the hiring process reported an average of 1.4 vacancies left unfilled. This amounted to roughly one unfilled vacancy for every three officers hired (this was true among both small and large agencies).

In other analyses (not shown), the hiring difficulties reported by COPS agencies and non-COPS agencies were comparable; the most notable differences were modest in absolute terms. For example, unanticipated vacancies caused at least some difficulty for 47.6% of COPS grantees and only 37.8% of non-COPS agencies. COPS grantees were somewhat more likely to have experienced much difficulty due to lack of qualified applicants than were agencies without COPS grants (27% to 20%). Delays getting recruits into training academies were only a modest problem for both groups, but COPS grantees were somewhat more likely to experience some or much difficulty in this regard (16.5% to 11.5%).

Table 4.3. Factors creating difficulties in filling vacancies
*(n=409 small agencies and 538 large agencies)**

	No difficulty		Some difficulty		Much difficulty	
	Small	Large	Small	Large	Small	Large
Delays in getting recruits to academy (crowding)	85.0%	78.0%	12.0%	18.0%	2.5%	3.3%
Lack of qualified applicants	44.6%	34.3%	31.3%	35.0%	24.1%	30.4%
Recruits failing to complete academy	85.8%	58.8%	13.0%	38.2%	.9%	2.5%
Unanticipated vacancies	56.4%	43.0%	35.6%	46.3%	8.0%	10.0%
Other causes	77.5%	69.2%	14.3%	17.5%	8.2%	12.8%

* Based on agencies that hired officers and/or had unfilled vacancies.

4.2. OFFICER ATTRITION AND TENURE

Once officers have been hired and trained, how long do they typically serve with their agencies and under what circumstances do they leave? To answer these questions, we questioned H&R respondents about the number of officers leaving their agencies during the prior year, the circumstances of those officers' departures, and the departing officers' lengths of service.

On average, large agencies had a turnover rate of 5%, and small agencies had a turnover rate of 7% (table 4.4). Overall, 70% of agencies reported losing one or more officers during the previous year.

Table 4.4. Annual attrition rates

	Average sworn force size	Officers departing during the prior year	Attrition rate
Large agencies (n=541)	361.41	17.78	5%
Small agencies (n=710)	23.6	1.70	7%

4.2.1. Sources of Officer Attrition

Sources of officer attrition are presented in table 4.5.[28] A minority of officers leaving small agencies left due to retirement, medical reasons, or dismissal. About 20% of departing officers were retirees. The majority (59%) of departing officers left due to other circumstances which might have included transfers to other law enforcement agencies or a move out of the policing profession.

Small agency respondents estimated that about 45% of their departing officers went on to work for other law enforcement agencies.[29] While some of the officers leaving to join other law

[28] Respondents were questioned about the number of officers leaving their agencies during the past year and asked to provide the number leaving under the circumstances listed in table 4.5. The figures presented in table 4.5 are based on 816 of 894 agencies (91%) reporting the loss of one or more officers. The agencies retained for the analysis are those whose respondents provided counts of officers leaving due to retirement, disability, etc. which summed accurately to the total number of officers reported to have left the agency during the prior year.

[29] This estimate and the corresponding estimate noted below for large agencies are based on 760 respondents whose estimates of departing officers by reason and length of service (see below) both summed accurately to the total number of departing officers. Note also that the survey question on subsequent law enforcement service

enforcement agencies may have been retirees planning to spend a few additional years working for other agencies, it seems likely that most of these officers were among the 59% of officers departing for "other," non-medical and non-disciplinary reasons. This suggests, in turn, that about 35% of all departing officers (100%-20%-45%) left the policing profession for non-retirement reasons: about 21% probably had their careers cut short by disability or dismissal (assuming these officers obtain no additional law enforcement work), and the remaining 14% appear to have left the policing profession for other reasons.

In large agencies, some patterns were notably different. About half of the officers departing from large agencies were retirees. Hence, officers working in large departments seem more likely to serve full careers in their agencies than do their counterparts in small departments. Dismissals and medical-related departures accounted for small to modest percentages of departing officers. Over a third of departing officers left for other reasons.

Twenty-four percent of officers departing from large agencies were estimated to have gone to work for other law enforcement agencies. Assuming that these officers were among the 36% leaving for "other" reasons implies that about 27% of all departing officers probably left the policing profession for non-retirement reasons (100%-49%-24%). About 14% probably had their careers ended by medical or disciplinary reasons, while the remaining 13% appear to have left the policing profession of their own volition.

Table 4.5. Sources of officer attrition: Percentages of officers leaving under selected circumstances*

	Retirement	Disability / medical	Dismissal	Other
Small agencies (n=424)	20%	6%	15%	59%
Large agencies (n=392)	49%	5%	9%	36%

* Percentages may not add to 100 due to rounding.

4.2.2. Length of Service of Departing Officers

Twenty-one percent of officers leaving small agencies and 46% of those leaving large agencies had served 15 or more years with their agencies (see table 4.6), numbers virtually identical to the estimates of retiring officers.[30] In general, we can estimate that these officers had served for 20 or more years; the length of service required to receive full retirement benefits averages 20 years for small agencies and 23 years for large agencies. At the other extreme, two-thirds of the officers leaving small agencies had five or fewer years of service, as did one-third of officers leaving large agencies. Officers with intermediate lengths of service (i.e., 6-14 years) were the least prevalent among departing officers in both groups of agencies.

The high representation of short-term officers among departing sworn personnel may suggest that officers who decide to take jobs with other law enforcement agencies and those who choose to leave the profession entirely are most likely to do so early in their careers. In small agencies, other factors

inquired about officers leaving to serve with "another law enforcement agency." It is not clear if or how many respondents might have included private security jobs in that estimate.

[30] The analysis of officer tenure is based on 804 agencies whose respondents provided counts of officers leaving after specified periods of service (i.e., 1 to 5 years, 6 to 14 years, 15 years or more) that summed to the number of officers reported to have left the agency during the prior year. Overall, 894 agencies reported that one or more of their officers departed during the prior year.

may contribute to higher losses among relatively new officers: low pay and benefits; officers leaving for larger and/or more prestigious agencies after gaining a few years of experience; and retirees from large agencies working a few post-retirement years in management positions in small agencies.[31]

Table 4.6. Officer tenure: Departing officers by time served with agency*

	Served < = 5 years	Served 6-14 years	Served > = 15 years
Small Agencies (n = 427)	66%	14%	21%
Large Agencies (n = 377)	33%	21%	46%

* Percentages may not add to 100 due to rounding.

4.3. DISCUSSION

This paper has taken a brief look at contemporary patterns in the hiring, training, and retention of police officers. Perhaps the most noteworthy findings concern officer recruitment and retention. Over half of small agencies and two-thirds of large agencies reported that a lack of qualified applicants caused them difficulties in filling vacancies during 1999. While we do not have historical data to show whether this problem has become worse over time, the findings lend credence to anecdotal accounts suggesting that police recruitment is becoming more difficult for agencies around the country (e.g., Butterfield 2001; Law Enforcement News 2000a).

Unanticipated vacancies may be exacerbating this problem; 56% of large agencies and 44% of small agencies reported difficulties in maintaining staffing levels due to unanticipated vacancies. Further, an estimated two-thirds of officers who left small agencies and a third of those who left large agencies in 1999 had served for 5 or fewer years, suggesting that agencies are having difficulties with retaining new hires. As with the recruitment findings, however, we lack the historical data to show whether this pattern represents a new development (and note that many of these officers are thought to be continuing in law enforcement work with other agencies).

Nevertheless, the findings on officer recruitment and retention could be a warning flag for law enforcement. It is likely that the strong economy of recent years has aggravated recruitment and retention problems by luring some potential and new recruits away from law enforcement and into better paying jobs in the private sector. Increasing college requirements for law enforcement officers (Reaves and Goldberg 1999, p. v; 2000, p. 5) and current criticism of police over matters such as racial profiling and excessive use of force could be discouraging some from the profession as well. Further, the recent hiring binge in law enforcement, fueled by the COPS program, may have significantly drained the pool of potential applicants, thereby increasing competition between agencies for good

[31] Certain aspects of agencies' retirement plans may also influence the differences in time served between officers leaving small and large agencies. An officer must typically serve for some period of time before becoming vested in his or her agency's retirement plan (when vested, the officer can leave the agency and retain his or her retirement savings). While the average time to vesting does not differ much between large and small agencies, there are some differences in the distribution of vesting periods. The primary difference is that 11.4% of small agencies have immediate vesting, while only 3.3% of large agencies have immediate vesting. At the opposite end of the spectrum, 6.6% of small agencies require 15 years of service for vesting in contrast to nearly 13% of large agencies. These differences may be another reason why officers in large departments serve in the same agency for longer periods.

officers. These problems could become worse as larger numbers of baby boom officers enter their retirement years. Hence, strengthening methods for recruiting and retaining qualified officers could be emerging as one of the major contemporary challenges facing law enforcement administrators.

Another implication of the findings is that efforts by OCOPS and other agencies to increase police staffing through grants for hiring new officers may be approaching a saturation point, at least for the present. Hence, COPS grants that attempt to put more officers in the field through efficiency gains from newly funded civilians and technology, rather than through funding new sworn officers, could begin to assume a more prominent role in OCOPS' funding efforts. Of course, it remains to be seen whether the nation's changing economic conditions will alter the patterns of hiring and retention observed in this study.

APPENDIX 4.A. OFFICER ALLOCATION AND THE COPS PROGRAM: SOME THOUGHTS ABOUT FUTURE LINES OF INQUIRY

4.A.1. Allocation to Field and Support Units

Once agencies have hired and trained officers, how do they allocate them across units and ranks? H&R survey interviewers inquired about the number of officers working in field units, defined as units doing patrol, investigations, or other field work, and the number working in non-field support units, such as administrative services, technical services, or planning and research. We used these numbers to develop the estimates of field to support officer ratios displayed in table 4.A.1. The first set of estimates is based on all respondents. The estimates reflect the ratio of the mean number of officers reported to be in field units to the mean number of officers reported to be in support units. Because some respondents reported numbers of officers in field and support units that were not consistent with their agency's overall sworn force, we calculated separate estimates based on agencies whose respondents reported numbers of officers in field and support units that summed to within 5% of their agency's overall sworn force size ("best data" respondents). Using the separate estimates as ranges, they imply that 81% to 85% of sworn officers in small agencies serve in field units, as do 77% to 80% of sworn officers in large agencies.[32]

Table 4.A.1. Ratio of sworn officers in field units to sworn officers in support units

	All respondents	Best data respondents
Small agencies	4.35 n=717	5.7 n=240
Large agencies	4.01 n=551	3.48 n=240

4.A.2. Ratio of Command Staff to Officers

Interviewers also asked respondents to estimate the ratio of command staff to officers in their respective agencies. Because police agencies use a variety of rank structures, we allowed respondents to define "command staff" as it applies for their agency. In departments with more than a few officers, we can expect command staff to comprise officers ranking above the department's first supervisory rank. In larger agencies, for example, ranks of lieutenant or above would most likely qualify as command staff.

Table 4.A.2. shows that there are an estimated 7.31 to 9.63 line officers for every command staff officer in small agencies (the range is based on separate estimates calculated for all respondents and the "best data" respondents used in the previous section). For large agencies, this figure ranges from 28.26 to 31.54. Focusing on the "best data" estimates, there is thus one command staff officer for approximately every 10 officers in small agencies and every 28 officers in large agencies.

[32] Similarly, a Bureau of Justice Statistics (BJS) 1996 census of state and local law enforcement agencies reported that about 79% of all state and local law enforcement officers serve in the field, responding to calls for service or conducting investigative duties (Reaves and Goldberg 1998, p. 3). The H&R survey did not inquire about the specific duties of non-field support officers, but the BJS census suggests that about half of these officers perform jail or court-related duties while the remainder conduct various administrative, training, research, and technical support activities.

Table 4.A.2. Ratio of officers to command staff

	All respondents	Best data respondents
Small agencies	7.31 (n=710)	9.63 (n=240)
Large agencies	31.54 (n=526)	28.26 (n=240)

Combining these estimates with the estimates of officer allocation between field and support units suggests the following. (The following figures are based on the "best data" estimates of officer allocation.) For every 100 officers serving in large agencies, roughly 77 officers work in field service units, while the remaining officers work in support units. Based on the estimated ratio of command staff to officers, about 3 command staff officers are required to supervise the 77 field officers. Therefore, we can estimate that there are 74 officers serving in non-command field assignments for every 100 officers serving in large agencies. For small agencies, the comparable figure is about 76 officers. Note, however, that command staff in smaller agencies probably participate more significantly in field activity.

Table 4.A.3 illustrates the years of service required for officers to move into supervisory positions. Officers in large agencies must serve nearly three and a half years on average before being eligible for a supervisory position, while their counterparts in small agencies must serve a little over two years on average. For both large and small agencies, the lowest ranking supervisory position is typically that of sergeant or corporal (table 4.A.4), though this varies more widely in smaller agencies.

Once promoted to the lowest ranking supervisory position, officers must serve 1.2 and 1.7 years in small and large agencies, respectively, to be promoted to the next supervisory rank (table 4.A.3). In sum, therefore, officers in large agencies must serve over 5 years on average before reaching middle management positions, while those in small agencies must serve an average of 3.4 years.

Table 4.A.3. Years of service required for supervisory positions

	Lowest ranking supervisory position	Promotion to next rank
Large agencies (n=536)	3.41	1.74
Small agencies (n=700)	2.19	1.22

Table 4.A.4. Lowest ranking supervisory position

	Small agencies (n=700)	Large agencies (n=536)
Sergeant	52.8%	76.7%
Corporal	17.3%	14.6%
Patrol Officer	5.2%	1.6%
Chief	4.0%	.1%
Chief Deputy	2.3%	0.0%
Lieutenant	1.8%	2.5%
Other	7.8%	3.7%
Does not apply	5.7%	.6%
No answer	3.1%	.2%

We have taken this brief look at officer allocation primarily to stimulate thinking about additional organizational issues that could prove relevant to the legacy of COPS. The impact, if any, of COPS on officer allocation between field and support units, for instance, could prove to be a subtle but noteworthy topic because of its potential impact on crime control. If COPS grants facilitate the deployment of a higher fraction of officers into field units, this might conceivably enhance any crime control benefits stemming from COPS (e.g., see Wilson and Boland's [1978] discussion of officer allocation and crime control).

The potential impact of COPS MORE (Making Officer Redeployment Effective) grants on staff allocation may prove to be particularly interesting. MORE grants provide funding for technical equipment and civilians that are intended to create time savings which, in turn, enable grantee agencies to put more of their officers into the field and/or to keep field officers in the field for greater lengths of time. In other words, MORE grants attempt to increase the number of officers serving in the field without increasing the number of officers hired.[33]

However, trying to predict how MORE grants might affect officer allocation is an ambiguous task. Grants for civilian hires may often facilitate the redeployment of sworn officers from support assignments to fieldwork, thereby increasing the ratio of field to support officers. However, most of the productivity gains expected from MORE grants are linked to technology grants; as of mid-1998, for instance, about three-quarters of the officer equivalents awarded through MORE grants were associated with technology grants (Koper and Roth 2000, p. 165). MORE grantees typically use their technology awards for things like mobile and desktop computers, computer-aided dispatch systems, and booking/arraignment technologies, among other things (Roth et al. 2000c). While the productivity gains from these technologies might sometimes free officers for redeployment from support to field tasks, it seems that the major productivity gains permit existing field personnel to spend more time in the field and less on administrative tasks like submitting reports (see Roth et al. 2000c). That being the case, we would not necessarily expect MORE grantees to have a higher field to support officer ratio; it is even conceivable that they would have lower ratios because the grants might enable them to get the same time in the field from fewer officers or because they would assign more officers to work directly with the new technology (for example, assigning sworn officers to new crime analysis tasks using new computers).

To take a first exploratory look at this issue, table 4.A.5 displays field to support officer ratios for MORE grantees. Small MORE grantees reported field to support officer ratios between 4.76 (all respondents) and 4.88 (best data respondents). Large MORE grantees reported ratios between 3.25 and 3.93. Comparing these ratios to the allocation ratios shown earlier in table 4.A.1 suggests that MORE grantees do not deploy a higher fraction of their officers into the field than do other agencies (the field to support ratios reported by MORE grantees tended to be somewhat lower than those reported by the full sample). This would seem to support the notion that MORE grantees are achieving their productivity gains primarily by keeping officers in the field for longer periods rather than by reallocating officers from support to field positions. We must stress, however, that we lack the historical data to show whether MORE grants have altered field and support allocations within the MORE agencies.[34]

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[33] Nearly 40,000 of the first 100,000 officers awarded through the COPS program were measured in terms of time savings projected from MORE grants (Koper and Roth 2000).

[34] For example, it is possible that MORE applicants tend to have a lower fraction of their officers working in the field, and that MORE grants have enabled them to raise their field officer allocations.

Table 4.A.5. Ratio of field to support officers (COPS MORE grantees)

	All respondents	Best data respondents
Small agencies	4.76 (n=275)	4.88 (n=102)
Large agencies	3.93 (n=335)	3.25 (n=139)

Interviewers also asked respondents if they believed that the share of officers working in non-field support units will change in coming years due to factors like civilianization, deployment of new technology, privatization, and department reorganization. Although the largest group of respondents felt that there would be no change in officer deployment, the remaining respondents were more likely to believe that allocation of officers to support services would increase. Results in table 4.A.6 show that there were no dramatic differences in the expectations of MORE grantees and other agencies (i.e., agencies with no COPS grants and agencies with COPS hiring grants only). Small MORE agencies were somewhat less likely to believe that allocation of officers to support units would increase than were other small agencies (38% to 46%), and large MORE grantees (who received MORE-funded civilians more often than did small MORE agencies – see Roth et al. 2000c) were somewhat more likely to believe that such allocation would decrease than were other large agencies (22.8% to 18%).

Table 4.A.6. Respondents expectations regarding changes in the percentage of sworn officers working in non-field support services

	COPS MORE grantees		Other agencies	
	Small (n=243)	Large (n=328)	Small (n=367)	Large (n=210)
Increase a lot	6.7%	5.0%	6.6%	7.4%
Increase a little	31.3%	29.5%	39.4%	26.1%
Remain unaffected	56.8%	42.7%	48.7%	48.4%
Decrease a little	3.9%	18.9%	4.5%	16.2%
Decrease a lot	1.2%	3.9%	.8%	1.8%

Although we have focused on officer allocation and COPS MORE grants, there are also allocation issues relevant to COPS hiring grants. For example, COPS hiring grants are intended specifically to fund officers working in field assignments. Consequently, these grants could be increasing both the number and percentage of officers that grantee agencies have working in field assignments. If, on the other hand, the ratios of field to support and line to command officers presented above reflect organizational necessities (such as optimal supervisory levels for controlling corruption), then hiring grantees may tend to adjust to COPS-funded staffing increases by moving some non-COPS field officers into supervisory and support roles.

Another potential question is how COPS might be changing the philosophy of command staff in policing agencies. It would seem that many of the officers placed into community policing assignments created with COPS funds, including both experienced officers and new COPS hires,[35] are now eligible for supervisory roles, based on the preceding figures on the time to eligibility for supervisory and command staff positions. The success of community policing officers in ascending to supervisory roles may prove to be an important organizational factor that affects the speed and resilience of an agency's transition to community policing.

[35] Many COPS hiring grantees place their newly hired COPS officers into regular patrol work and move more experienced officers into community policing assignments, a strategy referred to as "backfilling" (see Roth et al. 2000c).

CHAPTER 5.

Retention of Staff Positions Funded Through the Federal COPS Program: Comparing Retention Rates Among COPS Agencies to Historical Patterns of Staff Retention in Police Agencies

Christopher S. Koper and Gretchen E. Moore, With David E. Huffer

One of the most ambitious crime policy initiatives of recent years has been the federal government's Community Oriented Policing Services (COPS) program. Passed as part of the *Violent Crime Control and Law Enforcement Act of 1994*, a primary objective of the COPS program is to add 100,000 additional police to the nation's communities. One mechanism for achieving this is hiring grants that generally fund up to 75% of the salary and fringe benefits of new officers for three years. When the federal government reached the milestone of funding 100,000 officers in May 1999 (additional officers have been awarded since that time), approximately 61,000 of these officers had been funded through hiring grants (the remainder had been funded through grants to improve officer productivity by means of new technology and civilian positions).

The long-term impact of COPS on sworn force levels in the United States will be heavily influenced by the extent to which grantees retain COPS-funded positions after the grants expire. In other words, how much of the staffing increase funded by COPS will prove to be temporary and how much will last permanently, or at least indefinitely? The first part of this chapter assesses retention of COPS-funded positions using survey data gathered from a random sample of over 600 COPS grantee agencies (of all sizes and types) that were awarded COPS hiring grants in 1995 or earlier and that were interviewed by telephone for the Police Hiring and Retention (H&R) Survey in the summer of 2000 (see the Methodological Appendix). The updated survey data permit an assessment of both actual retention patterns for positions funded by expired COPS grants and expected retention patterns for positions that are still covered by COPS funding requirements.

As will be shown below, most COPS grantees have retained or expect to retain their COPS-funded positions, but a notable minority will not maintain their COPS-funded staffing increases. This may not prevent COPS from adding 100,000 more officers to the nation's police forces on a temporary or permanent basis, but it does imply that COPS will need to fund more than 100,000 officers to achieve a lasting increase of 100,000 officers. Should we view this as a failure of the COPS program?

Judging the success or failure of COPS in creating stable increases in police staffing can arguably be facilitated by reference to historical patterns of staff retention following periods of police growth. If, for example, an agency increases its sworn force from 100 to 110 officers, how long should we expect the agency to maintain a force of 110 or more officers based on historical norms? How long should we expect the agency to maintain a force greater than its baseline level of 100 officers? The second section of this chapter investigates these questions using national data on police employment from 1975 through 1994, a period prior to the start of COPS. We then conclude by contrasting retention rates among COPS grantees to historical patterns of staff retention. Based on the limited

data available at this time, it appears that, overall, observed and expected retention rates among COPS grantees are consistent with what we would expect based on historical patterns.

5.1. RETENTION OF STAFFING INCREASES FUNDED BY COPS HIRING GRANTS

As noted above, COPS hiring grants are three-year awards. After a grant expires, COPS award regulations stipulate that the grantee must keep the COPS-funded position(s) for one full budget cycle (generally, one year) following the budget cycle in which the grant expires. Using data gathered during the H&R survey, we examine both current retention of positions funded with expired COPS grants and expected retention of positions still covered by either COPS funding or COPS retention requirements. H&R survey interviewers administered the COPS retention questions to 638 police agencies that were sampled from among year 1995 COPS hiring grantees (see the Methodological Appendix).[36] These agencies were chosen because they were among the earliest COPS grantees and, consequently, were more likely to have expired grants than were later cohorts of hiring grantees.

Note that in all analyses for this chapter, our focus is upon the retention of positions, irrespective of the particular officers filling those positions. For the COPS retention analyses, we counted positions as retained (or likely to be retained) only if they had not been cut (or were not expected to be cut) and had not been retained by cutting or using vacancies in non-COPS positions (or were not expected to be retained through such means). By these criteria, an agency with five expired COPS positions that reported keeping all five positions through cuts in other positions would not qualify as a true retaining agency. Hence, our focus is on the full or partial retention of staffing increases that were achieved with COPS funds. In other words, does it appear that an agency that had n officers and received a grant for k COPS officers will retain n+k officers or retain at least more than n officers after the expiration of its COPS grant?

5.1.1. Short-Term Retention of Positions Funded by Expired Grants

Among the 638 agencies that were questioned about COPS hiring grants during the H&R survey, 374 (63% weighted) had one or more expired COPS grants. For 185 of these agencies, all COPS grants were expired. As noted earlier, however, COPS grantees are required to keep positions for one full budget cycle following the budget cycle in which the positions expire. Hereafter, we use the term "programmatically expired positions" to refer to expired COPS positions that have been expired for longer than a full budget cycle and are thus eligible for cutting. Only 277 of the surveyed agencies (49% weighted) had programmatically expired COPS positions. Of this group, 213 agencies were no longer required to keep any of their COPS-funded positions.

To determine whether the staffing increases produced by COPS grants had been maintained, interviewers inquired as to whether programmatically expired COPS positions had been cut. If the positions had not been cut, interviewers asked whether the agency had kept any of the COPS positions by cutting non-COPS positions or by using vacancies that opened up through the departure of officers in non-COPS positions.

As shown in table 5.1, about 12% of large agencies and 20% of small agencies with programmatically expired COPS positions had cut some or all of these positions (as in the other chapters in this volume, we classify large agencies as those serving jurisdictions with 50,000 or more persons and classify small agencies as those serving jurisdictions with fewer than 50,000 persons). In addition, nearly 13% of large agencies and nearly 9% of small agencies indicated keeping COPS positions through cuts or attrition involving non-COPS positions.

[36] These agencies were in the COPS FAST/AHEAD and COPS UHP strata of the H&R survey (see the Methodological Appendix).

Agencies that had cut COPS positions were questioned about the reasons for these cuts. Overall, 14% of the agencies with programmatically expired COPS positions had cut some or all of those positions. Interviewers questioned respondents for these agencies about possible reasons for the cuts. Echoing findings discussed elsewhere in this volume, nearly half of the agencies cutting positions cited economic/financial reasons for the cuts, but none of the agencies cited crime reduction as a factor (see table 5.2).[37]

The key numbers reflecting retention of COPS-funded staffing increases are shown in the fourth and fifth rows of table 5.1. Note that based on the timing of the H&R survey, we can expect that the programmatically expired positions had been so since only 1999 or early 2000 (in some cases, perhaps as early as 1998).[38] Consequently, the retention figures represent short-term retention rates. Three-quarters of large agencies and just over 72% of small agencies with programmatically expired COPS positions indicated that they had kept all of their COPS positions without making cuts or using attrition of non-COPS positions. In other words, about three-quarters of large and small agencies had fully retained the staffing increases funded by COPS. The figures change very little when considering partial retention of COPS-funded staffing increases; that is, virtually all COPS grantees retaining COPS positions without cuts or attrition reported keeping all COPS positions.[39]

Table 5.1. COPS grantees' experiences with retention of programmatically expired cops positions*

	Large agencies (n=116)	Small agencies (n=152)**
Cut some or all COPS positions	11.2%	20.2%
Keeping some or all COPS positions through cuts or attrition	12.6%	8.6%
Keeping some or all COPS positions using other grants***	1.2%	0.2%
Keeping all COPS positions without cuts or attrition (full retention of staffing increases)	75.0%	72.2%
Keeping some or all COPS positions without cuts or attrition (full or partial retention of staffing increases)	75.5%	73.4%

* Categories are not mutually exclusive. Retention status was unclear for 4% of large agencies and 6% of small agencies.

** Excludes nine agencies that had received supplemental COPS grants (under the Small Communities Grant Program) to assist small agencies with retention.

*** Agencies with all programmatically expired positions on other grants were not counted as retaining agencies because the positions were not yet on the agencies' base budgets.

[37] We did not run these analyses separately for large and small agencies due to the small sample size. Twenty-five of the thirty-three agencies were small agencies.

[38] A few thousand of the earliest COPS hiring grants were awarded in late 1993 and 1994 under the Police Hiring Supplement (PHS) and COPS Phase I grant programs (Gaffigan et al. 2000). If the sampled agencies had such grants, they may have expired programmatically prior to 1999.

[39] For these analyses, we treat all COPS awards granted to an agency as one staffing increase. Our data do not permit the calculation of retention rates for each individual COPS grant awarded to an agency with multiple grants. Likewise, these figures do not refer to the percentage of individual COPS positions that have been retained. An assessment of the number of COPS positions that have been retained (and the number that are likely to be retained in the future) will be presented as part of a separate, forthcoming report which will update earlier estimates of the COPS program's impact on sworn force levels throughout the nation (Koper and Roth 2000).

Table 5.2. Reasons for discontinuing programmatically expired COPS-funded positions (n=33)

Reason	% Saying reason was applicable
New political administration with new priorities came into office	10.5%
Jurisdiction experienced decrease in crime and needed fewer officers	0%
Fiscal constraints	48.6%
Other reasons	40.8%

5.1.2. Retention Projections for COPS Positions Not Programmatically Expired

When applicable, respondents were also questioned about whether they expected their agencies to keep COPS positions that had not programmatically expired (i.e., positions that had not expired financially and/or were still covered by the federal one budget cycle retention requirement). Overall, 12% to 13% of COPS grantees expect to cut some or all of their COPS positions when the grants expire (table 5.3). About 21% of agencies expect to cut non-COPS positions or use attrition to retain some or all of their COPS positions.

The key short-term retention figures are presented in the third and fourth rows of table 5.3. Just over two-thirds of both small and large COPS grantees expect to maintain COPS-funded staffing increases in full without cutting other positions or using attrition. Seventy-four percent of small COPS agencies and eighty percent of large COPS agencies expect to retain at least some COPS positions without cuts or attrition.

Respondents were also questioned about the length of time that their agencies expect to keep these positions (see bottom two rows of table 5.3). Virtually all of the large agencies expecting to maintain COPS positions expect to maintain these positions for five or more years, regardless of whether they expect to retain all or just some of the positions. Small agencies expect some drop in their long-term retention rates. For example, 73.9% of small agencies expect to keep at least some of their positions for the short-term, but a little less than 68% expect to keep at least some of their positions for as long as 5 years. Nonetheless, by either definition of retention (full or partial), over 90% of small retaining agencies expect to retain their positions for the long term.[40]

The preceding analyses demonstrate that observed and expected retention rates among COPS grantees are high but certainly not perfect. How might we judge these retention rates? Should we view them as evidence of success or failure? One way that we might begin to answer these questions is to put COPS retention rates into an appropriate context. More specifically, we might ask whether retention rates among COPS agencies are consistent with normal practice. Accordingly, the next section examines typical retention patterns in police agencies over the course of 20 years.

[40] The observed and expected retention rates reported here are better than those reported in an earlier evaluation of the COPS program. Preliminary projections based on survey data gathered in the summer of 1998 suggested that more than half of grantees might fail to retain at least some of their COPS-funded staffing increases (Roth et al. 2000c, pp. 112-113). Methodological differences between this and the earlier study (e.g., differences in the groups of agencies surveyed) and differences in the respondents' levels of experience with expired or nearly expired COPS grants at the time of the two surveys probably account for some of the differing results. It also seems likely that grantees are currently more informed about COPS retention requirements. At the time of the earlier survey, the one budget cycle retention requirement had not been clearly established. Further, the federal COPS Office (the agency that administers COPS grants) has recently undertaken efforts to improve grantees' understanding of programmatic retention requirements, including the stipulation that grantees should use COPS funds to supplement, and not supplant, local funds (i.e., grantees should not retain COPS positions by cutting or failing to fill other positions).

Table 5.3. COPS grantees' expectations regarding future retention of cops positions not yet programmatically expired

	Large agencies (n=238)	Small agencies (n=286)
Cutting some or all COPS positions.	13.4%	12.2%
Keeping some or all COPS positions through cuts or attrition.	20.8%	21.4%
Keeping all COPS positions without cuts or attrition (full retention of staffing increases).	67.3%	68.0%
Keeping some or all COPS positions without cuts or attrition (full or partial retention of staffing increases).	79.7%	73.9%
Keeping all COPS positions without cuts or attrition (full retention of staffing increases) for 5 or more years.	66.7%	62.6%
Keeping some or all COPS positions without cuts or attrition (full or partial retention of staffing increases) for 5 or more years.	77.9%	67.5%

5.2. HISTORICAL PATTERNS OF STAFF RETENTION FOLLOWING PERIODS OF AGENCY GROWTH

In this section, we investigate historical patterns of staff retention in police agencies using 20 years of police employment data reported by state and local law enforcement agencies to the Federal Bureau of Investigation's Uniform Crime Reports (UCR).[41] Our objective is to determine how long agencies typically retain new positions following periods of growth. The analysis is based on 8,365 agencies that reported employment data with sworn officer counts to the UCR for each year from 1975 to 1994 and that experienced one or more moderate to large staffing increases from 1976 to 1993. We identified such staffing increases by examining the agencies' annual changes in sworn force. For each occasion when an agency experienced a substantial staffing increase, we tracked the agency's subsequent annual sworn force levels through 1994 to determine how long the agency maintained some or all of that staffing increase. We selected 1994 as the last tracking year because the COPS program began that year. We conducted survival analyses (Allison 1995) with these data to gauge typical retention patterns.

As for most analyses presented in this report, we classified agencies as small or large based on the population of each agency's jurisdiction. In order to focus on changes in agency size that seemed more likely to represent meaningful, planned changes (rather than fluctuations due to annual turnover), we selected staffing increases of 20% or more for small agencies and 5% or more for large agencies.[42] We also chose these levels because COPS hiring awards through year 2000 have averaged, in sum, 5% of the sworn force size of large grantees and 24% of the sworn force size of small grantees;[43] hence, the historical analysis is based on staffing increases approximately as large or larger than those typically funded by COPS.

[41] We obtained the data from the UCR's annual Law Enforcement Officers Killed and Assaulted files, which are publicly archived by the Inter Consortium for Political and Social Science Research. The analyses are based on actual sworn force levels as opposed to authorized or budgeted sworn force levels, which are not readily available.

[42] We selected larger percentage increases for small agencies because percentage changes tend to be more volatile in agencies with small numbers of officers.

[43] These figures are based on an analysis of grant records from the federal Office of Community Oriented Policing Services (the agency which administers COPS grants).

Using these criteria, we identified 19,364 staffing increases in small agencies and 4,565 staffing increases in large agencies.[44] The staffing increases averaged 54% for small agencies and 20% for large agencies. The survival time for each staffing increase corresponds to the number of years that the agency maintained the new staffing level (or retained at least some portion of the staffing increase). If the agency retained the new staffing level through 1994, then the case was censored at 1994. For censored cases, we know only that the higher staffing level was maintained through at least 1994.[45]

The first set of analyses examines full retention of staffing increases. If, for example, an agency with n officers grows to n+k officers, how long does the agency maintain a force of at least n+k officers? Table 5.4 presents the probabilities that staffing increases are maintained for selected lengths of time based on the estimation of survival functions (see Allison 1995, pp. 9-60). To illustrate, the chance that a staffing increase is maintained in full for at least a year after its occurrence is 63% for small agencies and 66% for large agencies. By the fifth year following a staffing increase, these figures decline to 37% and 47% for small and large agencies, respectively. Therefore, less than half of staffing increases in police agencies are maintained fully for at least five years, based on the staffing increase criteria used in these analyses. The full survivor functions for small and large agencies are illustrated graphically in figures 5.1 and 5.2.

Agencies are most likely to fail at maintaining full staffing increases during the first few years after the staffing increase occurs. The longer the agency maintains the higher staffing level, the more likely it is that the new staffing level will be maintained indefinitely (hence, the survival curves in figures 5.1 and 5.2 become flatter over time). This might suggest that agencies tend to raise staffing levels in advance of expected attrition so that the target staffing level is equal to the increase of k officers minus some number of officers that are expected to depart.

The data provide some indications that large agencies are more likely to fully maintain staffing increases than are small agencies, but such inferences may be contingent on the magnitudes of the staffing increases chosen for analysis. A 5% staffing increase in a large agency may not affect the agency in the same way that a 20% staffing increase affects a small agency. Moreover, large and small agency comparisons are not central to the research question under study.

Table 5.4. Probabilities that staffing increases will be retained in full for selected lengths of time by agency size

Time in years	Small agencies (n=19,364 staffing increases)	Large agencies (n=4,565 staffing increases)
1 year	.63	.66
2 years	.50	.56
3 years	.44	.52
4 years	.40	.49
5 years	.37	.47
10 years	.30	.44
15 years	.28	.42

[44] Note that any given agency may have had multiple staffing increases incorporated into the analysis.

[45] Of course, the potential follow-up time varied according to when the staffing increase occurred. A staffing increase occurring from 1975 to 1976 had 18 years of potential follow-up before censoring. In contrast, a staffing change occurring from 1992 to 1993 had one potential year of follow-up.

Figure 5.1. Probability that small agencies retain staffing increases in full, by years of follow-up

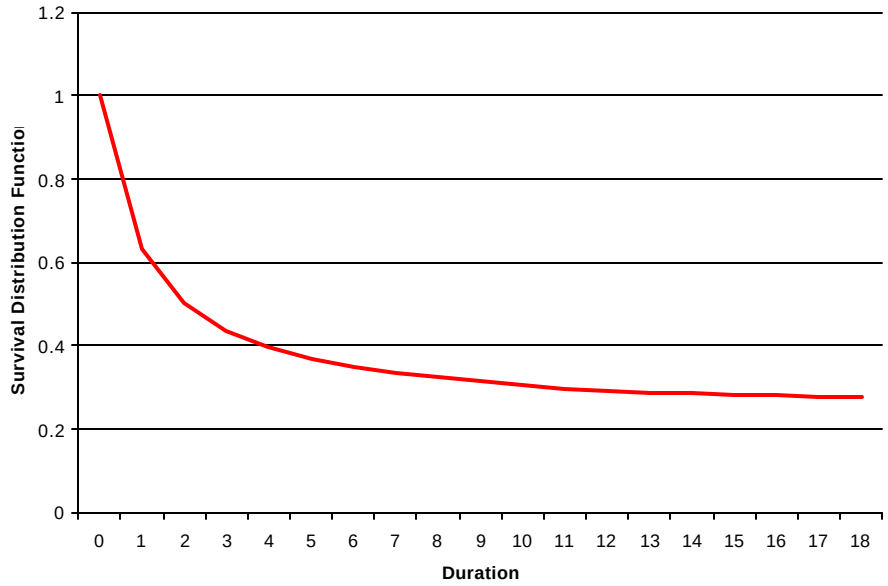
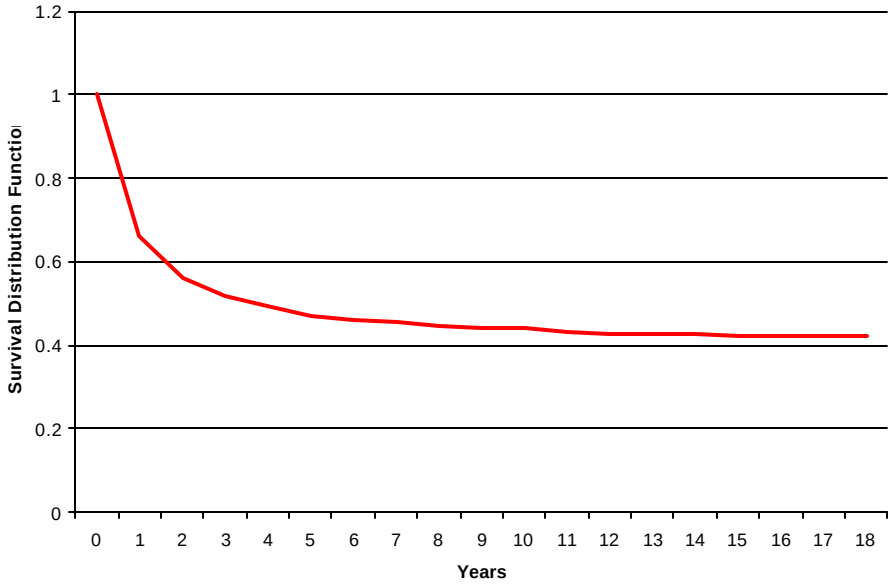


Figure 5.2. Probability that large agencies retain staffing increases in full, by years of follow-up



Further analyses revealed that full retention varies by the size of the staffing increase. As shown in tables 5.5 and 5.6, staffing increases are more likely to be maintained in full in both small and large agencies when they are more modest in size.

Table 5.5. Probabilities that staffing increases will be retained in full for selected lengths of time by size of staffing increase (small agencies)

Time in Years	Increases Below Median: 20% to 33% (n=8,263 staffing increases)	Increases Above Median: >33% (n=11,101 staffing increases)
1 year	.66	.61
2 years	.54	.48
3 years	.48	.41
4 years	.44	.36
5 years	.41	.34
10 years	.35	.27
15 years	.33	.25

Table 5.6. Probabilities that staffing increases will be retained in full for selected lengths of time by size of staffing increase (large agencies)

Time in years	Increases below median: 5% to 9.8% (n=2,290 staffing increases)	Increases above median: >9.8% (n=2,275 staffing increases)
1 year	.68	.63
2 years	.59	.54
3 years	.55	.49
4 years	.52	.46
5 years	.50	.44
10 years	.47	.41
15 years	.45	.40

In a second set of analyses, we estimated the probability that an agency maintains at least some of a staffing increase for selected periods of time. If, in other words, an agency increases its force from n officers to n+k officers, how long does the agency maintain any staffing level higher than its baseline level of n? Using this criterion, agencies are much more successful at retaining staffing growth (see table 5.7). The chance that an agency will retain some of its growth for at least a year is 92% for large agencies and 81% for small agencies. The five-year maintenance rate is 79% for large agencies and 59% for small agencies. As in the previous analyses, the likelihood that an agency fails to maintain a staffing increase is greatest during the period immediately following the increase. Also, there are again tentative indications that large agencies are more successful at retaining new positions, subject to the caveats noted above. Indeed, 72% of staffing increases in large agencies last in at least some residual form for 15 years. Figures 5.3 and 5.4 illustrate the survivor functions.

Table 5.7. Probabilities that staffing increases will be retained partially for selected lengths of time by agency size

Time in years	Small agencies (n=19,364 staffing increases)	Large agencies (n=4,565 staffing increases)
1 year	.81	.92
2 years	.72	.87
3 years	.66	.83
4 years	.62	.80
5 years	.59	.79
10 years	.51	.74
15 years	.48	.72

Figure 5.3. Probability that small agencies retain staffing increases partially or fully, by years of follow-up

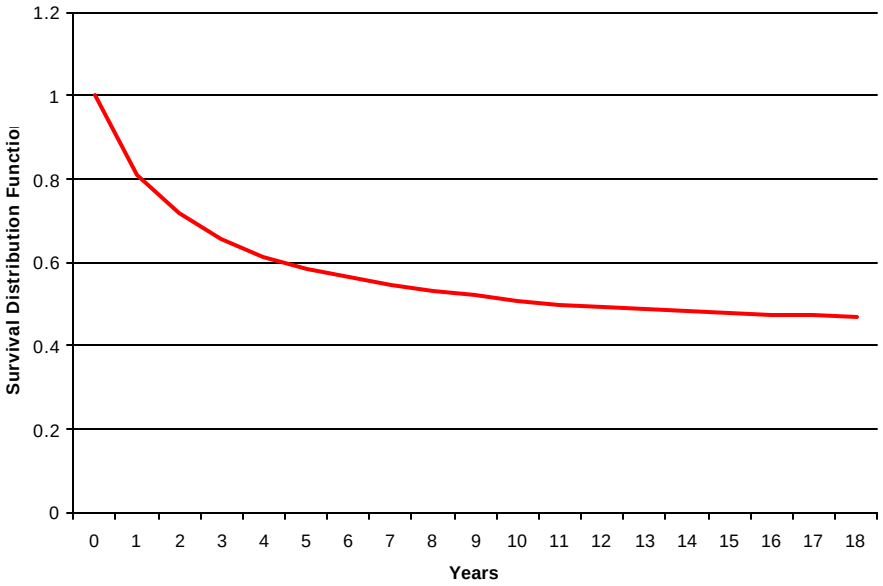
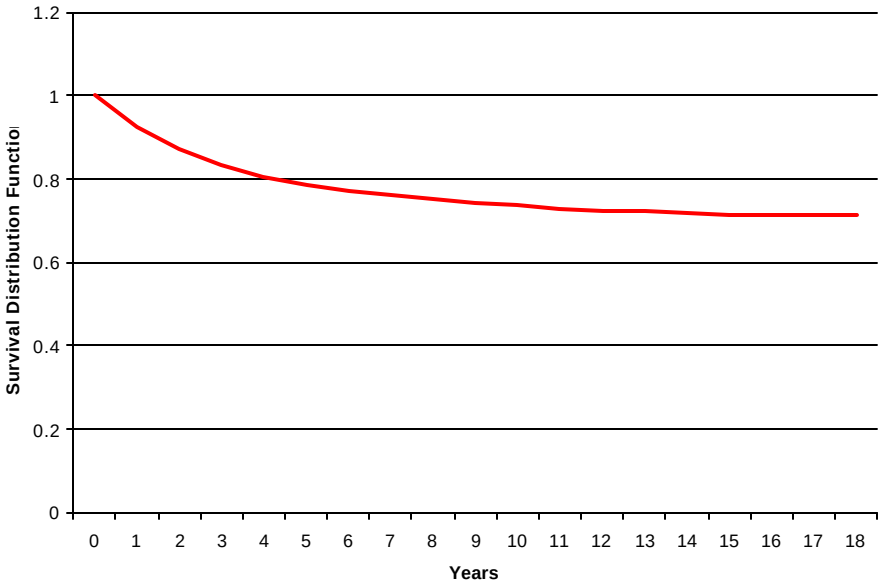


Figure 5.4. Probability that large agencies retain staffing increases partially or fully, by years of follow-up



The size of the staffing increase is not strongly related to this weaker form of retention. Among small agencies, the survivor functions for staffing increases above and below the median do not differ significantly. For large agencies, the differences are statistically significant but modest. The differences are most notable at longer follow-up times. For example, staffing increases above the median have a .81 probability of retention to 5 years, while those below the median have a probability

of .76. (This may suggest that larger staffing increases are more indicative of meaningful, planned staffing changes in large agencies.)

To conclude, this investigation has revealed some basic patterns of staff retention in police agencies following periods of agency growth. One conclusion is that it is not uncommon for agencies to fail to retain staffing increases for more than a few years. This is particularly true for full retention of staffing increases. In general, agencies are less likely than not to retain full staffing increases for more than just a few years following implementation. In most instances, however, they retain some residual of those increases for five or more years. A second general point is that agencies are at greatest risk of retention failure in the first few years after a staffing increase. If an agency manages to retain new positions for at least a few years following the staffing increase, it becomes much more likely that the agency will retain the new positions for the long term.

A number of caveats should be noted. As discussed above, this inquiry is based on a group of between 8,000 and 9,000 agencies that experienced staffing increases and reported employment data annually to the UCR from the mid-1970s to the mid-1990s. We cannot say if or how retention patterns differ for this subset of agencies and the full universe of police agencies.[46]

In addition, it is likely that various agency characteristics and external social factors, such as economic conditions, crime trends, and the availability of grant money, affect retention patterns. Testing such hypotheses is beyond the scope of this exploratory investigation.[47] Nonetheless, these analyses reveal typical retention patterns net of various influences over parts or all of three different decades, and they provide a basis for initial comparisons to the COPS retention rates described earlier, which were also presented net of other social influences.

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[46] For some agencies and years, staffing levels listed in the UCR are those reported by agencies in the prior year. If such records do not reflect staffing levels accurately, they could potentially bias the types of analyses presented here by introducing error into both the identification of staffing increases (in terms of timing and magnitude) and the measurement of survival periods. The analyses presented in the text are based on whatever staffing levels were reported in the UCR and assume that those levels are accurate (i.e., if the data for agency x, year t indicated that agency x's sworn force count was from the prior year, we assumed that agency x did not change in size from year t-1 to year t).

To test the sensitivity of the analyses to this assumption, we identified staffing increases and follow-up periods that were potentially contaminated by this possible source of measurement error. (For each agency, we identified the last year up through 1994 in which the UCR listed data from a prior year. For an agency whose most recent questionable data year was year t, we flagged all staffing increases and follow-up periods occurring up through year t+1 as potentially contaminated observations.) This resulted in the loss of 24% of the observations used in the main analyses. We re-estimated the basic survival functions presented in figures 5.1 through 5.4 without these potentially contaminated cases. The alternative estimates differed little from those presented in the text. To illustrate, the survival probabilities for partial maintenance of staffing increases in large agencies were .93 at year 1, .80 at year 5, and .76 at year 10. For small agencies, the comparable values were .81, .60, and .52. All of these values are nearly identical to those presented in table 5.7.

[47] However, we conducted tentative analyses on two additional factors: agency type and decade when the staffing increase occurred. A number of basic univariate tests indicated that staffing increases are more likely to be maintained in county and municipal agencies and less likely to be maintained in sheriffs' agencies. We also found some indications that staffing retention has improved over time. In general, retention was somewhat higher in the 1980s and early 1990s than in the 1970s.

For the latter analyses, we compared survival functions for staffing increases occurring during the 1970s and 1980s (we excluded the 1990s due to the short follow-up periods available for observations from that decade). In addition, we contrasted 2-year survival rates for staffing increases occurring during 1970s, 1980s, and early 1990s (1990-1992). For example, the probabilities that staffing increases would be maintained in part for two years in small agencies were 69%, 72%, and 75% for, respectively, those occurring during the 1970s, 1980s, and early 1990s. The comparable figures for large agencies were 82%, 88%, and 89%.

5.3. COMPARING RETENTION RATES AMONG COPS GRANTEES TO HISTORICAL RETENTION PATTERNS

For comparative purposes, the observed retention rates for COPS agencies with programmatically expired COPS positions and the initial, post-expiration (i.e., short-term) retention rates expected for agencies with non-expired COPS positions should be most comparable to the 1-2 year retention rates in the historical analysis. For long-term assessments, we can compare the expected 5-year retention rates for COPS agencies to the historical 5-year patterns.

Relative to historical patterns, full retention of staffing increases appears to be greater among COPS grantees. For example, 72% of small agencies with programmatically expired COPS positions and 75% of corresponding large agencies have retained all of their expired COPS positions. Based on historical patterns, in contrast, we would expect only 50% to 63% of small agencies and 56% to 66% of large agencies to retain all new positions.

However, these comparisons are likely to be misleading. As shown in the historical analysis, full retention of a staffing increase is sensitive to the size of the staffing increase – the larger the increase, the less likely it is that the agency will maintain the new staffing level in full for any given length of time. Because the staffing changes analyzed in the historical study tended to be substantially larger than COPS-funded staffing increases, the preceding comparisons have a bias in favor of COPS.

Partial retention of staffing increases, on the other hand, tends to be less sensitive to the magnitude of the staffing change (see previous section) and may therefore provide a more reliable means of comparing COPS and historical retention patterns. Table 5.8 presents a series of comparisons using this less restrictive retention criterion. The range of short-term (i.e., 1-2 year) estimates for COPS grantees in table 5.8 is based on both observed retention rates for expired COPS positions and expected short-term retention rates for non-expired COPS positions. The long-term (i.e., five-year) projections for COPS grantees are based on expectations about the retention of non-expired positions.

Table 5.8. Retention of cops-funded positions (actual and expected) compared to historical norms: Probabilities that at least some new positions are retained for selected follow-up periods

	Small agencies		Large agencies	
	COPS	Historical	COPS	Historical
1-2 years	73%-74%*	72%-81%	75%-80%*	87%-92%
5 years	68%**	59%	78%**	79%

* Ranges based on short-term retention experience with expired grants and short-term retention projections for non-expired grants (see tables 5.1 and 5.3).

** Based on long-term retention projections for non-expired grants (see table 5.3).

Overall, the estimates in table 5.8 suggest that retention rates among COPS grantees will be comparable to historical patterns. Retention rates among small COPS agencies will be consistent with historical patterns in the short-term and better than historical patterns in the long-term. Retention rates for large COPS agencies will be somewhat lower than historical projections in the short-term but are expected to be virtually identical to historical patterns in the long-term.

These comparisons should be treated cautiously because they are based largely on the future expectations of COPS grantees; only a relatively small fraction of COPS agencies had actual experience with retention of programmatically expired COPS grants by the time of the H&R survey. Further, the historical investigation was of necessity a somewhat crude method of identifying and analyzing staffing changes in police agencies. But based on the limited data available at this time, we can say cautiously that retention rates among COPS grantees, while not perfect, will be comparable to historical norms of staff retention in police agencies. If COPS grantees' projections prove accurate, then it seems that money invested in raising police staffing levels through COPS grants will produce a return on investment comparable to the usual return on investments to raise police staffing levels.

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METHODOLOGICAL APPENDIX.

The Police Hiring and Retention (H&R) Survey

A.1. OVERVIEW OF THE COPS-POLICE HIRING AND RETENTION SURVEY SAMPLE

From June through August of 2000, interviewers from the National Opinion Research Center (NORC) conducted telephone interviews with a nationally representative sample of 1,270 police agencies. Each interview was conducted with the chief of police or a representative designated by the chief of police. Project staff selected and interviewed these agencies initially in 1996 as part of the Urban Institute's (UI) national evaluation of the COPS program (Roth et al. 2000a). Project staff re-interviewed these agencies during the summer of 2000 for an updated study of the COPS program. The follow-up interviews also included a series of questions pertaining to general hiring and retention practices (referred to throughout this volume as the H&R survey).

Key characteristics of the sample are presented in tables A.1 through A.3. The sample is stratified by jurisdiction size and COPS funding status and program type as of 1996 (the development of the survey design is discussed below). Large agencies are categorized as those serving jurisdictions of 50,000 or more persons (see table A.1). The remaining agencies constitute the small agency group. COPS grantees and large agencies were sampled disproportionately due to, respectively, the survey's role in the ongoing UI evaluation of the COPS program and the disproportionate concentration of the nation's police officers in large jurisdictions. The data were weighted to provide national estimates. The breakdown of COPS grantee status shown in table A.2 represents the agencies' grant status as of year 2000. By that time, 86% of the agencies were COPS grantees; 59% of the agencies had been funded with COPS hiring grants.[48]

As shown in table A.3, the majority of the agencies are municipal or county police agencies. Sheriffs' agencies are the next most common agency type. State police and other miscellaneous agencies account for less than 10 percent of the sample.

Table A.1. Jurisdiction size of sample agencies (n=1,270)

Size	Average number of officers	% of sample	% of weighted sample
Large: population of 50,000 or more	361.4	43.5	5.0
Small: population less than 50,000	23.6	56.5	95.0

[48] Some agencies changed COPS funding status from 1996 through 2000. In 1996, 293 of the agencies in the sample (23%) were not funded through the COPS program. By 2000, 175 of these agencies (14% of the sample) still did not have COPS funding. Only 2.8% of the agencies changed from being grantees in 1996 to non-grantees by 2000.

Table A.2. COPS grantee status of sample agencies (n=1,270)

	% of sample	% of weighted sample
COPS Grantee	86.2	62.5
Hiring Grantee	*59.2*	*54.0*
No COPS Grants	13.8	37.5

Table A.3. Agency types of sample agencies (n=1,270)*

	% of sample	% of weighted sample
Municipal / County	80.1	78.3
Sheriff	13.1	13.1
University or School Police	2.8	4.6
State Police	1.4	1.0
Other**	2.5	2.7

* Percentages may not add to 100 due to rounding.

** "Other" agencies include transit police, public housing police, park police, tribal police, and other miscellaneous agency types.

A.2. DEVELOPMENT OF THE SAMPLE DESIGN

The sample design is based on that developed in 1996 for the UI evaluation of the federal COPS program (Roth et al. 2000a). To create the 1996 sample, UI staff utilized records from the federal Office of Community Oriented Policing Services (the COPS Office), the Uniform Crime Reports, and the National Crime Information Center to develop a national list of nearly 21,000 law enforcement agencies eligible for COPS funding. These agencies were stratified according to COPS grant status and jurisdiction size as follows (see table A.4).

Table A.4. Sampling frame by funding/program status and population category for 1996 cops survey*

Population group	Agencies not funded through COPS	COPS FAST-AHEAD grantees	COPS UHP grantees	COPS MORE grantees	Total
Less than 50,000	8,373	5,845	1,186	1,136	16,540
50,000 or more	267	546	159	349	1,321
Missing	4,208			79	4,287
Total	12,848	6,391	1,345	1,564	22,148

* Some agencies are counted more than once due to participation in multiple COPS grant programs.

The FAST/AHEAD and Universal Hiring Program (UHP) strata refer to different COPS hiring grant programs. The MORE stratum corresponds to agencies which were funded to acquire technology or civilians and/or to pay overtime for additional patrol.[49]

[49] The size stratification point of 50,000 residents was based in part on administrative distinctions established for early COPS grants. In late 1994, the COPS Office established the Funding Accelerated for Small Towns (FAST) program for agencies serving populations of 50,000 or less. The program had simplified application procedures to speed processing. At the same time, the COPS Office established the Accelerated Hiring, Education, and

UI staff sampled over 2,000 of these agencies for a first-wave interview in the fall of 1996. The designed sampling fractions are shown below (table A.5). Based on substantive and statistical considerations, project staff sampled disproportionately from among COPS grantees and large agencies. Nonetheless, the sample is a nationally representative sample weighted to produce national estimates.

Table A.5. Designed sampling fraction by funding-program status and population category for 1996 COPS Survey

Population group	Agencies not funded through COPS	COPS FAST-AHEAD grantees	COPS UHP grantees	COPS MORE grantees	Total
Less than 50,000	0.013	0.048	0.236	0.248	0.057
50,000 or more	1.0	0.498	1.0	0.777	0.734
Missing	0.044				0.044
Total	0.044	0.086	0.326	0.354	0.095

Table A.6 presents the response rates for the 1996 COPS survey.

Table A.6. Survey response rates by funding-program status and population category (in percentages) for 1996 cops survey

Population group	Agencies not funded through COPS	COPS FAST-AHEAD grantees	COPS UHP grantees	COPS MORE grantees	Total
Less than 50,000	61	84	78	75	77
50,000 or more	67	78	99	84	80
Missing	61				61
Total	64	81	85	79	77

For the COPS / H&R survey in the summer of 2000, we sought to re-interview the 1,471 agencies which participated in the 1996 survey. Telephone interviewers from the National Opinion Research Center (NORC) completed interviews with 1,270, or 86%, of the target agencies. Table A.7 presents the response rates by stratum for the H&R survey. Interviewers achieved a response rate of 83% or higher for each cell.

Table A.7. Completed interviews and response rates (in parentheses) by funding-program status and population category for 2000 COPS-H&R survey*

Population group	Agencies not funded through COPS	COPS FAST-AHEAD grantees	COPS UHP grantees	COPS MORE grantees	Total
Less than 50,000	146 (.830)	199 (.865)	183 (.851)	189 (.896)	717 (.862)
50,000 or more	147 (.855)	187 (.886)	132 (.880)	201 (.910)	667 (.885)
Total	293 (.842)	386 (.875)	315 (.863)	390 (.903)	1384 (.873)

* Some agencies are counted more than once due to participation in multiple COPS grant programs

Deployment (AHEAD) program, which had more stringent application procedures, for agencies serving larger jurisdictions. These early programs were later replaced by the Universal Hiring Program (UHP), which applies to agencies of all sizes.

Based on work subsequent to the 1996 survey, we collapsed the non-COPS agencies with missing population into the small non-COPS group for the H&R survey. Note also that because some agencies had multiple grants as of 1996 and were thus eligible to be sampled more than once, the interview numbers sum across the cells to 1,384 rather than to 1,270, the actual number interviewed (i.e., some agencies are counted more than once in the table above).

UI staff developed a weighting scheme for the 1996 survey to account for the agencies' differential probabilities of selection into the sample, adjusting for non-response and aligning the weighted distribution of agencies in the sample with the distribution of agencies in the U.S. population of police agencies. In the simplest case, each agency in the same grant program and population category has the same weight. If j is the index for grant program and k is the index for population category, then the weight, W_{jk}, for a particular grant program and population category is

$$W_{jk} = U_{jk} / S_{jk}$$

where U_{jk} is the number of agencies in the population and S_{jk} is the number of agencies with completed interviews in the sample. If, however, an agency received funding for multiple grants, then the agency had a selection probability and sample weight for each program. For multi-program agencies, therefore, the weight is the average of the agency's program weights (i.e., the arithmetic average probability of being selected into the sample). Because the H&R survey response rates were high and did not differ significantly across strata, we retained these weights for the H&R analyses. Further details of the original survey design and weighting scheme are provided in Roth et al. (2000a, pp. 275-287).