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The Impact of Agency Policies and Practices on Violence Against Police

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The Impact of Agency Policies and Practices on Violence Against Police

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Table of Contents

Table on Contents (Cont.)

Appendices

List of Abbreviations

BDU: Battle Dress Uniforms

BJS: Bureau of Justice Statistics

CAD: Computer Aided Dispatch

CDC: Centers for Disease Control and Prevention

DOJ: Department of Justice

ERU: Emergency Response Unit

EWS: Early Warning Systems

FATS: Firearms Training Simulator

FBI: Federal Bureau of Investigation

GED: General Educational Development

LEMAS: Law Enforcement Management and Administrative Statistics

LEOKA: Law Enforcement Officers Killed and Assaulted

NCVS: National Crime Victimization Survey

NIBRS: National Incident Based Reporting System

NIOSH: National Institute for Occupational Health and Safety

OC: Oleoresin Capsicum (spray)

OLS: Ordinary Least Squares

PERF: Police Executive Research Forum

SRT: Special Response Team

SWAT: Special Weapons and Assault Team

UCR: Uniform Crime Reports

Abstract

Law enforcement officers are second only to taxi cab drivers in terms of the rates at which they are *murdered* on the job. Their rate of *non-fatal violent victimizations* exceeds that of taxi drivers and, indeed, exceeds the rates of all other occupational groups. Despite the seriousness and importance of the problem of violence against the police and despite considerable changes within agencies over recent decades geared toward improving officer safety, surprisingly little research has been conducted to study the impact of various law enforcement agency initiatives on the level of violence against their personnel.

The purpose of this project was to identify the factors, both internal and external to law enforcement agencies, which impact the rate at which police officers are assaulted and murdered. The dependent variable is the rounded average count of officer killings and assaults in each subject jurisdiction for 2000 through 2002 as reported in the National Incident-Based Reporting System (NIBRS). This represents the first time that data from NIBRS are used to study violence against police. Unlike other sources of data on police violence, NIBRS provides valid and reliable information on both homicides of and assaults against police.

Two sets of independent variables represent (1) the factors internal to the agency that might impact on officer safety (e.g., training, policies, practices, equipment), and (2) factors external to the agency that might impact on the rate at which officers are assaulted/killed (e.g., violent crime rate, poverty level). Independent variables are also classified according to our theoretical constructs of "exposure" and "guardianship." Based on routine activity theory, exposure refers to the proximity of potential crime victims to motivated offenders (in our study, proximity of police to subjects who are motivated to harm them). Guardianship refers to

protective factors, such as the policies, practices, tools and training that agencies use to promote officer safety.

Information to measure the independent variables comes from the U.S. Census, Uniform Crime Reports, and an agency survey. The subjects are the 121 law enforcement agencies that submitted NIBRS data for 2001, serve populations of 50,000 or more, and returned the project survey. (The response rate for the survey was 77 percent.)

Descriptive data from the survey provide important information regarding the extent to which agencies across the nation use various policies, procedures, tools and training programs to enhance officer safety. Negative binomial regression was used to assess the impact of those policies, practices and tools on violence against police. Only four variables produced statistical significance: number of Part I arrests per officer, percentage of female headed households in the jurisdiction, number of officers in the jurisdiction per 100,000 people, and agency policies/practices to promote the wearing of body armor.

These results are discussed in the context of police practices, the methods used to produce the results, prior research and future research.

Significant Findings and their Relevance for the Workplace

Descriptive data from the survey provide important information regarding the extent to which agencies across the nation use various policies, procedures, tools and training programs to enhance officer safety. Negative binomial regression was used to assess the impact of those policies, practices and tools on violence against police.

Descriptive Data Regarding Agency Policies and Practices

The descriptive information produced by our study regarding safety-relevant agency policies and practices can be used by agency executives (for instance, chiefs and sheriffs) to assess whether their own practices are consistent with national practice. For instance, data from the survey indicate that most of the departments in our sample (84 percent) report that over 80 percent of the automobile patrol units are one-person (versus two-person) units. However, for certain calls such as domestic violence (97 percent), disorderly persons (79 percent), and residential alarms (69 percent), most departments have a policy of sending two officers to respond to the call (e.g., dispatch two one-person vehicles).

Ninety percent of the departments in our sample have a written policy regarding the wearing of body armor. Of those agencies with a written policy, just over half include a mandate that body armor be worn by sworn personnel performing uniform patrol (56 percent); nearly all require vests during tactical operations (87 percent). The vast majority of departments (85 percent) promote the wearing of body armor through education and/or encouragement (85

percent) and written policy (76 percent). Other less-used strategies to promote the wearing of vests include daily checks (22 percent) or periodic checks (46 percent) and other means (18 percent). The vast majority of our sample (78 percent) of departments have over 80 percent of their transport vehicles for prisoners/suspects fitted with physical barriers.

Nearly all of the departments in our sample (98 percent) have a Computer Aided Dispatch (CAD) system that provides information to dispatchers that would be beneficial if shared with officers responding to a call (e.g., history for an address, previous contacts with suspect). For the information categories "history for an address" (67 percent) and "history of presence of weapons" (79 percent) a majority of the departments in our sample convey this type of information without a specific request from an officer. For the categories "crimes in progress" and "traffic stops," over 75 percent of the departments have policies/general practice whereby the dispatchers follow-up with officers over the radio to check on their safety.

All of the departments in our sample have authorized the use of semiautomatic weapons, and 90 percent of them supply these firearms to the officers. For the departments in our sample, the most commonly carried less-lethal weapon is Oleoresin Capsicum (OC) spray; in 98 percent of the agencies some or all uniformed personnel carry OC spray on their person (versus in their vehicle). Also high was the extent to which uniformed patrol officers carry batons on their person (95 percent of the agencies reported "Some" or "All" of their uniformed patrol officers carry batons on their person). One-third of the agencies (31 percent) report that all of their patrol officers carry conducted energy devices (commonly referred to by the commercial name, Taser).

For most departments in our sample (90 percent), the use of handcuffs is mandatory when executing a physical custody arrest of an adult (barring a specified exemption); 82 percent of the departments have a similar mandatory policy for a physical arrest of a juvenile. Much smaller percentages of agencies mandate handcuffing for the transport of non-arrested adult and juvenile suspects.

The average number of hours of training recruits received at the last academy class across all the departments in our sample is 670 or 84 days, ranging from a low of 114 hours for one department to 1,440 for another. A quarter of the participating departments have fewer than 500 hours of training. Nearly all of the departments in the sample provided in-service training during the previous two years covering the use of deadly force (98 percent), domestic violence (98 percent), use of non-lethal weapons (94 percent), and officer survival (90 percent). In-service training on physical fitness/health/wellness (62 percent) and communications with people with disabilities (66 percent) was covered by the fewest number of departments in our sample.

A variety of conditions, relevant to officer safety, are included in post-academy firearms training for the majority of departments in our sample. Over 90 percent of our sample of departments train under simulated stressful conditions (95 percent), train at night-time or in reduced light conditions (92 percent), and require qualification with off-duty weapons (91 percent). Sixty to 70 percent of our sample of departments use computerized firearms training systems (68 percent), use artificial rounds (63 percent), and/or train under live fire (60 percent).

To assess community relations and trust we measured the implementation of community policing. First, an important aspect of community policing is the placement of patrol officers on

permanent geographic assignments; less than one-third of our sample of departments use such assignments (31 percent). We queried respondents on whether each of a list of common community policing elements was implemented at their agency and by whom. The community policing elements that were most frequently reported were meeting with community groups and police-citizen problem solving.

Multivariate Analyses

Our research was based on routine activities theory which has been applied only once to the study of violence against law enforcement (see Kaminski, 2002). Key concepts within routine activity theory are "exposure" (that is, proximity to motivated offenders) and "guardianship" (protective factors). Examples of exposure variables in our study included jurisdiction crime rate, criminogenic factors in the environment (e.g., high levels of poverty, income inequality), and level of aggressive policing. Examples of guardianship variables include protective vest policies, level and quality of training in officer safety topics, deployment of one- versus two-person patrol vehicles and so forth.

Negative binomial regression was used to develop the best fitting model that included 14 variables. Only four variables produced statistical significance. These were

- Agency Use of Policies that Promote the Use of Body Armor,
- Number of Part I Arrests Per Officer,
- Percentage of Female Headed Households in the Jurisdiction, and
- Number of Officers in the Jurisdiction per 100,000 People.

One had been categorized as "guardianship" (body armor promotion) and the other three had been categorized as "exposure." The relationship between three of the four variables to violence against police were in the opposite direction as hypothesized.

As above, we found only one guardianship factor that impacted on violence against police (and the findings were in the opposite direction of what we had hypothesized). At first glance, one might interpret these results to mean that department policies and procedures to enhance officer safety do not impact on the level of violence against department members. This interpretation would be inappropriate. There are many policies/procedures that virtually *all* agencies use to promote officer safety. This includes arming officers with guns, training them in their use, developing policies and providing training pertaining to tactics and verbal skills for effectively dealing with people, and so forth. Our study did not measure the impact of these universal measures on violence against police—indeed, we could not, because they would not be "variables" but rather, constants. Instead our methods, by necessity, attempted to identify the ways agencies varied in their practices; in so doing we were assessing the impact of non-universal "advanced methods" for reducing violence against police.

The one statistically significant guardianship variable pertained to the strength of the agency promotion of body armor. A one unit increase in the variable that reflects agency promotion of body armor use is linked to a 38.4 percent increase in LEOKA incidents controlling for all other factors. Policy makers would certainly hope that the use of body armor would lead to a *decrease* in LEOKA incidents, not an increase. And, in fact, that expectation may explain our results. Ours is a cross-sectional study. The ideal study would have a longitudinal design,

where researchers could assess levels of violence against police before and after safety-facilitating policies or procedures are adopted. The unexpected results pertaining to body armor use produced by our cross-sectional study may reflect chiefs/sheriffs experiencing high levels of violence implementing stronger body-armor-promotion policies and procedures in the hopes of bringing the levels down. In this scenario, the causal sequence is reversed: agencies with high levels of violence adopt stronger vest-promoting policies/practices.

It is also, however, important to point out that our dependent measure—which is overall a strength of the current study, is a detriment with regard to this independent variable. Policies that promote the use of body armor are designed, not to reduce overall violence against police, but rather to turn what might have been a homicide into the lesser harm, a serious assault. Since our dependent measure includes both homicides and serious assaults, we did not measure this predicted impact when we included the body-armor-promotion variable in our larger equation. (Kaminsky, too, found that body armor use was positively related to violence against police; he used homicides as his measure of police violence.)

Three exposure variables were significant. These are number of Part I arrests per officer, number of officers in the jurisdiction per 100,000 people, and percentage of female-headed households in the jurisdiction.

A one unit increase in the rate of arrests was associated with a 6.5% decrease in incidents of violence against police. This result is in the unexpected direction in light of our classification of this variable as an exposure variable. We used rate of arrests as one measure of department

aggressiveness, arguing (based on input from practitioners who attended our focus groups) that aggressive departments were more likely to have violent incidents, including incidents in which officers were harmed. This result may have been produced due to the caveats associated with this study's design and measures (discussed in the scientific report), or alternatively it could be the case that high levels of aggressiveness serve as a safeguard to officers. In this conceptualization, people in a jurisdiction are disinclined to engage in a violent confrontation with police because of the department's reputation for aggressiveness.

A one unit increase in officers per capita is associated with a 0.3 decrease in the number of law enforcement officers killed or assaulted (LEOKA). First of all, it is important to note that, while significant, the substantive change in violence against police produced by this variable is quite small (0.3 incidents). Second, this association is in the unexpected direction in light of our categorization of this variable as exposure. With this classification we expected that more officers per population would mean that there are more officers at risk of violence (i.e., increased exposure). Alternatively, as discussed in the scientific report, we could argue that more officers per population might provide mutual protection (guardianship). Viewing this variable as a guardianship measure would be consistent with our findings that higher guardianship reduces the number of LEOKA incidents.

Percentage of female-headed households in the jurisdiction was the only factor to produce significance among the two related categories of crime in the jurisdiction and criminogenic conditions. A one percent increase in female-headed households is associated with a 6.9 percent increase in incidents of LEOKA. This variable served as a proxy measure for

family/neighborhood instability. Family structure variables—such as percent divorced and percentage of children living in single-parent households—has been linked to violence against civilians (Land, McCall, and Cohen, 1990; Parker, McCall and Land, 1999). Having a higher proportion of female-headed households has been linked in other research to violence against police (e.g., Peterson and Bailey, 1988; Morrison and Meyer, 1974; Gaminski, Jefferis and Gu, 2003). Hence, as expected, we found that departments operating in jurisdictions with this type of higher criminogenic condition also experienced more LEOKA incidents. Six other external factors made it into the model because, in bivariate assessments, they were associated with violence against police. These include southern state, firearm index (representing the proportion of Part I UCR offenses involving a firearm), residential stability, income inequality between whites and all other races, percent of males in the jurisdiction aged 15 to 24, and, as mentioned above, number of officers in the jurisdiction per 100,000 people.

Scientific Report

The Impact of Agency Policies and Practices on Violence Against Police

Law enforcement officers are second only to taxi cab drivers in terms of the rates at which they are murdered on the job. Their rate of *non-fatal* violent victimizations exceeds that of taxi drivers and, indeed, exceeds the rates of all other occupational groups. Many law enforcement agency policies, practices and procedures, as well as police training and equipment, are geared toward enhancing the safety of officers on the job. Improved equipment, new training, and refined policies have characterized these efforts over the past two decades. Despite the seriousness and importance of the problem of violence against the police and despite considerable changes within agencies over recent years geared toward improving officer safety, we know surprisingly little about the impact of various law enforcement agency initiatives on the level of violence against their personnel. Instead, the vast majority of research on violence against police has emphasized four main categories of variables: individual victim-officer characteristics (e.g., age, race, height, education and experience),[1] individual assailant characteristics (e.g., age, race, gender, and socio-economic status),[2] situational features of the assault or homicide incident (e.g., type of call and number of officers present),[3] and community characteristics or other contextual features of the larger environment.

The considerable efforts of agencies that are geared toward enhancing officer safety have been undertaken because they seem to "make common sense," not as the result of any scientific

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[1] See Bayley & Garofalo, 1989; Binder & Scharf, 1980; Cascio, 1977; Kaminski & Sorensen, 1995; King & Sanders, 1997; Little, 1984, Margarita, 1980; Swanson & Hale, 1975.
[2] See Binder & Scharf, 1980; Kaminski & Sorenson, 1995; Kavanaugh, 1997; Little, 1984; Meyer, Magedanz, Feimer, Chapman, & Pammer, 1986.
[3] See Ellis, Choi, & Blau, 1993; Fridell & Pate, 2001; Geller & Karales, 1981; Hirschel, Dean and Lumb., 1994; Kaminski & Sorensen, 1995; Kavanaugh, 1997; Meyer, Brunk, & Wilson, 2001; Stanford & Mowry, 1990; Wilson & Brewer, 1992.

evaluations of effectiveness. The implementation of new policies and procedures, the adoption of new tools such as less lethal weapons and soft body armor and enhanced training geared toward safety over the last few decades have coincided in time with significant reductions in the rates at which officers are violently victimized. While this correspondence between changes and rates of violence against police, as well as common sense, would seem to imply that agency interventions can impact on the level of officer victimizations, there has been little research that has assessed the impact of these various organizational practices on violence against officers.

The purpose of the study conducted by the Police Executive Research Forum is to remedy this research deficiency. Specifically, the **aim of the project** is to identify law enforcement agency practices that impact on the incidence of serious assault and murders of on-duty police officers. For this agency-level study we use multivariate statistical analyses to identify the factors both internal and external to law enforcement agencies that impact on the rate at which police are assaulted/murdered. The dependent variable is the agency rates at which officers are assaulted/murdered. The two sets of independent variables represent (1) factors internal to the agency that might impact on officer safety (e.g., training, policies, practices, equipment), and (2) factors external to the agency that might impact on the rate at which officers are assaulted/killed (e.g., violent crime rate, poverty level). The variables in the second set (external variables), were selected based on prior empirical research and are necessary as control variables so that we are able to isolate the effect of the internal factors. The ultimate objective is to produce policy-relevant recommendations for departments to help them reduce the violence against their officers.

In the literature review, of this report we describe what is known about the nature and extent of workplace violence against police and introduce the theory and previous research upon which this study is based. In the methods section we describe the research methods used and the analyses conducted. Next we describe the results of the study and in the final section we discuss the implications of these results for the law enforcement profession.

I. LITERATURE REVIEW

In late 2001, the Department of Justice reported that for the years 1993-1999, an average of 1.7 million workers were victims of non-fatal workplace violence each year.[4] In addition, each year, another 900 employees were murdered while on the job. All told, workplace violence accounted for 18 percent of all violent crime during the seven-year period (Duhart, 2001). By 2000, homicide had moved from the third to second leading cause of death in the workplace (NIOSH 2002). Accordingly, when all causes of work-related deaths are included, homicide is the second leading cause of death on the job, after motor vehicle incidents and before accidents with machines and falls (Marsh & Layne, 2001).

Peek-Asa, Runyan, & Zwerling (2001) identify four major categories of workplace violence:

- Criminal intent (perpetrator has no legitimate relationship to employee),
- Customer/client,

[4] The Workplace Violence Research Institute defines workplace violence as "any act against an employee that creates a hostile work environment and negatively affects the employee, either physically or psychologically. These acts include all types of physical or verbal assaults, threats, coercion, intimidation and all forms of harassment." The analysis of statistics based on crime reporting, such as the National Crime Victim Survey, is more limited with regards to physically violent victimizations, ranging from simple assault to homicide (see, e.g., Duhart, 2001).

- Worker on worker, and
- Personal relationship (e.g., domestic violence spills over into the victim's workplace).

Using the same four categories, the Department of Justice places violence against police in the customer/client category. The National Institute of Occupational Safety and Health (NIOSH) (1996) has listed 10 risk factors for assaults in the workplace, seven of which apply to police officers: contact with the public, having a mobile workplace, working with unstable or volatile people, working alone or in small numbers, working late at night or during early morning hours, working in high-crime areas, and working in community-based settings. Arguably, an eighth risk factor, guarding valuable property or possessions, would also apply to police officers.[5]

What effect do these risk factors actually have on the rates of police victimization? As referenced above, NIOSH reports from recent years (1995, 1996, 2002) have placed law enforcement officers second after taxicab drivers in rates of workplace homicides. The 1995 report indicates that taxicab drivers were victims of homicide at a rate of 15.1 per 100,000 per year, while police officers were killed at a rate of 9.3 per 100,000 per year. The rates for police and detectives had dropped to 5.9 per 100,000 by 1997 (NIOSH 2002). Recent research including all violent victimizations in the workplace (i.e., non-fatal assaults as well as homicides) determined that law enforcement, as an occupation, has the highest violent victimization rate (Duhart, 2001; Warchol, 1998). Specifically, aggravated assaults occurred at a rate 3.7 times higher for police officers than for the next highest category (mental health employees), and

[5] The remaining two risk factors are exchange of money and delivery of passengers, goods, or services.

simple assaults occurred at a rate 2.2 times higher. These two types of assaults accounted for 94% of all workplace victimizations (Duhart, 2001).

Below we provide information about workplace violence against police. First we describe the major sources of information about these victimizations and characterize the trends indicated by those data. We describe research on incident-level factors, which include characteristics of the officer and assailant (e.g., race, age, years of service, assignment) and characteristics of the incident (e.g., the type of crime/call to which the officer was responding, presence of other officers). We summarize the empirical work that has been conducted that links victimizations of police to various jurisdiction-level factors. We distinguish between factors that are external to the agency (e.g., crime environment, region, jurisdiction size) and factors that are internal to the agency. The latter encompasses agency efforts to reduce killings of and assaults against officers such as the provision of body armor, training, back up policies and so forth. We complete Chapter 2 with a discussion of the theory and prior research upon which the current study is based.

1. Sources of Information for Research on Violence Against Police

The major source of data on officers killed and assaulted in the line of duty is produced by the Federal Bureau of Investigations (FBI) as part of the Uniform Crime Reporting (UCR) system and is reported annually in a publication entitled *Law Enforcement Officers Killed and Assaulted* (LEOKA). In this document, the FBI presents information on officers killed feloniously (where offenders intended to harm the officers and/or otherwise resist the officers' interventions), killed accidentally (e.g., in traffic accidents, accidental shootings), and assaulted

but not killed.

The FBI began collecting information on officers killed in the line of duty in the U.S. and its territories in 1945 and started issuing LEOKA's in 1972. The annual LEOKA provides summary statistics for both felonious and accidental deaths that occurred during the year, presents information on trends, and contains a one- to three-paragraph narrative describing each incident in which the officer was feloniously (not accidentally) killed. The incidents included in this FBI data involve persons who are sworn law enforcement officers with full arrest powers. The deaths occurred while these law enforcement officers were acting in a duty-related capacity. (This includes officers who were officially "off-duty" when they intervened in incidents in their law enforcement capacity.)

The amount and quality of data regarding the incidents in which officers are feloniously or accidentally killed have improved progressively and are considered the most reliable of all data collected in the UCR (Vaughn and Kappeler, 1986). The FBI goes to great lengths to identify officers who were killed in the line of duty in the United States each year. While most information comes from local agencies who submit the information with their UCR reports, the FBI also relies on their field divisions and legal attaché offices to report such incidents to the LEOKA staff. Additionally, data come from the Bureau of Justice Assistance, Administrator of the Public Safety Officers' Benefits Program who provides information based on benefits provided to the survivors of slain officers.

As noted above, the FBI also collects and reports data on assaults against officers. Specifically, agencies submit monthly information (with their crime data) on the number of assaults "resulting in serious injuries or instances in which a weapon was used that could have caused serious injury or death" (FBI, 2002: 73). The LEOKA data on assaults have several drawbacks. Many agencies, even those participating in the UCR, do not submit their assault data to the FBI for inclusion in the LEOKA.[6] Further, the data submitted are not incident-level data, but rather aggregated data on the assaults on officers within the participating departments. Finally, there are serious questions regarding whether agencies submitting data are defining assaults similarly.[7]

Another source of information on law enforcement victimizations is the National Crime Victimization Survey (NCVS) conducted by the Bureau of Justice Statistics (BJS). As a supplement to the UCR for measuring crime in the U.S., BJS surveys people within 86,000 U.S. households about their victimizations during the last 6 months. Items in the NCVS solicit information regarding whether victimization occurred in the workplace and the occupation of the subject, producing information on crimes against on-duty officers. Since the respondent is conveying information about his/her own victimizations, information on murder is not collected by the NCVS. These data, however, can produce information on officer assaults.

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[6]During 1995 to 2003 assault data were submitted by agencies representing from 63 to 75 percent of the U.S. population. This contrasts with the homicide data which, based on the methods described above, is accumulated from agencies representing virtually 100 percent of the U.S. population.

[7]That is, some may be including all assaults including those, for instance, in which an offender grabbed the arm of the officer. Others may be submitting data on only those assaults they consider as "serious," however they might define the term.

Some researchers have studied police killings and assaults using police agency records (see e.g., Bristow, 1963; Marafioti, 1972; Stobart, 1972; Chapman et al., 1974a, 1974b; Meyer et al., 1979, 1981; Banyon, 1976; Margarita, 1980; Geller and Karales, 1981; Fyfe, 1978; Moorman and Wemmer 1983). Some of these researchers have relied on information from a single jurisdiction (e.g., Uchida, et al., 1987; Stetser, 2001); others have combined information from multiple agencies (e.g., Chapman et al., 1974; Meyer et al., 1979, 1981; Brown, 1994). Some researchers have collected information from all agencies in a state (e.g., Moorman and Wemmer, 1983; Bridges and Hegner, 1976; Handberg, et al., 1988). A handful of studies have used officer surveys within one to several agencies to better understand assaults (Bannan, n.d.; Brown, 1994).

As is true for violence in all realms—whether it be violence against police or violence against citizens—homicides are easier than assaults to measure in a consistent fashion. A clear manifestation of this difference is the high quality data in LEOKA on police slayings compared to the assault data of questionable reliability. In large part because of the superiority of the data on killings from the LEOKA and from other sources, much of the research on violence against police focuses on deaths and not assaults. This fact is reflected in our coverage below of trends and of the nature of violent incidents.

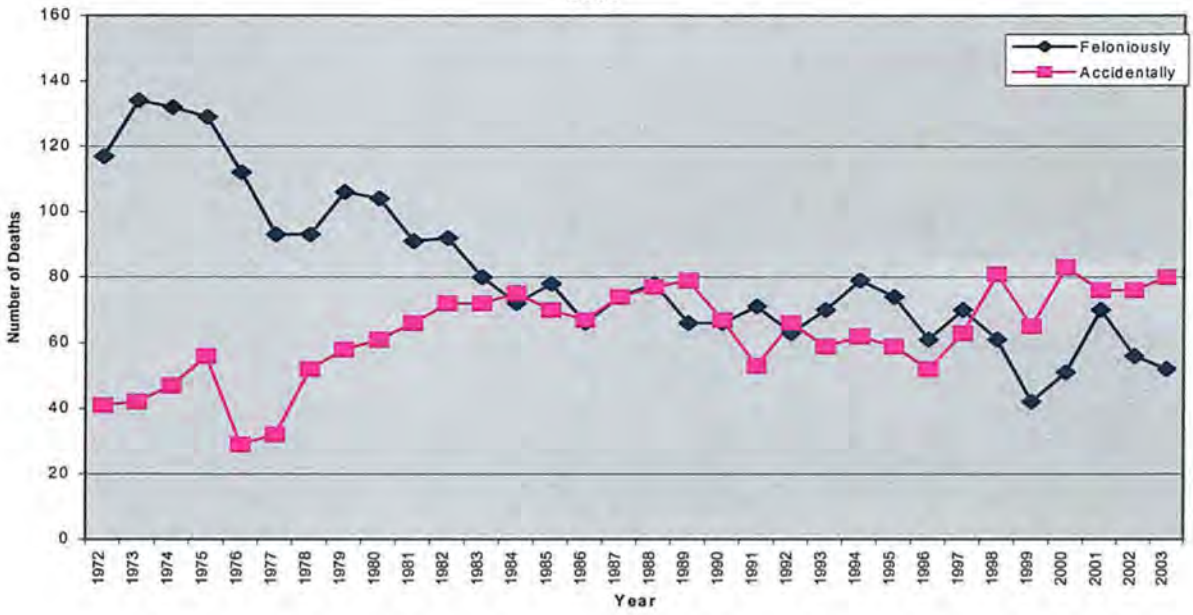
In the next section we describe the trends in violence against police that have been documented—primarily measured with data on deaths.

2. Trends in Police Victimizations

According to the FBI, 4,687 law enforcement officers were killed in the line of duty between 1972 and 2003; 2,675 of these (57.1%) were killed feloniously including 72 that were killed in the terrorist attacks on September 11, 2001. The remaining 2,012 (42.9%) were killed in accidents such as in automobile crashes or as a result of friendly fire. As indicated in Figure 1, the number of officers feloniously killed in the line of duty has decreased dramatically since the FBI started to report national data in the early 1970s.[8] Up until 1982, 90 or more officers were feloniously killed each year, with highs of 134 and 132 officers killed in 1973 and 1974, respectively. Since that volatile period, the number of officers *feloniously* slain has generally fluctuated between 60 and 80 per year, reaching a low of 42 in 1999. Interestingly, the great decrease in felonious killings in the 1970s and early 1980s was paralleled by a notable increase during that same time period in the number of officers who were killed *accidentally*. The numbers of officers killed feloniously and killed accidentally converged in the mid-1980s; in the last ten years (1994-2003), the average number of accidental killings (69.7) has exceeded the averaged number of felonious killings (61.6).[9]

[8] In conveying trends, we omitted from the data producing Figure 1 the 72 officers killed on 9-11-2001.
[9] Again, the 72 deaths on 9-11-2001 have been removed from this assessment of trends.

Figure 1: Law Enforcement Officers Feloniously and Accidentally Killed, 1972-2003



Because the number of officers employed in this country has actually *increased* significantly in the last two decades the *rate* at which officers have been killed has declined quite significantly, as well. According to Fridell and Pate (1995, 2001), the rate of police killings (per 10,000 officers) fell from approximately 3.4 in 1973 to about 1.6 in 1983 to approximately 1.1 per 10,000 in 1993.

The absolute numbers of assaults set forth in the LEOKA for the period 1994 through 2003 show a high number of 64,967 in 1994, a low of 46,608 in 1996 and a fairly flat line between 1999 and 2003 (fluctuating between 56,000 and 59,500). Because of the serious questions concerning the validity of these data, we do not use them to draw conclusions regarding trends.

Despite the downward trends indicated by the police homicide data, police are still among the most frequently victimized workers in America. This victimization has adverse impacts at multiple levels. Violence affects individual police officers, their families, their colleagues, the department and the law enforcement profession as a whole. Most potent are the losses and grief associated with the death of an officer. The impact is severe for the officer's surviving family members, fellow officers, the department, and the community. Victimization costs (for assaults as well as deaths) also manifest in lost work time, lower morale, effects of serious injury, negative effects on recruitment, and increased stress (Kaminski & Sorensen, 1995). Departments face financial costs in the form of early retirement pay, sick days, health care, and replacing officers lost to injury or death.

To reduce the tragedies and associated costs of police victimizations, we must attempt to understand why the number of officers feloniously killed in the line of duty has declined. Understanding the factors that reduce danger to police is critical for continuing this downward trend and thereby reducing the still considerable danger faced by law enforcement in this country. The dramatic decline in the felonious killings of officers has been attributed to some factors external to agencies, such as emergency medical services (Doerner and Speir, 1986), but mostly to factors internal to agencies, such as better tactics and safety-facilitating policies/procedures, and the use of soft body armor (Bristos, 1963; Konstantin, 1984; Sherman et al., 1989; Fyfe, 1987; FBI, 1992).

The purpose of the research described in this report is to determine what policies and practices internal to agencies might impact on the rate at which officers are victimized after

controlling for key factors external to agencies.

3. The Nature of Law Enforcement Murders and Assaults

As mentioned above, much of the prior research has examined the nature of police victimizations in terms of incident-level factors such as the characteristics of the officer and assailant, the type of incident to which the officer responded, the presence of other officers at the scene, type of weapons used, and so forth. We review this literature below.

(1) Incident-Level Factors

Two major sources of incident-level data are Fridell and Pate (1995, 2001) and the FBI LEOKA's. Both of these sources of information focus on killings and not assaults. Fridell and Pate looked in depth at the 863 incidents in which officers were slain during the period 1983 through 1994. In describing the LEOKA results below, we describe results for the 10-year period covering 1994 through 2003.

i. Officer Demographics and Assignments

During the ten-year period of 1994-2003, 95.3% of the slain officers were male and 4.7% were female (FBI, LEOKA, 2003). Just over one-quarter (26%) of the officers were between the ages of 25 and 30 and a full two-thirds (69.8%) were 40 years of age or younger (FBI, LEOKA, 2003). One third (34.0%) had fewer than five years of law enforcement experience; another one-third (35%) had over 10 years of experience. Over half of the slain officers were on one-officer vehicle patrol and another 12.7% were on 2-officer vehicle patrol. Others were on foot patrol (1.6%), off duty (17.2%) or on another assignment (20.5%). The demographic data of slain

officers aren't significantly different from the demographics of officers on patrol in the United States.

ii. Precipitating Events

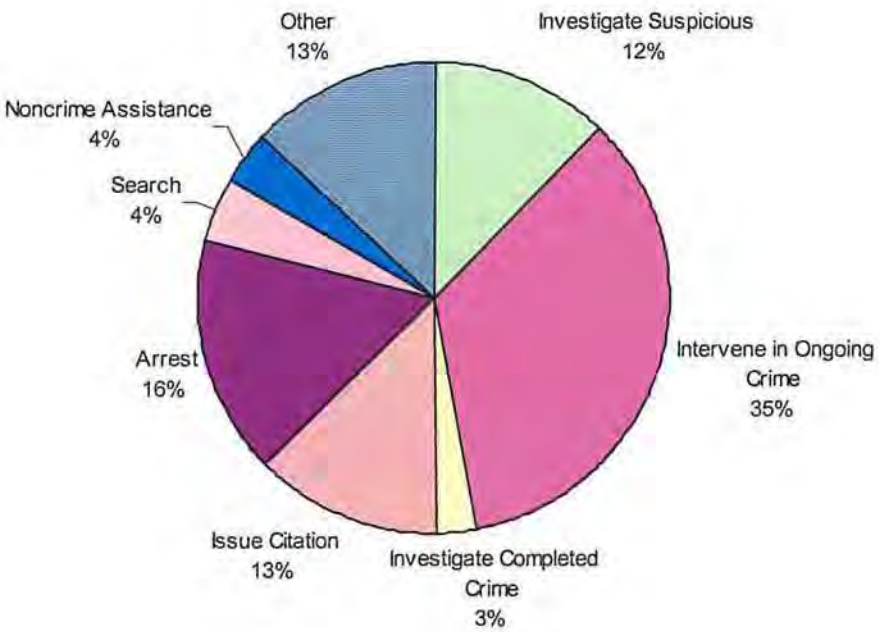
Over the ten-year period of 1994-2003, the FBI LEOKA reports that one-third (30.4%) of the slain officers were involved in arrest situations at the time of the attack. Comparable proportions of officers (15.5 to 16.5%) were involved in Ambush situations (16.2%), traffic pursuits/stops (16.4%), disturbance calls (15.9%) or investigating suspicious persons (15.6%). Fridell and Pate (1995, 2001) used the narratives contained in the LEOKA's to gather more in depth information regarding the events that precipitated the murder. For each incident, they coded information regarding both (1) the primary law enforcement activity in which the officer was engaged (e.g., intervening in an ongoing crime, executing a search warrant), and (2) the crime or other situation with which the officer dealt (e.g., robbery, domestic disturbance, non-crime assistance). Thus, the first variable indicates, for instance, whether the officer is investigating suspicious persons or circumstances, intervening in an ongoing crime, investigating a completed crime, executing a search warrant, doing undercover work, providing non-crime assistance (e.g., assisting at a traffic accident), and so forth. The second variable indicates the crime type that is the focus of the police activity, for instance, murder, robbery, drug offense, and so forth.

As indicated in Figure 2, in one-third (34.8%) of the incidents, the officers were intervening in ongoing crimes (or the immediate escape therefrom) when slain. Sixteen percent (16.2%) were arresting or attempting arrests in situations other than those in which the crime was

ongoing. Thirteen percent (12.8%) were issuing citations and 12.3 percent were investigating suspicious persons or circumstances. The rest were either conducting searches, providing "non crime assistance" (e.g., helping a disabled motorist), investigating a completed crime, or engaged in some other police activity (e.g., working undercover, handling a prisoner or mental patient).

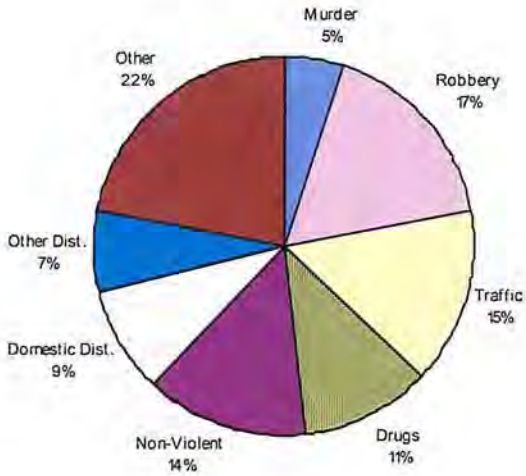
The crime or circumstance to which the officers were responding is contained in Figure

Figure 2: Law Enforcement Action at Time of Death



3. In 17.2 percent of the incidents, the officers were attending to robbery incidents. Another 15.1 percent were attending to traffic offenses, 13.5 percent to non-violent criminal activity other than burglary or drugs, and 10.8 percent to drug crimes.

Figure 3: Crime to Which Slain Office was Attending



The percentages above do not tell us which types of activities are the most dangerous for law enforcement and the absence of the appropriate data have led to misconceptions regarding which types of police responses are the most perilous. For instance, the degree of danger associated with domestic disturbance calls has been a subject of debate among law enforcement practitioners and in the police killings/assaults literature. Garner and Clemmer (1986) reviewed the history of this debate. (See also Hirschel et al., 1994.) They noted that there have been misconceptions regarding the types of incidents included under the heading of "disturbance" in the FBI reports. Until the FBI split the "disturbance" category into its two subgroups (i.e., "family quarrels" and "bar fights, man with gun, etc."), many criminal justice practitioners and researchers believed that the category was mainly comprised of *domestic* disturbances.

Further compounding the problem was the presentation of raw numbers and percentages instead of (the elusive) rates. As Garner and Clemmer (1986) point out, to assess the relative danger of types of calls requires base rate information on the frequency of all types of calls. (See also Geller and Scott, 1992.) Scharf and Binder (1983) addressed this issue in the context of discussing police use of deadly force, using as an analogy the relative dangers of two illnesses. Applying their analogy to our topic, we'll offer *hypothetical data* indicating that 25 percent of all officers are feloniously killed during traffic stops. As Scharf and Binder (1983: 66-67) point out:

> Such information is similar in kind to knowing that in a certain city, 25 percent of all deaths were related to influenza, whereas only 1 percent were related to the always fatal myasthenia gravis (or Lou Gehrig's disease). From such information one might, wrongly, conclude that influenza was more hazardous than is myasthenia gravis. In reality, myasthenia gravis is infinitely more hazardous; however, it is also far rarer. The lower proportion of deaths from myasthenia gravis is attributable to its rareness, not its benignity; similarly, influenza causes many deaths because it is an extremely common, if only occasionally fatal, disease.

To begin to assess which types of calls are most dangerous to police, researchers have attempted to develop rates—for instance rates at which officers are killed in responding to certain categories of incidents. For instance, Garner and Clemmer (1986) relied on two earlier studies which measured police activity to estimate the relative risks (in terms of deaths and assaults) of types of police activity. Consistently robbery calls ranked as the most dangerous.

Both robberies and burglaries were shown to be riskier than domestic disturbance calls. Other researchers have also found that robbery-related calls, instead of domestic disturbance calls, are the most dangerous (e.g., Margarita, 1980; Konstantin, 1984; and Little, 1984). Hirschel et al. (1992) calculated *assault rates* over a three-year period in Charlotte, North Carolina, using calls for service as the denominator in calculating those rates. In terms of "ratio of injuries to calls for service," domestic disturbance ranked below situations involving the mentally ill, the handling of prisoners, arrests other than disturbances, burglaries, robberies, and general disturbances.

The results of a study conducted by Uchida, Brooks, and Kopers (1987) are different from those described above concerning the relative danger of domestic violence incidents. These researchers analyzed non-fatal assaults against officers in the Baltimore County Police Department and calculated "danger rates" for various types of calls (e.g., domestic violence, robbery) using dispatch information to determine the frequency of each type of call. They found a higher "danger rate" (relative probability of assault) for police responding to domestic violence calls than for any other category of activity.

iii. Presence of Other Officers

The FBI collects and reports in the annual LEOKA's information regarding whether the slain officers were alone or assisted (the latter representing the presence of another officer at the scene). According to the FBI data, for the officers slain during 1994 through 2003, half (49.5%) had assistance at the scene at the time of attack and half (50.5%) did not. Using the narratives Fridell and Pate (1995) acquired more specific information regarding the presence of other officers; specifically, they determined whether and how many other officers were in the

immediate vicinity of the slain officer at the time of the attack. That is, in some incidents, officers may be together at the scene, but not in one another's immediate presence. For instance, officers might be at different locations at a residence. This information provides a different picture. Fridell and Pate found that even though one-half of the victim officers had other officers at the scene, only one-third of all victim officers (36.2%) had other officers in their "immediate vicinity"–that is, these other officers were close enough to intervene and/or to be in immediate danger themselves. Thus, whereas the FBI/UCR information from the same period implied that almost half of the officers had assistance, in fact, only one-third had other officers placed in positions to be of immediate assistance. In some of these instances more than one officer at the scene was slain. Not surprisingly, state officers (compared to city, county or federal officers) were least likely to have other officers in their immediate presence at the time of their deaths.

iv. Weapons and Body Armor

During 1994 through 2003, 92.2 percent of the 616 slain officers were killed with a firearm. Of those slain with firearms, three-fourths (74.8%) were slain with handguns, and 17.6% and 6.0% were slain with rifles and shotguns, respectively. Overall, 54.9% (n=338) of the officers slain during 1994-2003 were wearing body armor. This includes 67.6% of the officers slain in uniform and 20.0% of those who were not in uniform at the time of their murders. Three hundred and eighteen of the officers slain while wearing body armor were murdered with firearms. Over half of these (56.9%) were shot in the head. Another 40 percent (39.3%, n=125) were shot in the upper torso and 3.8% percent were shot below the waist. Of the 125 officers shot in the torso, all but 19 were killed because the bullet or bullets entered between the side

panels of the vest, through the armhole or shoulder area, or immediately above or below the vest. In the other 19 incidents the bullet penetrated the vest. The LEOKA does not distinguish between bullets that penetrated because they exceeded the design capabilities of the vest or because of vest failure. Fridell and Pate (1997), however, identified no vest failure in the 863 incidents they studied during the period 1893 to 1994. In each case where the bullet penetrated the vest, the vest was not designed to stop the bullet that entered.[10] We return to the topic of body armor in the context of agency policy.

v. Other Incident-Level Factors

Various researchers have looked at the time of the incident (for example, see Moorman and Wemmer, 1983; and Boylen and Little, 1990). According to the 10-year LEOKA data, Friday is the day on which the plurality of officers are slain (16.9%), followed by Tuesday and Wednesday—each at 15.4%. Only 10.7% of the officers were slain on Sundays. One-third (32.8%) are slain between 6:01 p.m. and midnight and one-quarter are slain during 12:01 a.m. to 6 a.m. (23.4%) and between 12:01 p.m. to 6 p.m. (25.0%).

[10] Second Chance Body Armor, Inc. came under fire in 2003 when departments reported that the Ultima and Ultimax vests made from Zylon had not stopped bullets they were designed to stop. Critics charge that the vest material deteriorates much faster than the company had claimed it would and that at least one officer had been killed as a result of the deterioration. In July 2004, while facing at least 9 lawsuits brought by states, Second Chance Body Armor recalled 100,000 bulletproof vests

(2) Jurisdiction-Level Factors

Again with a focus on slayings versus assaults, a number of studies have been conducted looking at the relationship between jurisdiction-level factors and rates of violence against police. Overwhelmingly, these studies have focused on "extra" or external-agency variables." In this category, we include factors that are, for the most part (or, at least, arguably), out of the hands of the agency. This would most clearly include factors such as region of the country and the social-economic conditions of the jurisdiction. We are including, as well, the crime environment and characteristics of the agency that the department cannot change significantly. The latter include factors such as agency size and type. Following our description of the research that pertains to "extra agency variables," we look at the relationship between factors internal to the department and the rate at which officers are killed. We consider these factors as within the power of the agency to change and include provision of less lethal weapons, policy on dispatching backup, policy on body armor, and so forth. Much less empirical work has addressed this category.[11]

i. Extra-Agency (External) Variables

Extra-agency variables capture the measurable features of the context in which law enforcement agencies find themselves and which have the potential to affect the rates of assaults and homicides of police. These variables are aspects of the police environment that could affect the officer's exposure to risk of violence and include region, agency size and officer density, crime rates, community demographics, and community characteristics, such as poverty, income

[11] These "internal" and "external" categories will be used to group our research variables and to help us analyze the data to identify the factors internal to agencies that impact on the rate at which officers are killed and assaulted controlling for factors external to the agency.

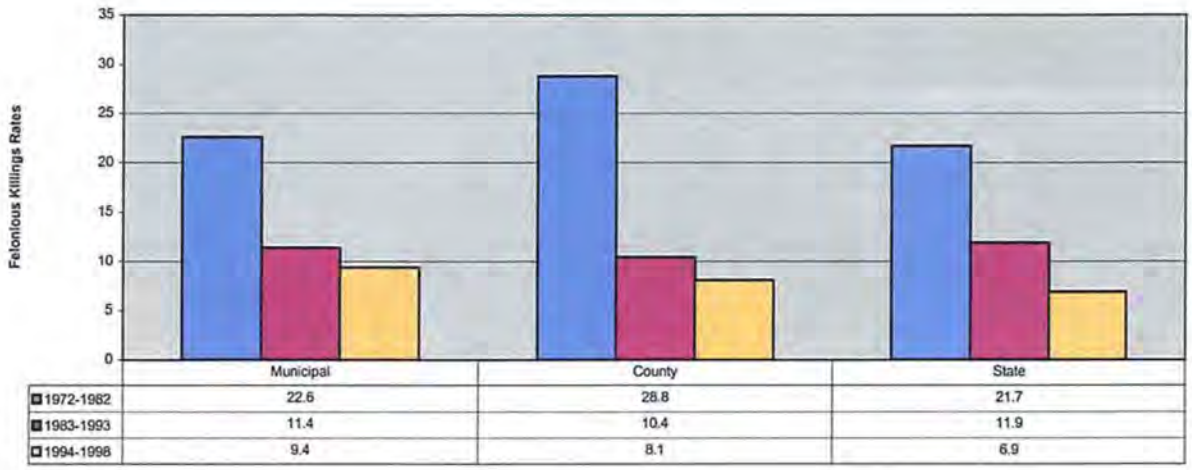
inequality, and social disorganization. Also considered here is the special case of gun ownership and availability.

a. Region. Perhaps one of the more consistent findings across studies is that both police murders and assaults are highest in the Southern region of the U.S. For example, analyzing LEOKA data, Boylen and Little (1990) found that fatal assaults during the years 1977-1986 were more frequent in the South. Lester (1978, 1982, 1984) similarly found that police were murdered at higher rates in the South in the 1970's. Kaminski, Jefferis, and Chanhatasilpa (2000) applied a spatial analysis, and using zip codes to control for population size, found that in general, the Southern region had more felonious killings of police, but that New York City had the highest single concentration. Meyer, Magedanz, Feimer, Chapman, and Pammer (1986) narrowed their focus by considering only ambush incidents across the U.S. in 1972-1973, a particularly turbulent time for police-citizen relations. They found that California, New York, and Pennsylvania accounted for over half of all incidents, though overall police killings were highest in the Southern region. These authors distinguished between planned and unplanned killings, hypothesizing that unplanned, impulsive killings were consistently highest in the South.

b. Agency type. Another of the most persistent findings from analyses of assaults and murders of police officers is that the highest *numbers* of both are accounted for by municipal police departments, followed by sheriff's offices (Federal Bureau of Investigation, 1992; Pinizzotto, Davis and Miller, 1997; Fridell & Pate, 1995, 2001). These numbers are explained, in large part, by the simple fact that there are more municipal police officers in the country than county, state or federal officers. To put these absolute numbers in perspective, Fridell and Pate

(1995, 2001) calculated the *rates* at which officers from various types of agencies were killed, relative to their number in the population of law enforcement officers. Figure 4 provides a comparison of the rates at which officers of various types of agencies were feloniously killed during three periods: 1972 through 1982, 1983 through 1993, and 1994 through 1998. It is notable, first of all, that the rate at which municipal, county, and state law enforcement officers were feloniously killed declined consistently across the three periods. The felonious killing rate of municipal officers, for example, fell from 22.6 per 100,000 during the 1972-1982 period, to 11.4 during the second period, and to 9.4 between 1994 and 1998. Similar declines were found among county and state officers. It is also noteworthy that the killing rates were generally the same across municipal, county and state officers. Data on the number of federal law enforcement officers were not available during the first two time periods, making it impossible to calculate killing rates. During the 1994-1998 period, however, the rate at which federal law enforcement officers were feloniously killed was 5.6 per 100,000, the lowest of any agency type.

Figure 4:
Felonious Killings per 100,000 Sworn Officers by Agency Type
for 1972-1992, 1983-1993, and 1994-1998
(Source: Fridell and Pate, 1995, 2001)



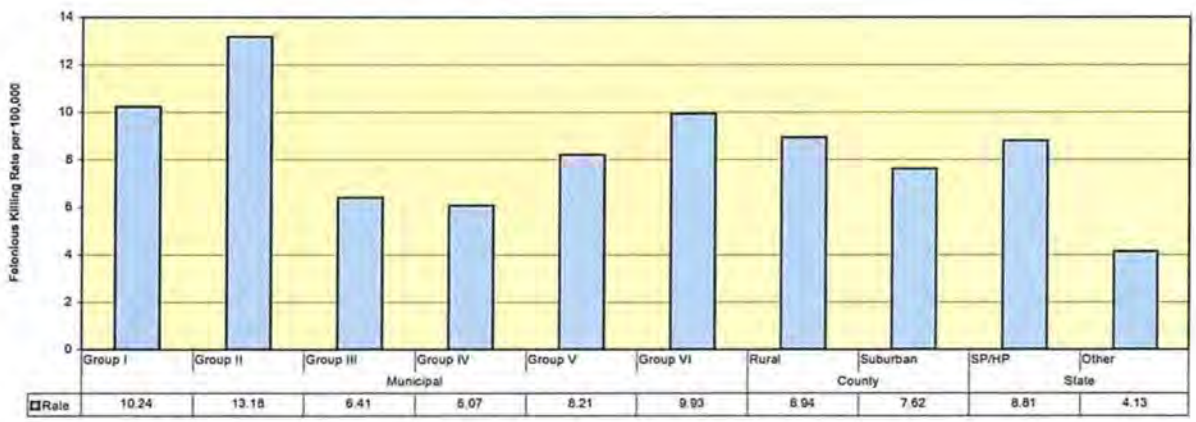
	Municipal	County	State
1972-1982	22.6	28.8	21.7
1983-1993	11.4	10.4	11.9
1994-1998	9.4	8.1	6.9

c. Agency size. Fridell and Pate (2001) found that the largest and smallest agencies had similar rates of officers killed, with the highest rates found in the second largest category of agencies (Fridell & Pate, 2001). Lester (1978) found that police murders were positively correlated with number of officers per unit of population. Cardarelli (1968) and Geller and Scott (1991) reported that police killings correlated positively with city size.

Figure 5 provides felonious killing rates for the period 1994 through 1998 for subsets of jurisdictions within municipalities, counties and states (Fridell and Pate, 1995, 2001). The first six bars represent the killing rates for municipal police agencies of various sizes with "Group 1" representing agencies in the largest cities (with populations of 250,000 or more) on down to "Group 6" representing municipal agencies in the smallest cities (with populations under

10,000).[12] The next two bars represent the felonious killing rates of agencies in rural and suburban counties. The final two bars represent the felonious killing rates of state officers providing first the rate for slain officers who worked for either a State Police, Highway Patrol, or Department of Public Safety agency and second the rate for officers who worked for other types of state agencies. As the figure indicates, the highest felonious killing rate (13.18 per 100,000) was for cities in Group II, with populations from 100,000 to 249,999. The largest and the smallest cities had virtually the same killing rates, 10.24 and 9.93 respectively. Cities in Group 5 had a rate on 8.21, with those in Groups II and IV both with rates slightly above 6.00. Rural country officers had a killing rate of 8.94, slightly higher than the 7.62 rate found among suburban county officers. State Police/Highway Patrol officers had a killing rate of 8.81 almost double that of officers in other state law enforcement agencies.

Figure 5: Felonious Killing Rates for Subcategories of Municipal, County and State Agencies, 1994-1998
(Source: Fridell and Pate, 1995, 2001)



[12]Group II is cities with 100,000 to 249,999 population; Group III is cities with 50,000 to 99,999 population; Group IV is cities with populations of 25,000 to 49,999 and Group V is cities with 10,000 to 24,999.

d. Crime rates. Lester (1982, 1984) may have been the first to report an association between rates of police killings and violent crime rates in the communities in which the officers served, based on analyses of 56 U.S. cities with populations larger than 250,000. Attempts to replicate these findings have been mixed. For example, Peterson and Bailey (1988) found no correlation between murders of police and rates of serious crimes. If a relationship were present, it may have been weakened by their aggregation of data at the state level, so that, for example, no difference between New York City and Syracuse, New York would be detected. Chamlin and Cochran (1994) also found no relationship between assaults on police and rates of robbery, burglary, and citizen assault, but their study was limited to Oklahoma City, and analyzed changes in rates over time. In comparison, Fridell and Pate (1995) aggregated data by agency jurisdiction and found that the violent crime rate predicted felonious killings of police across two time periods and was the only significant predictor for both periods (1972-1984 and 1985-1992). Also analyzing data at the jurisdiction level, Handberg, Unkovic, and Feuerstein (1988) found that rates of murder and robbery were strong predictors of violence against the police. Their study also included non-fatal assaults. Similarly, Kaminski, Jefferis, and Gu (2003) found that the risk of police assault was higher in areas with higher violent crime rates. Broadening the focus to include less serious crimes, Morrison and Meyer (1974) found that five variables accounted for 85% of the variance in non-fatal police assaults, including arrests for auto theft and arrests for sex offenses, including prostitution.[13] Kaminski (2002) found that the risk of police assault was higher in areas within a jurisdiction with more citizens who had prior arrests and more active arrest records, even though many arrests were for less serious crimes.

[13] The other three variables were percent of female-headed households, total police activity, and population aged 65 and older.

e. Community demographics. Studies of the role of demographics on police violence, such as race, gender, and age proportions in a population, have their obvious roots in early research linking such variables with crime rates in general. As with the research pertaining to crime rates, results have been mixed. Lester (1978, 1982, 1987) introduced and replicated findings that the percent of African American citizens in a population predicted police killings. Attempts to replicate these findings by others have been inconsistent. For example, Fridell and Pate (1995) found no impact of race for the period 1985 to 1992. Peterson and Bailey (1988) found that the percent of African American citizens predicted general, but not police, homicides. In contrast, Chamlin (1989) found police assaults were correlated with both the percents of African American and Hispanic surnames, and Kaminski, Jefferis, and Gu (2003) found risk of police assault was higher in areas with a higher percentage of non-Hispanic African American citizens. Several theories have been posited to explain these findings when they appear, including conflict and control theories, which assume that the dominant, majority group perceives the minority group as a threat and exercises more control, which the minority group then reacts against with higher levels of opposition (Jacobs & Carmichael, 2002). The apparent link between proportion of minorities in a population and violence against police may be explained by the disproportionate representation of minorities among populations with lower incomes. The link between poverty and income inequality and police violence is discussed below.

Based on longstanding observations that young men are more likely to involve themselves in crime than other demographic groups, several researchers have explored the relationship between violence against police and percent of youthful males in the jurisdiction

(Peterson and Bailey 1988; Lott 2000). Results supporting this link have been weak. Kaminski, Jefferis, and Gu (2003) found that assaults were slightly higher in areas with a higher percentage of young, residentially mobile college students, but did not find that police assaults were higher in communities with a higher percentage of male residents. Both results surprised them, and no definitive theory is available to explain them.

At a more general level, both Lester (1984) and Fridell and Pate (1995) have found that police killings are less frequent in jurisdictions with higher population density. Handberg, Unkovic, and Fuerestein (1998) found that population and population change were stronger predictors of violence against police than agency characteristics.

f. Poverty, income inequality, and social disorganization. Variables representing levels of deprivation and social disorganization have a long history of observation in connection with crime in general, and have received much attention in studies examining correlates of police assaults. Relatively early, Lester (1978) found a relationship between police killings and the welfare rate, and these findings continued to hold into the 1980s (Lester, 1982, 1987). Other researchers have also consistently found a relationship between rates of poverty or economic distress and rates of assaults or killings of police (Peterson & Bailey, 1988; Chamlin, 1989; Kaminski & Marvell, 2002; Kaminski, Jefferis, & Gu, 2003). In contrast, Fridell and Pate (1995) found that police killings for the period 1985-1992 were negatively related to the poverty index.

Attempts to look beyond poverty, *per se*, to explanations for why poverty may relate to higher police assaults have included theories about the role of income inequality in negative

attitudes toward police—as symbolic enforcers of the unequal status, as well as the role of social disorganization, which is expected to have a negative impact on the perceived authority and legitimacy of the police force. These findings have not been as clear as the findings for poverty. Peterson and Bailey (1988) and Chamlin (1989) failed to find a correlation between an index of income inequality and police assaults, even where poverty appeared to play a role. On the other hand, using percent female-headed households or the divorce rate as an indicator of social disorganization, studies have found relationships between these variables and assaults against police (Peterson & Bailey, 1988; Morrison & Meyer, 1974; Kaminski, Jefferis, & Gu, 2003).

At a more anecdotal level, Meyer, Magedanz, Kieselhorst and Chapman (1978) observed that most police assailants in Albuquerque were young males on low rungs of the vocational-occupational ladder or unemployed. From these qualitative observations, they argued that police assaults necessarily have implications for society being structured to impose deprivations, hardships, anxieties, and resentments on the lower class. Similarly, after a study of several community and agency variables, Kaminski (2002) suggested that reductions in police homicide would be better achieved through decreases in levels of poverty, economic inequality, family disintegration, and racial segregation than through improvements in police performance.

g. Firearm usage and availability. There can be no serious question that firearms play a prominent role in murders of police officers. Depending on the database used for a study, between 70% and 90% of police murders are committed with firearms (Boylen & Little, 1990; Wilson & Meyer, 1990; Fridell & Pate, 2001). Wilson and Meyer (1990) found that, in non-fatal assaults, guns are the second most frequently used weapons after fists. Meyer, Magedanz,

Feimer, Chapman, and Pammer (1986) found that most ambush assailants also used handguns, and that the higher likelihood of using guns for these attacks also resulted in higher levels of violence and injury inflicted than police assaults in general. Relationships also have been found between rates of police killing and more general gun-crime indices (Fridell & Pate, 2001). Relationships between gun availability and police murders are less clear; Lester (1978, 1984, 1987) found that rates of gun ownership predicted police killings, while Southwick (1998) found that an increase in both gun stock and handgun sales was associated with a decrease in the relative risk to police. These differences may be explained, in part, by differing methodologies. Lester used cross-sectional analyses, comparing police murder rates in areas of higher and lower rates of gun ownership at one point in time, while Southwick analyzed increases and decreases in both variables longitudinally

ii. Internal to the Agency

The section above described jurisdiction-level factors that are external to (out of the hands of) the agency. In this section, we review what is known about the policies and practices of agencies that are geared toward increasing officer safety. First we review three general strategies for reducing workplace violence and their applicability to the police environment. Then we discuss specific efforts seen in the law enforcement environment. As reported above, there is not much research on either the extent to which these efforts are utilized by agencies nor their effectiveness.

a. General strategies for reducing workplace violence and their applicability to law enforcement. Reporting on efforts in all professions to reduce workplace violence, NIOSH

(1996; see also Injury Prevention Research Center, 2001) describes prevention strategies in three main categories, environmental, organizational/administrative, and behavioral/interpersonal. These three strategies are described generally here; their application to police work is discussed below. Environmental strategies are those that implement changes in the environment to render workers either less available or less attractive to potential assailants. Where cash is involved, these strategies may include using locked drop safes and signs indicating that limited cash is available. Environmental strategies are also geared toward achieving physical separation between workers and potential assailants, through the use of bullet-resistant barriers and higher counters. Visibility and lighting changes are also included in the environmental category. Organizational/administrative strategies include changes in staffing plans and work practices, such as using escorts for patients and prohibiting unsupervised movement in facilities. Administrative changes in how threats are assessed and reported are also included. Behavioral/interpersonal strategies overlap with the first two categories, but operate at the level of training employees to implement them. For example, individual employees may receive training in conflict resolution and de-escalation tactics.

Successful implementation of prevention strategies may vary by type; a 1999 survey of employers indicated that a majority had made environmental changes to reduce workers' exposure to violence and most employers had implemented a policy of referring potentially violent employees to their Employee Assistance Program. In contrast, only a minority of employers had trained managers and supervisors to identify early warning signs of violent behavior (Deming, 2000). What efforts have police departments made within these categories to reduce officers' exposure to risk of violence? Before discussing specific steps agencies have

taken, it is important to recognize the great diversity that characterizes the law enforcement profession. In the United States there are approximately 18,000 publicly funded law enforcement agencies. These agencies vary by size, function, responsibilities, and philosophies. These agencies are spread across fifty states and the District of Columbia, and each one is accountable to a separate authorizing body. There is no set of mandatory national standards for officer qualifications, training, or personnel policies, or standard operating procedures for fundamental police activities such as arrest, use of force, and pursuits. This lack of standards—and thus great variation across agencies—extends to all facets of officer safety as well. With this context explained, we describe various police agency efforts to improve officer safety, even though the implementation of particular interventions varies significantly across U.S. agencies. We begin by characterizing law enforcement efforts in terms of the three NIOSH strategies presented above.

Environmental strategies (a1), as discussed above, would involve changing the environment to render officers less available or attractive to assailants. Changing the physical features of the surrounding environment is probably less feasible in the police officer's workplace than in other settings. For instance, erecting physical barriers to separate workers from clients is neither feasible nor desirable within the police profession, especially in light of the move toward "community policing" which fosters increased police-citizen interaction. In fact, some agencies have actually removed the physical barriers in their stationhouses that separate citizens from officers. Nevertheless, there are analogous changes to the "physical" environment of police work that have been made to reduce officers' risk of injury in specific situations. Similar to the environmental strategies described above, these steps directly address

the officer's physical exposure to risks inherent in dealing directly with the public. In contrast to the "environmental designs" described above, they are implemented at the level of the mobile, individual officer. Personal protective equipment, such as soft body armor, is believed to be a key factor in the prevention of serious harm to officers. A number of less-lethal force weapons are now available for officers to use when responding to aggressive subjects–including items such as pepper spray, batons, and conducted energy devices (commonly referred to as Tasers, which is a brand name)–with the goal that suspects be subdued with a minimal amount of hand-to-hand physical contact. Another circumstance in which interventions have been implemented is at the point at which a suspect is taken into custody. Agencies have installed protective barriers between the front and back seats of patrol cars and more effective handcuffs are used in an attempt to reduce officer injuries. To reduce the likelihood of officers being injured or killed with their own weapons, officers are equipped with redesigned holsters and firearms, and are required to remove and secure firearms when processing prisoners.

Organizational strategies (a2) in police departments to reduce exposure to violence include increasing the number of staff on duty. Specifically, this strategy includes increasing the ratio of sworn officers to jurisdiction residents, and may include increasing the number of officers made available and visible in particular situations, thereby reducing the attractiveness of individual officers as targets of assault. The latter strategy takes the form of assigning officers to two-person versus one-person vehicle patrols, backup policies (e.g., requiring officers to have backup before entering the scenes of particular crimes), and dispatch policies (e.g., requiring dispatchers to send two officers to certain calls). Other organizational/administrative interventions have focused on promoting an agency "culture" that gives priority to non-violent

solutions to problems where possible. In general, this cultural approach attempts to create an environment that disfavors violent interactions, and in particular, discourages police use of force to accomplish police objectives. These interventions include specific policies about how and when force can be used, along with administrative controls (e.g., use of force review boards, early warning systems) to review officers' use of force and hold officers accountable for inappropriate practices. At a less direct level, organizational considerations of police culture may also include broader mission statements and expressions of values that set a tone for non-violent problem solving throughout the law enforcement agency.

Behavioral/interpersonal strategies (a3) involve providing the individual employee with guidance in recognizing and diffusing potentially violent situations, as well as instructions for using security devices and protective equipment. These strategies go to the heart of law enforcement agencies' efforts to reduce violence against officers. These strategies include training in such topics and skills as defensive tactics, de-escalation strategies, interpersonal communication, crisis management, "verbal judo," and suspect restraint techniques. Training programs have been developed for very specific circumstances, all in an effort to improve officer safety. For example, courses are available on traffic stops, house searches, interacting with individuals under the influence of alcohol, disarming an individual, responding to domestic violence, and arrest and control techniques. As discussed above, behavioral and interpersonal strategies overlap with the other categories, but operate at the level of the individual officer. Therefore, these strategies include the transmission of departmental culture and value to the individual officer, so that individual use of force decisions are made consistent with departmental policy.

b. Specific law enforcement strategies or agency characteristics that may impact on workplace violence. As discussed above, research into departmental level variables that affect rates of violence against police is much less well developed than research aimed at community context, individual officer, and situational variables. Where departmental level concerns have received attention, the greater weight of this literature is comprised of suggestions and recommendations for "good policy and practice," rather than demonstrations of which policies are actually related positively or negatively to rates of violence against police. This section summarizes the literature on those variables that operate at the agency level. While our priority is to present empirical findings regarding the effects of these variables on violence against officers, reflecting the literature, this section also includes suggestions from knowledgeable authors about what it makes sense for departments to do, in the interest of protecting the officer on patrol from violence.

First, agency aggressiveness and community relations (b1) may be related to violence against police. An apparently long-standing belief found in the literature on violence in police-citizen encounters is that departments contribute, both directly and more subtly, to a culture among their officers, and that this culture can affect officers' attitudes toward the use of violence. Many researchers have investigated the expected relationship between violent culture and rates of assaults *against citizens* (e.g., Wilson, 1975). Expanding on those theories, other researchers have investigated the link between aggressive police culture and assaults *against police.* For these studies, agency aggressiveness is usually operationalized as either arrest rates for minor crimes or rates of police-initiated arrests. For example, Handberg, Unkovic, and

Feuerstein (1988) found that among law enforcement departments in Florida, rate of officer injury was positively correlated with arrest rates for prostitution and commercialized vice. Morrison and Meyer (1974) found that arrest rates for prostitution were related to rate of non-fatal assaults against officers. Fyfe (1979) found that officer injuries declined after New York City promulgated rules restricting authorized discharge of firearms, lending further support to the theory that reducing officer aggressiveness may actually offer them protection against violence. In contrast, Southwick (1998) found no relationship between killings of police and killings by police. While most commentators support controls on and accountability for use of force as protective factors for officer safety, Pinizzotto et al. (1997) identify a converse risk factor, expressing concern that rules disallowing officers to draw weapons unless drawn on first increase risk of injury to officers.

Perhaps serving as a partial explanation for why more aggressive police departments are expected to suffer more assaults on their officers are findings that poor community relations increase the risk of officer injury. Kavanagh (1997) emphasizes citizen disrespect for police as the most powerful and consistent situational finding in the violent arrest encounter. Heller, Chapman, Kieselhorst and Meyer (1974) also found, in an anecdotal study of police assailants in Albuquerque, that poor community relations contributed to the assailants' motivations; they felt they had been generally treated unjustly by the police. Hemmens and Levin (2000) suggest that a new emphasis on aggressive policing may increase hostility toward police in inner-city neighborhoods and Kaminski and Sorensen (1995) similarly suggest a need to reduce interracial tension and hostility as part of the effort to reduce the risk of assault on police. The Department of Justice (1993) suggests that good community relations are further served by police

accountability for use of force, as well as community education and input into police polices. Both these authors and Kaminski and Sorensen (1995) include recruitment and selection policies as opportunities to positively affect agency culture; the former emphasize the need for minority representation, while the latter approve of the recent trend toward requiring higher education levels among officers.

Second, officer assignment (b2) may be related to violence against police. There is much interest in the law enforcement field regarding the relative dangers of one-officer versus two-officer patrol assignments. As reported above, by far, the highest numbers of assaults on officers are among officers who are alone at the time of assault, whether serving in a one-officer vehicle, or on foot patrol (Fridell & Pate, 1995; Hirschel et al., 1994; Wilson et al., 1990; Wilson & Brewer, 1992; FBI, 1992). Fridell and Pate (2001) report that for the period 1983-1994, 50% of officers killed were on one-officer vehicle patrol, compared with 12% on two-officer vehicle patrol. As Fridell and Pate (2001) and Wilson and Brewer (1992) point out, however, these numbers may simply reflect the higher percentage of officers assigned to lone patrol and may not indicate an elevated risk by type of assignment. To assess danger across assignments we need to consider level of victimization relative to the proportion of officers on the various assignments (e.g., assigned to one-officer versus two-officer patrol). Pate and Fridell (1993) analyzed data from 56 large U.S. cities, and found that after controlling for crime rates and other community variables, agencies with higher percentages of one-officer vehicle assignments had higher rates of felonious killings. Specifically, they used data obtained for the 56 largest U.S. cities from a national survey that solicited from responding agencies the percentage of their patrol officers assigned to one-officer and two-officer vehicle patrol. They used Poisson Regression to assess

the impact of this variable on the rates at which officers were feloniously killed in each city controlling for other relevant jurisdiction variables including poverty rate, percent males 15 to 24, population density, violent crime rate, gun crime rate and hours of pre-service defensive tactics training. As previewed above, the results indicated that agencies with higher percentages of one-officer vehicle assignments had higher rates of felonious killings, controlling for the other variables. Although their results confirmed the "conventional wisdom" among officers—that two-officer patrol is more safe, the authors point out that their study involved only a small number of cities and, equally important, relied upon survey data to measure one-officer versus two-officer assignments.

Wilson and Brewer (1992) report several attempts to arrive at per capita risk of injury for officers among different assignments, using extrapolation methods to model comparative risk, and suggest that lone officers may actually be less likely to be assaulted, but more likely to suffer injury if assaulted. Wilson et al. (1990) also found that officers from two-person units were less likely to be injured when assaulted, at rates of injury of 39% for assault victims in two-person units compared to 45% in one-person units. Kaminski and Sorensen (1995) found, in the Baltimore County Police Department, that among officers who suffered assault, injury was more likely in two situations: either when the officer was alone, or when the officer joined a situation where the suspect was already arguing with or resisting another officer.

Dangerousness of activity may interact with officer assignment to increase officer risk of injury. Hirschel et al. (1994) found that, for domestic disturbance calls, officers were much more likely to be assaulted if alone. In a national study of police assaulted by ambush, Meyer,

Magedanz, Feimer, Chapman and Pammer (1986) found that victims of ambush were more likely than general police assault victims to be alone when assaulted. Two-thirds of ambush victims were assigned to vehicle patrol, with the majority of these in one-person units.

Third, soft body armor (b3) may be related to deaths of police. Kaminski (2002) suggests, based on a review of several decades of data on police assaults and killings, that bullet proof vests may be the greatest contributor to the steady decline in police homicides since 1973. Soft body armor designed to protect the torso from shotguns and small-caliber handguns while being comfortable enough for routine wear under a uniform, was first patented in 1972 (U.S. Congress, 1992a:2). Stewart (1988:21) describes the first "save":

> On December 23, 1975, an off-duty but uniformed Seattle patrolman, Ray Johnson, was standing in a food market checkout line. A stickup man shot him. "He was only three feet away," said [one of the researchers] "but he did not fall down, so the guy shot him again. We rushed out to Seattle to see him. All he had under the vest were two mean-looking bruises. He was out of the hospital in three days."

The FBI (1994) has collected compelling data on this issue and estimates that officers are 14 times more likely to be killed if not wearing a protective vest. As part of a broader survey of force used by and against police, Pate and Fridell (1993) collected data on firearms assaults data from agencies around the U.S. Providing information regarding the number of officers who were "hit by bullets intentionally fired by civilians" for the period 1987 through 1992 were 289

sheriff's departments, 31 county agencies, 676 municipal agencies, and 37 state agencies. Regarding each of these incidents, the departments indicated whether the officer was killed or wounded, whether the officer was wearing body armor or not, and the location of the hit (as either within the upper torso area, outside of the upper torso area, or both within and outside the upper torso area).

Figure 6 provides the data for Sheriff's departments with regard to fatalities associated with firearms assaults of officers with and without body armor by the location of the bullet wound. Less than one percent (0.2%) of the officers who were wearing body armor when they were shot in the upper torso area—the area that soft body armor is designed to protect—were killed. In contrast, one-fourth of the officers who were not wearing body armor when shot in the upper torso died from their wounds.

The data were not as striking for the other agency types, but are still instructive. Among city agencies, 1.9 percent of the officers who were wearing body armor when shot in the upper torso were killed, compared to 4.7 percent of the officers who were shot in the same location, but were not wearing soft body armor. Seven percent of the state officers who were wearing body armor when shot in the upper torso died from the assault, compared to 13.3 percent of their counterparts who were not wearing body armor.

Figure 6: Percent of Firearms Hits Which were Fatal for Sheriffs Deputies Wearing and Not Wearing Body Armor by Location of Hits (Source: Pate and Fridell, 1993)

	Inside Upper Torso Area	Outside Upper Torso Area	Both Within/Outside Torso Area
Not Wearing	24.0%	3.0%	2.0%
Wearing	0.2%	7.0%	0.5%

Not surprisingly, increased use of soft body armor appears ubiquitously in suggestions for safe policing (e.g., FBI, 1992; Meyer et al., 1986; Mayhew, 2001b; Chapman, 1986).

Fourth, the use of less-than-lethal weapons (b4) may be help reduce violence against police. Although access to less-lethal methods of force might be expected to curb incidents of *citizen* injury more than *officer* injury, in fact a specific objective of some less-lethal weapons is to reduce injury to *both* officer and subject by reducing the likelihood of physical altercations. Oleoresin Capsicum (OC) spray and Tasers are examples of less-lethal weapons that were designed to allow officers to subdue suspects from a distance. And, indeed, several studies have demonstrated that these methods of restraining and subduing suspects may actually reduce the

risk of assault and thus injury to officers. For instance, in a study of a Florida police department, Morabito and Doerner (1997) found that incidents involving the use of OC spray resulted in fewer and less severe officer injuries than incidents involving the use of impact weapons, such as batons and flashlights. The researchers suggested the benefits might result from the ability to use OC spray from a distance. This distance reduces the opportunity for an assault by the subject. A study of the Baltimore County Police Department found that officer injuries declined after the introduction of OC spray. Since injuries had begun to decline before the adoption of OC spray, the decline could not be conclusively attributed to the spray incidents (International Association of Chiefs Police 1995). The authors did find, however, that in cases where OC spray was used, injuries to officers were few and were minor, and that use of force complaints by citizens also declined.

The last few years have seen a great increase in the number of agencies adopting Tasers. While no national studies have yet been conducted on the impact of Taser use on various outcomes, some agency reports indicate that, like OC spray, Taser use is reducing the incidence of assaults against officers and thus injuries (see e.g., San Jose Police Department, 2004; Cape Coral P.D., 2004). Anecdotally, officers report that merely threatening the use of a Taser (e.g., merely pointing the Taser or using the laser aiming device to show the suspect that s/he is literally "in the officer's sights") leads in some instances to subject compliance. For instance, the report of the San Jose Police Department (2004) describes various incidents of Taser use including one in which "...the suspect gave up and submitted to arrest when an officer simply pointed a Taser at the Suspect" (p. 6). In another more dramatic incident, "the suspect began making threats to the officers that he would shoot them. In this case, officers gained compliance

by pointing the Taser at the suspect and advising the suspect they would deploy if he did not cooperate" (San Jose, 2004: 7). The Cape Coral Police Department (2004: 1) also reports that "suspect compliance has increased at the mere presence of an Air-Taser on the scene."

Meyer (1982) compared eight tactics used in over 500 use-of-force incidents that did not include firearms and found that incidents involving the use of a baton resulted in serious injury to 16% of the officers and incidents involving flashlights resulted in injury to 4% of the officers. Incidents involving the use of stun guns or sprays resulted in no injuries to either the officers or the suspects. In sum, it appears that access to effective less-lethal methods for subduing suspects, particularly those that reduce physical contact between officer and suspect, may play a role in reducing violence against police.

Fifth, the relationship between communication policies (b5) and acts of violence against police needs to be studied. We found no studies investigating the relationship between rates of officer assault or injury and dispatch or other communication policies, yet the need to improve provision of information to officers has received attention from those making safety recommendations, likely based on the assumption that officers who know more about the situations they face (e.g., history of violence on the part of the subject, presence of weapons in the home) will be safer than officers who do not. Chapman (1986) and Kaminski and Sorensen (1995) emphasize the importance of early identification of risky situations. In their study of ambush assaults, Meyer et al. (1986) also emphasize the officer's need to know what to expect before arrival. Lamb, Weinberger, and DeCuir (2002) suggest that officers should be provided information when calls involve individuals with known mental health problems and note that

some departments have implemented systems that can quickly download information about previously encountered suspects and locations into laptop computers taken into the field by mobile crisis teams. Fridell and Binder (1992) examined the impact of officer foreknowledge of an incident or suspect on incident outcome; their study pertained to police use of deadly force, as opposed to violence against police, but their findings are instructive.[14] These researchers compared incidents which resulted in police shootings of civilians to carefully selected incidents in which a police shooting could reasonably have been expected but did not occur. They compared these incidents using information collected through extensive surveys of officers.[15] A key finding of this research was that encounters characterized by ambiguity or surprise are more likely to result in the use of deadly force. More "nonshooters" knew their opponents and had information upon arrival that the incident might involve deadly force. Conversely, more "shooters" did not know their opponents and did not perceive upon entry that the incident might be deadly. These findings indicate that officers and opponents may be safer when the officer has information about the suspect or incident upon entering a scene.

Sixth, the relationship between training (b6) and acts of violence against police needs to be studied. Although very little research addresses the actual relationship between quantity and quality of training on the one-hand and rates of violence against police on the other, the issue of training has probably received as much attention as any other in connection with police officer safety. The topic is broad, includes both academy and in-service training, and ranges from vehicle placement to avoiding risk of communicable diseases (Lamb, Weinberger,

[14] Arguably, incidents in which police use deadly force and incidents in which police are feloniously killed are distinguished only by who got their shot off first.

[15] Fridell and Binder (1992) was a secondary analyses of data originally collected and reported by Binder and Scharf (1980) and Scharf and Binder (1983).

and DeCuir 2002; Hirschel et al., 1994; DOJ, 1993; Mayhew, 2001a; Meyer et al., 1986). Training in effective conflict resolution and use of self-defense tactics is emphasized in the general workplace violence literature as a form of behavioral/interpersonal interventions to prevent violence to employees. Virtually all discussions of appropriate training of law enforcement personnel include these elements. For example, Hirschel et al. (1994) suggest officers receive training in crisis intervention; the FBI (1992) recommends training in weapon retention and "professional demeanor;" Pinizzotto, Davis and Miller (1997) recommend training in boxing/martial arts, weapon retention, self-defense, physical fitness, and crisis intervention; and Kaminski and Sorensen (1995) opine that officer injuries may be reduced by training in unarmed defensive tactics. Some implications for training were drawn from an FBI analysis of officers who were slain in the line of duty (FBI 1992). In *Killed in the Line of Duty*, the analysis of felonious assaults resulted in recommendations that officers be better trained in calling for backup, not acting alone before backup arrives, effective searches that include the groin area, proper use of handcuffs, vehicle placement during stops, placement of suspect in police vehicle, dealing with persons with mental impairments, dealing with individuals with culturally diverse backgrounds, proper approach to vehicles or suspects, and challenges unique to working at nighttime (FBI 1992). Pinizzotto, Davis and Miller (1997) assessed non-fatal assaults and recommended further training in use of side arm, shotgun, baton, black jack, chemical agent, Taser, street survival, waiting for backup, proper placement of vehicle, facing a drawn gun, proper approach to vehicles, teamwork, frame of mind (such as complacency during "routine" duties), risk of mentioning intent to arrest before calling for backup, taking action without communicating with dispatcher, and attentiveness to surroundings.

Despite the call for more training on an increasing array of topics, evidence is not yet available to support a direct connection between training and safety. Fridell and Pate (1995) found that, across departments, hours of training were not related to felonious killings of police. In a study comparing methods of training, Helsen and Starkes (1999) attempted to train officers to shift from reactive shooting to a problem-solving approach in a complex decision-making context. Measuring effectiveness by the number of new preventive actions attempted, they found that officers trained by interactive simulation performed better than those trained with slides or classic classroom techniques. A survey of officers in West Coast municipal police departments suggests that officers have doubts about the efficacy of traditional training methods. Kaminski and Martin (2000) found that most officers reported that arrest and control tactics were easy to learn and remember, but only a minority felt they were easy to apply when assaulted. Fewer officers reported that defensive tactics were easy to learn, remember, or apply, and fewer than half thought they were effective with violent subjects. Most officers felt their training had been generally inadequate and patrol officers were more critical of training than sergeants and lieutenants.

Several authors have noted the somewhat obvious problem that training can only be as effective as its later application. For example, Pinizzotto, Davis and Miller (1997) identify, as a training deficit, "failure to follow procedure even after training." In *Principles of Good Policing,* DOJ points out that success of training should not be measured solely by hours completed (1993). The FBI (1992) also notes the importance of first-line supervision to curb departures from trained procedures.

In sum, more research is needed to link quantity, quality, and type of training to a reduction in violent incidents. Early research in this area has demonstrated a need for hands-on, realistic, interactive training to give officers an opportunity to apply, practice, and better prepare themselves to use the techniques traditionally discussed in a classroom setting.

4. Prior Research and Theory upon which this Study is Based

There is much in the criminological literature on how the structure of society impacts on crime generally and violence in particular. This literature looks at the relationship between crime rates and structural variables such as unemployment, income, population size and density, inequality, social disorganization and so forth (Merton, 1938; Shaw and McKay 1969). As interest in violence against police has grown, researchers have attempted to understand it in the context of theories developed in connection with other types of violence. For example, assaults on police may result from subcultural values that provide normative support for such violence, in order to protect such values as honor, courage, or manliness (Kaminski, Jefferis, & Chanhatasilpa, 2000; Meyer, Brunk, & Wilson, 2001). Most notably, this "subcultural" theory of violence has been invoked to explain an oft-reported finding that assaults against police are generally more prevalent in the Southern region of the U.S., where a traditionalistic view of power, rooted in interpersonal relationships, may give value to disobeying formal laws and rules (Meyer, Brunk, & Wilson, 2001). Others have suggested conflict and control theories, in which crime in general, and assaults against police in particular, may be related to the ability of those in power to enforce an unequal distribution of benefits in their favor, by rewarding acceptance of the social order (Chamlin, 1989; Jacobs, 1979; Meyer, Brunk, & Wilson, 2001). These theories

often appear in studies utilizing statistics about poverty, displacement, and disorganization, such as divorce rates, and minority representation.

The current study builds upon the theory-based work of Kaminski who points out that the various studies referenced above have implied "that the determinants of police homicide risk are for the most part a function of conditions external to the potential victims" (2002: 1). That is, they imply that risk of victimization is a function of the environment in which police do their jobs—ignoring the potential impact of department policies and procedures on the potential for victimization. To remedy this one-sided assessment, Kaminski drew upon criminal opportunity theory to examine killings of police. Criminal opportunity theory posits that the structural conditions of society impact on opportunities for crime (Merton, 1938; Shaw and McKay, 1969; Hindelang, Gottfredson, and Garafalo, 1978). Several theoretical constructions under the umbrella of opportunity theory look at how people's activities increase or decrease their risk of crime. Cohen and Felson developed "routine activity theory" to explain how macro-level factors could impact on routine activities and thus on crime rates over time. Hindelang, Gottfredson, and Garofalo (1978) looked at "routine activities" another way. They developed the "lifestyle-exposure model" to explain how and why the routine activities of various social and demographic groups might impact on their risk of victimization. As examples, increased economic opportunities for women could explain the increase in recent decades in the victimization of women and increased participation of women in criminal activity. [Regarding the latter, Simon (1975) explains the increased involvement of women in property crimes by the fact that women have more opportunities by virtue of their exposure through their work to criminal opportunities (i.e., things to steal).] Pursuant to this theory, victimization by youth

would be greater in economically challenged neighborhoods where female heads-of-households are working two jobs and leaving the children unsupervised.

Key concepts within routine activity theory are geographic *proximity* to motivated offenders, target (of crime) *attractiveness, exposure* to potential offenders, and *guardianship* (or protective factors). That is, according to Cohen and Felson (1979), crime occurs when suitable or attractive targets without guardianship are exposed to motivated offenders.

(1) Kaminski Study on Police Homicides

As above, Hindelang et al. (1978) used routine activities theory to explain differential victimization across social groups. In the same vein, several researchers have used routine activity theory to explain differential victimization across professions (e.g., Block, Felson, and Block 1984; Collins, Cox and Langan, 1987). Kaminski extended this occupational inquiry by using routine activity theory to look at differential victimization within a profession—the police profession. Specifically, the major purpose of Kaminski's study was to assess "whether variation in structure or organization of police work impacts opportunities for the victimization of officers, once effects of social, demographic, and economic conditions are controlled." In contrast to previous research, Kaminski did not focus solely on the factors external to agencies that might impact on violence against police, but rather attended to the possibility that victimization was a function at least in part of various police policies and practices. He viewed agency policies and practices as having the potential to increase or decrease exposure to motivated offenders and/or guardianship, which would, in turn, increase or decrease the likelihood that officers would be killed.

In his study he tested whether "variation in organization characteristics of law enforcement agencies is associated with homicide of police after controlling for structural conditions." From 190 municipal agencies, he collected data on the number of slain officers and data on agency and jurisdiction characteristics (e.g., policies, practices, and equipment; crime environment) that might impact on officer safety. His data on police homicides came from the FBI LEOKA for the years 1986 through 1997. Information regarding agency policies and practices came from the Law Enforcement Management and Administrative Statistics (LEMAS) reports for 1987, 1990, 1993, and 1997.[16] U.S. Census data and UCR data were used to measure the crime rate and criminogenic conditions of jurisdictions. He collected the data for four periods of time that roughly corresponded with the LEMAS report dates.[17] Below we describe how Kaminski conceptualized for police and measured each of the constructs—exposure, guardianship, attractiveness and proximity—and report his results.

i. Exposure

Cohen, Kluegel and Land (1981: 507) explain that exposure refers to "variations in physical visibility and accessibility of potential targets (persons or objects) to potential offenders." Thus, for instance, for a civilian (versus police) exposure would be increased by nights spent at bars, use of public transportation, and so forth. Kaminski used three variables to measure this construct for police: arrests for serious (i.e., Part I) offenses, proportion of field officers assigned to foot versus motorized patrol, and proportion of officers assigned to one-

[16] For a description of the LEMAS program go to http://www.ojp.usdoj.gov/bjs/pubalp2.htm#LEMAS.
[17] With regard to the measures of felonious killings, the periods were1986-1988, 1989-1991, 1992-1994, and 1995-1997.

versus two-officer patrol units. Arrests, Kaminski explained, could indicate increased "exposure" due to police aggressiveness or to greater police activity. Officers on foot patrol, he argued, have more face-to-face contacts with the public and thus with potential offenders. Two-officer patrol units, he reports, increases patrol unit density, "and thus affects officer exposure as well" (p. 26).[18]

ii. Guardianship

Guardianship refers to people or things that can enhance the safety of a potential victim. Social guardianship refers to the protection afforded by the presence of other people. Physical guardianship for civilians would encompass burglar alarms, firearm ownership and so forth. With regard to law enforcement, many policies, practices and tools can be categorized as guardianship factors, including the wearing of protective vests, carrying of firearms and less-lethal weapons, training in defensive tactics and other topics, and so forth. To measure guardianship, Kaminski used percentage of officers assigned to one-officer versus two-officer patrol units, mandatory vest-wear policies, types of weapons authorized (i.e., semiautomatics v. revolvers, pepper spray), and training requirements (total hours of academy training plus total hours of field training).

[18] Kaminiski notes that two-officer patrol units could also be conceived of as a guardianship variable with each officer in a two-unit unit providing extra protection for the other. The two different conceptualizations of the variable predict opposite effects: if two-officer patrols increase exposure the result, according to the theory, would be increased violence against police; if two–officer patrols increase guardianship, the predicted result would be decreased violence against police.

iii. Attractiveness

The "attractiveness" of a target of crime is usually based on their economic value, symbolic value or vulnerability. Kaminski argues that the concept of "attractiveness" requires "substantial redefinition" when applied to police as victims. He explains that subjects who use violence against police have, for the most part, done something wrong and want to harm the officer so that they can escape justice. Kaminski argues that the more serious the crime committed and the more extensive the criminal record, the more motivated the offender is to harm the officer and escape. Using this conceptualization, Kaminski argues that attractiveness could be measured in terms of the crime environment. He explains, "...police working in areas or jurisdictions with greater proportions of offenders (and/or more active offenders) committing serious crimes should be subject to increased risk of assault and homicide, other factors being equal" (2002:41). These measures, however, overlap with the measures for proximity to potential offenders (described below) and, as such, Kaminski did not include "any independent measures of attractiveness in the analysis, and it is necessarily assumed that more severe criminogenic conditions and/or high levels of serious reported crime increase both spatial proximity to motivated offenders and the attractiveness of police as targets for homicide." (p. 42). Further, he claims that the concept of target attractiveness overlaps with guardianship, in that the unprotected officer (e.g., no body armor, alone) is more attractive than his protected counterpart.

iv. Proximity

According to the routine activities conceptualization of criminal opportunity theory, a person who is geographically proximate to motivated offenders is more at risk for victimization than a person who is not. Thus in terms of civilians, we would predict greater victimization for a person who lives in a high crime area than for one who does not, all other things being equal. According to Cohen et al (1981: 507) proximity and exposure are different in that proximity "is a physical relational property pertaining to physical distances between residential locations of populations of potential targets and potential offenders," whereas exposure "pertains to variations in physical visibility and accessibility of potential targets (persons or objects) to potential offenders as determined by personal characteristics of the potential targets."

This concept, too, requires some redefinition when applied to police particularly in the context of studies (such as Kaminski's and ours) the level of analysis of which is the agency, not the individual officer or areas within a jurisdiction. A study that used officers as a unit of analysis (or used subareas within jurisdictions as the unit) could consider the crime rate of the area in which the officer or officers were deployed. Officers deployed to high crime areas would be considered at greater risk of victimization than would their counterparts in less crime-ridden areas. For purposes of a study of agency-level variation in victimization, Kaminski argues that "proximity" is appropriately measured by the crime rate (as measured by reported crime) and criminogenic conditions (e.g., poverty, income inequality, unemployment) of the jurisdiction that the agency is policing. For his measures of proximity, Kaminski used resource deprivation, population density, residential stability and field officer density.

In addition to the variables named above that are associated with the four concepts related to routine activities theory, Kaminski included variables for region (location in the South or not), educational requirements for the police, and proportion of females on the force.

(2) Kaminski's Results

Overall, Kaminski reports no link between agency policies and practices and the level of police homicides. In preliminary models, Kaminski looked separately at the association between guardianship, exposure and proximity variables and violence against police. In the model including guardianship variables, he finds that the proportion of two-officer patrol units, mandatory vest-wear policies and the authorization of pepper spray are associated with increased (not decreased) violence against officers. He notes that this could be due to agencies with high levels of violence against police adopting more guardianship measures. These associations between guardianship variables and violence against police disappear when other variable groups (e.g., exposure, proximity) are introduced.

In a model including only exposure variables, he found no impact on violence against police of level of foot patrol assignment, but found that level of arrests for Part I crimes is positively correlated with level of violence against police. He explains, "the results support the notion that arrests for serious offenses increase opportunities for the victimization of police by increasing officer exposure to motivated offenders" (2000; p. 124).

Three measures of proximity related to the crime environment—resource deprivation, population density and reported crime—were significantly related to violence against police in the hypothesized direction. High levels of each corresponded with high levels of police violence. The impact of reported crime was substantial and, in fact, the results indicate that population density and residential stability are unrelated to homicides once reported levels of crime are controlled. Another measure of proximity—field officers per 10,000 population—is significantly and positively related to violence against officers net of the other proximity-related regressors.

Kaminski produced a model including exposure, guardianship and proximity variables. As referenced above, he found no impact of guardianship factors on level of violence against police when proximity and exposure are controlled. The most consistent finding was that homicides of police are related to the number of arrests for Part I crimes (true for all four waves), followed by the positive association between violence against police and number of field officers per 10,000.[19] A final model included the variables region, proportion of females on the force, and educational requirements for police. Findings were not consistent across waves.[20]

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[19] Additional analyses indicated an interaction between arrests and population density. Specifically, Kaminski reports that the effect of arrests depends on the level of population density with the effects of arrests diminishing at higher levels of density.

[20] Kaminski also produced a Generalized Estimating Equation (GEE) combining all waves of data. He confirmed findings pertaining to the effects of deprivation, field officer density, and arrests on violence against police and confirmed the interaction between arrests and density.

Kaminski summarizes his results as follows (p. 176-177):

> First, most policing-related factors (measures of guardianship, education, foot patrol) are statistically unrelated to police homicide victimization. Second, arrests for serious crime (exposure) and the number of police assigned to field duties (a component of proximity) are policing-related factors that impact homicide risk. Third, criminogenic conditions (another component of proximity) or the ecological context in which policing takes place is an important determinant of risk.

(3) Building upon Kaminski's Work

Kaminski reported that his findings could be due, at least in part, to his limited ability to measure various guardianship efforts on the part of agencies. He states that "obtaining and testing improved measures [of guardianship] therefore, is critical not only for informing police policy and practice to enhance officer safety, but for further theoretical developments regarding the determinants of police homicides as well" (p. 178). Additionally, he notes that his research—like most studies in this realm—used as a dependent measure only police homicides and not other police victimizations. As described above, this is the problem of accessing for multiple agencies reliable and valid data on non-fatal assaults against police. Kaminski reports that a dependent variable based on only police homicides "fails to capture many other forms of violence directed at police" (p. 185). He suggests that, if data validity and reliability issues can be overcome, future research should be based on more comprehensive measures of violence against police. Pursuant to Kaminski's suggestions, the research described in this report utilized

comprehensive data on police guardianship policies and practices and a dependent measure that encompassed both police homicides and serious assaults. Based on the challenges Kaminski had in trying within the police-violence context to distinguish meaningfully between attractiveness, proximity and guardianship, and the corresponding challenge of identifying measures that were mutually exclusive, we will combine these theoretical constructs into one: guardianship. We describe the methods for our research in the next chapter.

II. RESEARCH DESIGN AND METHODS

1. Introduction to Methods

The aim of the proposed project is to identify law enforcement agency practices that impact on the incidence of assaults and murders of on-duty police officers. The ultimate objective is to produce policy-relevant recommendations for departments to help them reduce the violence against their officers. For this agency-level study we used multivariate statistical analyses to identify the factors both internal and external to law enforcement agencies that impact on the rate at which police are assaulted or murdered.

The "subjects" are the approximately 158 local law enforcement agencies (i.e., municipal and county agencies) that submitted NIBRS data (data for the National Incident Based Reporting system discussed further below) for 2001 and that serve populations of 50,000 people or more. The data for the dependent variable–rates at which officers are killed and assaulted–come from NIBRS data for the years 2000, 2001 and 2002. The two sets of independent variables represent (1) factors internal to the agency that might impact on officer safety (e.g., training, policies,

practices, equipment), and (2) factors external to the agency that might impact on the rate at which officers are assaulted/killed (e.g., violent crime rate, poverty level). The variables in the second set (external variables), were selected based on prior empirical research and are necessary as control variables so that we are able to isolate the effect of the internal factors. Information regarding the internal agency factors were collected primarily through a survey of agency chiefs and sheriffs.[21] Information on the external factors come from the 2000 census (e.g., population density, poverty) and NIBRS (i.e., crime environment). The two sets of independent variables are further classified as either guardianship or exposure.

2. The Dependent Variable and Subject Agencies

In this section we describe both the dependent measure and the subject agencies. The combined coverage is based on the fact that the subject agencies were selected based on the fact that the dependent measure could be produced for them. The dependent measure for this study is the weighted average number of law enforcement officers killed or assaulted in the line of duty for the years 2000, 2001, and 2002.[22] The individual law enforcement agency is used as the primary unit of analysis for the descriptive and multivariate analysis. As previously noted, LEOKA incidents are a fairly low rate occurrence and, as will be explained shortly, this influenced the criteria used for selection of target law enforcement agencies and the methods used for defining the dependent measure.

In the previous chapter, we described sources of data for measuring violence against police. Although these data sources are of some value for purposes of characterizing

[21] Some agency information, such as type (e.g., municipal, sheriff) and size was available independent of the survey.
[22] This will be discussed in more detail shortly.

victimizations of law enforcement, they do not–alone or in combination–provide the information that is required for assessing organizational factors related to violence against police when that violence includes both murders and serious assaults. The LEOKA data on police murders—because of their comprehensiveness and depth—are considered the most reliable of all data collected in the UCR (Vaughn and Kappeler, 1986). Further, because the LEOKA identifies the agency for which each slain officer worked, rates can be produced for jurisdictions and those rates used to assess factors that predict high and low victimization. However, these data only measure murders and not *non-fatal* violence against police.

The LEOKA data on assaults have several drawbacks. Many agencies, even those participating in the UCR, do not submit their assault data to the FBI for inclusion in the LEOKA. Further, the data submitted are not incident-level data, but rather aggregated data on the assaults on officers within the participating departments. Further, there are serious questions regarding whether agencies submitting data are defining assaults similarly.

The officer victimization data now being collected through the NCVS has solid potential for providing comprehensive information regarding the nature and extent of assaults of officers. Again, however, these data are not suitable for research on organizational factors related to police violence because the data cannot be linked to the officers' organizations. Further, because the NCVS is a self-report victimization study, murders of officers are not included.

Data collected from a single agency or groups of agencies can provide in-depth information on assaults or killings. For instance, some of these studies have pulled data from,

not only the incident file, but also personnel records and even court cases. Because the data are from only one or a few jurisdictions, however, the researchers cannot generalize their results to agencies nationwide.

In contrast to the above data sources, the National Incident Based Reporting System (NIBRS) (1) contains information on both assaults and murders of officers, (2) can be linked to individual agencies, (3) includes information from a large number of agencies, and (4) is reliable. In sum, NIBRS overcomes all the deficiencies of the data sets described above and can, supplemented by a survey of agencies, be used to examine organizational factors that affect violence against police.

NIBRS is the system that is replacing the UCR as a measure of crime reported to police. Agencies are gradually transitioning to this new system. In 2000, over 3,000 agencies from 19 states submitted NIBRS data to the FBI. The FBI estimates that well over 4,000 agencies from approximately 26 states reported NIBRS in 2001. Under the traditional UCR system, agencies aggregate the number of incidents by offense type monthly and report these totals to the FBI. The great value of the NIBRS is that it is an incident-based system. Made possible by computers, agencies provide an individual record for each reported crime. The NIBRS provides up to 53 unique data elements for crimes, with detail on the circumstances, the offense and other characteristics of the incident.[23] Most important for the research we propose, is the fact that assaults and homicides of police officers are recorded in the "victim circumstances" segment.

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[23] More information on NIBRS can be found at http://www.ojp.usdoj.gov/bjs/nibrs.htm and/or http://www.jrsa.org/ibrrc/index.html.

This change in reporting requirements—to an incident-based system—has the potential to revolutionize our understanding of crime in the U.S. Importantly, it also can revolutionize our understanding of the violence that is committed against the officers that safeguard our communities—because NIBRS includes data for each incident in which one or more officers were assaulted or killed.

(1) Subject Agencies

NIBRS is an evolving system in the early stages of development. At the onset of this research the latest year of NIBRS data available from the FBI was 2001. Thus, 2001 was used as the baseline year for selection of target law enforcement agencies.

Two criteria were used for the selection of target agencies for this study. First, the agency had to be reporting NIBRS data to the FBI for all twelve months during the baseline year 2001. Second, because law enforcement officers killed and assaulted (hereafter referred to as LEOKA) is a fairly low base rate phenomenon it was decided that jurisdictions with a population of 50,000 or higher would minimize the number of agencies with zero LEOKA incidents. These selection criteria resulted in a total sample of 158 agencies.[24] Table 1 shows the distribution of target agencies by U.S. Bureau of the Census population groups.

[24] An initial review of LEOKA incidents in our original selection of 159 agencies revealed that one agency had a LEOKA rate several times that of all other agencies. The agency was contacted and it was learned that this agency was using a definition of aggravated assault against law enforcement officers that did not conform to the NIBRS requirements specified by the FBI. This agency was dropped from the analysis.

Table 1: Population Category for Target Departments

	Frequency	Percent
Cities from 500,000 thru 999,999	3	1.9
Cities from 250,000 thru 499,999	4	2.5
Cities from 100,000 thru 249,999	23	14.6
Cities from 50,000 thru 99,999	55	34.8
Non-MSA Counties 100,000 or over	1	.6
Non-MSA Counties from 25,000 thru 99,999	10	6.3
MSA Counties over 100,000	21	13.3
MSA Counties from 25,000 thru 99,999	41	25.9
Total	158	100.0

(2) Measuring Violence Against Police in the Line of Duty Using NIBRS

As noted in the literature review most previous research on violence against police has relied upon a limited definition of violence using homicide as the sole measure. However, a homicide of a law enforcement officer is a low occurrence event and represents only the extreme end of the violence continuum. One of the objectives of the current research is to broaden the definition of violence by including aggravated assaults in the definition. The addition of aggravate assault will provide an opportunity to gain a more comprehensive understanding of violence against law enforcement.

For the current analysis both homicides, "the willful (non-negligent) killing of one human being by another" (FBI, August 2000, p.36) and aggravated assaults against law enforcement officers are used to define violence. According to the FBI's National Incident Based Reporting System Volume 1: Data Collection Guidelines (August 2000) an aggravated assault is:

> An unlawful attack by one person upon another wherein the offender uses a weapon or displays it in a threatening manner, or the victim suffers obvious severe or aggravated bodily injury involving apparent broken bones, loss of teeth, possible internal injury, severe laceration, or loss of consciousness. (p. 22)

For the homicide or aggravated assault to be considered a LEOKA incident it must have occurred against a "sworn" law enforcement officer who was victimized while "in the line of duty."

(3) Variable Transformation

The distribution of the original dependent variable that represented LEOKA incidents for 2001 was problematic. First, the data had a skewness value of 3.073 indicating a strong positive skew. Second, as would be expected with a positively skewed distribution there was a large range —from 0 to 99 with a clustering of values around the low end of the range. Slightly over 50% of the departments reported 5 or fewer LEOKA events including nearly 20% of the departments reporting zero LEOKA incidents during the baseline year.

The original proposal called for the use of Ordinary Least Squares (OLS) regression using 2001 LEOKA data. A key assumption of OLS is that the residuals be normally distributed. This assumption was checked and it was found that it did not hold. A common method used to "normalize" skewed data is to apply a logarithmic transformation to the dependent variable. In this case a constant (1) was also added to the dependent variable prior to the transformation because of the possibility of the dependent variable taking on a meaningful value of 0.

Normality was not achieved using the *ln + constant* transformation. OLS regression was thus deemed inappropriate for modeling the data.

At this point two adjustments were made to the dependent measure and plans for statistical analyses. First, to correct for the skewed distribution and the high percentage of zero incidents the team decided to create the dependent measure using an average of *three* years of data (2000, 2001 and 2002) instead of using just one. The team assumed this would reduce the number of jurisdictions with zero incidents as well as reduce the significance of the strong positive skew. Second, to model the effect of the independent variables on the dependent variable, the research team decided to use negative binomial regression, an extension of the Poisson model, instead of OLS.

The research team used the following process to calculate the weighted average number of incidents for each agency. If an agency reported data for all three years the denominator for the average is three (3). Four of the target agencies did not report a full 12 months of NIBRS data to the FBI for the year 2000. Since all other data (census, UCR, survey) for these four agencies was complete the denominator for the average was adjusted to reflect only two years of NIBRS reporting. None of the 158 agencies included in the original selection had fewer than two years of data.

The result was a distribution with fewer jurisdictions reporting zero LEOKA incidents, and a better overall estimate of the true nature of LEOKA incidents within the target agencies. The descriptive analysis of the weighted average data is provided below in Table 2. Although

there remains a positive skew to the dependent variable (2.61 with a SE of .219) the total number of zero incidents has been reduced to only 4.9%.

Table 2: Weighted Average LEOKA Dependent Variable Descriptive Statistics

Statistic	Weighted average
N	122
Minimum	0
Maximum	76.33
Mean	9.87
Median	4.42
Mode	.333
Std. Deviation	13.28
Skewness	2.61
SE Skewness	.219

(4) The Exposure Variable for the Negative Binomial Regression

The negative binomial regression model assumes that the dependent variable is a count of a phenomenon and overdispersion is present. Overdispersion is encountered when the conditional variance of the dependent variable is greater than the conditional mean. The negative binomial model is effective for data that are concentrated around zero as is true for this study. Negative binomial models also allow for what is called an exposure variable. The inclusion of an exposure variable allows the researcher to take into account the population that was "at risk" of the event happening to them. For the purposes of this model, the exposure variable is the average number of reported Part I crimes for 2000-2002.

3. The Independent Variables

As indicated above, a major goal of this research is to assess the impact of agency policies/practices on the level of violence against on-duty officers. To isolate the impact of

agency policies/practices we need to control for factors external to the agency that might impact on violence against police. Thus, the two subsets of independent variables are the factors internal to the agency and the factors external to the agency, which are further classified according to our theoretical constructs, guardianship and exposure. The former are measured through an agency survey; information on external factors comes primarily from NIBRS data (e.g., violent crime rates) and the U.S. Census (e.g., poverty rate). Below we describe (1) how we identified the relevant independent factors, and (2) how we measured them.

(1) Identifying and Classifying the Constructs

Project staff used the literature and two expert groups to identify the factors internal and external to agencies that might impact on violence against police and then used the theoretical literature and prior applications of it to this topic to classify the identified factors in accordance with our theoretical constructs, guardianship and exposure.[25]

Project staff reviewed the academic and practitioner literature to develop an initial list of constructs that represent the internal and external factors that might impact on violence against police. "External" was defined as a factor that represented something that was not directly in the power of the agency to change; colloquially, these factors represent the "hand that the agency was dealt." "Internal" was conversely defined as a factor that represented something that the agency had the power to do, adopt, change. Next the project staff convened other PERF staff who have law enforcement experience (primarily ex-chiefs) for a focus group to get their input on the internal and external factors that might impact on violence against police. Project staff

[25] Again, our exposure construct encompasses attractiveness and proximity.

did not present until late in the meeting the lists of factors identified through the literature review. We wanted the discussion to occur against the backdrop of a blank slate to ensure comprehensive and unbiased (unbiased by preconceived notions/lists) input. Toward the end of the discussion, staff shared factors on the list produced through the literature review that had not been raised by the group in their discussion and assessed whether the group of practitioners thought they were viable.

A second focus group was held to again consider the factors that might impact on violence against police. Attending this focus group were 9 sworn personnel from agencies in the Washington, D.C. area. This group, like the first, was asked to list internal and external factors. Additionally, this group was probed with regard to how the various factors might be measured. For instance, this group provided information regarding the types of data that agencies maintain that could be used to measure the identified factors.

The next step was to classify the internal and external factors in accordance with the theoretical constructs, guardianship and exposure. Again, "exposure" refers to the level at which officers are exposed to the "potentially motivated offenders" that could assault them. "Guardianship" refers to measures to protect officers from the potentially motivated offenders. Guardianship may be physical, in the form of barriers such as bulletproof vests, may be social, in the form of two-officer patrol units. Guardianship may also come in the form of information (e.g., as transmitted through training or from dispatch)

The first step was for staff to separate the variables into the two groups. These groupings were then presented to the project Advisory Board at a meeting in Washington, D.C. Final classifications were made at this meeting. This two-stage process was necessary because classification of variables into "guardianship" and "exposure" was not clear cut. Both the workplace violence and routine activity perspectives are rendered more complicated by the nature of police work. As originally conceptualized, both perspectives view contact with a motivated offender as preventable, and employers are encouraged to take many steps to discourage and prevent such contact (i.e., steps to reduce exposure). In police work, in contrast, officers are expected to initiate contact with potentially motivated offenders, not as an adjunct to their duties, but often as the very core of their job description. This distinguishing characteristic of police work leads to difficulty in distinguishing exposure from guardianship variables, in some cases. For example, the decision to dispatch two-officer units in place of one-officer units could be viewed as increasing the officers' exposure by sending a higher number of officers into harm's way. Yet, the practice is expected to reduce the risk of assault by making the paired officer a less attractive target than the sole officer, so that the policy looks more like an act of guardianship. We will discuss below some of the specific classification challenges we faced and the decisions we made with the input of the project advisory board. Although not *quite* as challenging, there were additionally several factors that were not easily classified as "internal" and "external" (e.g., overall agency size and field officer density) as described below.

In the next section we list the various constructs within the Exposure and Guardianship categories. In a subsequent section we describe how each was measured.

i. Exposure Constructs

Exposure factors could be external to the agency or internal to it, although most of them are external. External exposure constructs include crime in the jurisdiction, criminogenic conditions, region in which the agency was located, agency size and field officer density. Internal exposure constructs include aggressiveness of the police department and level of arrests. We hypothesized that agencies with environments, policies and practices that produced higher levels of exposure would experience higher rates of violence against police. Each of the exposure constructs are described below.

a. Crime in the Jurisdiction (External). Officers in a jurisdiction with higher levels of serious crime are more exposed to potentially motivated offenders than are officers in jurisdictions with low levels of serious crime.

b. Criminogenic Conditions (External). Another way to assess officers' exposure to potential criminals is to examine the nature of the jurisdiction population—focusing on population characteristics that previous research has associated with crime levels. As conveyed in the literature review above, relevant population factors include income/poverty, income inequality, unemployment, density, racial heterogeneity, residential stability, gender, age, and race/ethnicity.

c. Region (External). Previous literature indicates that officers in the Southern region of the United States are exposed more to violent offenders than are officers in other regions of the country.

d. Agency Size and Field Officer Density (External). Previous literature and our practitioner focus groups identify agency size and field officer density (traditionally measured as number of officers on the streets per resident population size) as factors that could impact on the extent to which officers are assaulted or killed. These two variables represented dual classification challenges. Reasonable minds might differ as to their classification as exposure or guardianship and in terms of whether they are internal or external.

In terms of the theoretical classification, one might argue that more officers or more officers per population means that there are more officers at risk of violence (i.e., increased exposure). Alternatively, however, one might argue that more officers and more officers per population might provide mutual protection (guardianship). Acknowledging that there may be no "right" answer, the advisory group recommended classification as exposure.

Similarly, the advisory board recommended classification of these variables as external to the agency rather than internal to it. While an agency executive has some power to change the size of the agency and thus officer density (for instance, s/he can lobby political powers for more officers, choose to fill or not fill authorized positions), the greater power to impact on these variables is in the hands of entities outside the agency. Referring back to our colloquial

definition of "external," we decided that the size of the agency (and therefore the density of officers) is part of the *hand that the agency is dealt*.

e. Aggressiveness of the Police Department (Internal). Practitioner advisors (in the focus groups and on the advisory board) believed strongly that officers in agencies that are "aggressive" are more exposed to potentially motivated offenders than are officers in non-aggressive agencies. The great importance accorded this variable by our advisors required us to face significant issues of construct definition and measurement. (Measurement issues are discussed below.) Our advisors explained that agencies on the "aggressive" end of a continuum would emphasize arrest over other ways to resolve incidents, be more inclined toward force than defusing potential violence, and would emphasize law enforcement functions over service functions and community relations/partnerships. These agencies, they explained would be recognized by such factors as their relative lack of accountability measures, military style units, rates of arrest, and so forth. The agencies on the non-aggressive end of the continuum would, conversely, emphasize alternatives to arrest when viable, attempt to reduce and/or avoid use of force when possible, and place greater emphasis on service to clients and community relations. Such an agency is more likely to be a "community policing" agency and would be recognized by their high level of accountability measures, use of alternative dispositions (other than arrest), community partnerships, and so forth. Again, the advisors hypothesized that officers in aggressive agencies are more likely to be exposed to motivated offenders and/or even to *produce* the motivation to assault in offenders with whom they are dealing.

f. Levels of Arrest (Internal). Arrests were thought to increase exposure in either or both of two ways: (1) more arrests means more face-to-face contact with motivated offenders, and/or (2) more arrests is a measure of an aggressive agency.

ii. Guardianship Constructs

All guardianship constructs are internal to the agency. As a group, they reflect agency policies/practices that are designed to protect officers (or at least thought to have the effect of protecting officers) from the potential violence of motivated offenders. They include social guardianship variables, including deployment of one- versus two-officer patrol vehicles, backup policies, dispatch follow-up policies, community relations/trust-building efforts; physical guardianship, including provision of and policies regarding protective vests, protective barriers in vehicles, handcuff policies, types of firearms used, and types of less than lethal weapons provided; and informational/preparedness guardianship including training, educational levels and information provided to officers regarding calls for service. We also include percent female based on previous findings and conjectures in the literature. We hypothesized that agencies with policies, practices and equipment that produced higher levels of guardianship would experience lower rates of violence against police, after controlling for external factors. Each of the guardianship constructs are described below. We discuss each of these below.

a. Social guardianship. This variable most closely reflects the concept of guardianship as set forth in routine activities theory. The original theory maintained that a person is less likely to be victimized if s/he has a "capable guardian." Our social guardianship variables therefore represent policies or practices that enhance the likelihood that an officer has a capable guardian.

One- versus two-person patrol vehicles (a1) is our first type of social guardianship measure. Officers with partners in their vehicles have an immediate capable guardian on the scene of a potentially violent situation. There is considerable variation across agencies, and within agencies across shifts and geographic areas with regard to the level of two-person vehicles.

Backup policies (a2) is our second type of social guardianship measure. Agencies also vary as to their policies regarding the dispatch of backup officers to a scene. Even officers in one-person vehicles might quickly have a capable guardian depending on agency policies regarding the circumstances in which backups are dispatched to support the primary officer responding to the scene.

Dispatch follow-up (a3) is our third type of social guardianship measure. Another measure of protection can be afforded to an officer (or officers) responding to a call if an agency requires communications personnel to check in with that officer after s/he has responded to a scene to check on his/her safety. An indication of danger would allow dispatch personnel to send immediate assistance.

Community relations, trust (a4) is our fourth type of social guardianship measure. There are various ways that police departments enhance the trust of their constituency including hiring a police force that is racially/ethnically representative of the population and by adopting community policing principles. This enhanced trust could produce guardianship in several ways.

It may prompt citizens to come to the aid of an officer who is being assaulted or threatened with assault. Additionally, trust and respect of officers may prevent suspects from becoming motivated to assault an officer. This latter manifestation is consistent with our discussion above regarding aggressive and nonaggressive agencies.

A discussion among staff and advisory board members centered on whether community policing practices could increase officer exposure. Community policing practices often result in more face-to- face contacts with citizens. This is manifested in foot patrol and other officer activities that facilitate direct interactions with residents of their assigned geographic areas. These face-to-face contacts could produce increased exposure. After considerable discussion at the Advisory Board, the group concluded that the guardianship power of community policing exceeded that of exposure.

b. Physical guardianship. This type of guardianship comes in the form of tools that provide physical protection for the officer. These tools include protective vests, weapons, and mechanisms for restraining potentially violent subjects.

Protective vests (b1) is our first type of physical guardianship measure. Body armor has become standard equipment for U.S. officers. Agencies vary, however, with regard to their policies regarding the wearing of body armor (for instance, mandatory for all sworn personnel or mandatory for some depending on assignment) and their efforts to enforce those policies (e.g., no enforcement, daily checks).

Firearms and less-lethal weapons (b2) is our second type of physical guardianship measure. Officers have various types of weapons *to* protect themselves from assaultive subjects including firearms and less-lethal weapons. Many agencies are moving away from revolvers toward the adoption of semiautomatic weapons based on the premise that the latter provide greater protection for officers. Some merely *authorize* the use of various weapons (e.g., revolver and/or semi-automatic) and others both authorize and *supply* the weapons to personnel. A number of less-lethal weapons have been developed and adopted over recent years to supplement the traditional baton. These include chemical sprays (e.g., OC), electrical devices (e.g., conducted energy devices such as the Taser™) and various types of impact devices (e.g., soft projectiles, rubber bullets). Agencies vary with regard to the types of weapons provided/allowed, the breadth of their deployment (e.g., carried by all personnel, by some personnel), and whether the weapons are carried on the person or in the vehicle.

Protective vehicle barriers (b3) is our third type of physical guardianship measure. Some police vehicles used to transport subjects have barriers between the front and back seats to protect the officers. Agencies vary with regard to whether they have these barriers in none, some or all vehicles used to transport subjects.

Handcuff policies (b4) is our fourth type of physical guardianship measure. Handcuffs are used to reduce the potential for violence on the part of people in custody. Agencies vary with regard to their policies regarding the circumstances in which officers must use handcuffs. Sometimes agencies have different policies for adult and juvenile suspects.

c. Informational or preparedness guardianship. Our third category of guardianship relates to the added protection that comes from having knowledge and/or skills that facilitate an officer's ability to prevent or handle an assault. This would include the long-term knowledge that comes from training or the short-term information that may be transmitted to the officer (e.g., through dispatch) regarding the call to which s/he is headed (e.g., information on previous calls for service at that address).

Training (c1) is our first type of informational guardianship measure. A significant proportion of law enforcement training—both in the academy and in-service—is geared toward promoting officer safety. Relevant topics include physical combat skills, mediation skills, use of less-lethal weapons, use of deadly force, stop and approach skills and others.

Information transmission to officers (c2) is another informational guardianship measure. Many agencies have information within their database (e.g., CAD system) pertaining to particular suspects, addresses and/or reporting parties. Even among the departments with this readily-available information there is variation in the extent to and circumstances in which that information is transmitted to an officer who is heading to a call involving the suspect, address or reporting party. This information might better prepare the officer for the circumstances s/he will encounter.

We added two variables related to officer characteristics that have received attention in the literature that do not fit precisely into any of three guardianship categories: social, physical or information/preparedness. Specifically, we assess the educational requirements of the

agencies and the proportion of agency personnel that are female. Conventional wisdom is that educated people make for "better" law enforcement personnel. While research has produced mixed findings regarding the impact of education on officer performance, we included it in the research as a guardianship variable. Some research has indicated that females are superior at defusing potentially violent confrontations. Based on these findings, we included female representation on police forces as a variable with potential for guardianship value. We acknowledge that an alternative view would predict that percent female represents more exposure because women are generally of smaller stature and strength and therefore might be more vulnerable and thus more attractive as targets to motivated offenders.

4. Measuring the Constructs

There were five steps associated with measuring the factors set forth above and ultimately producing a data base for analyses.

Step 1: Identify the potential source of information for measurement

Step 2: Develop the survey

Step 3: Field the survey

Step 4: Ensure quality data through follow-up with responding agencies

Step 5: Identify relevant census and UCR data and add this archival information to the survey data for each agency

(1) Identify the Potential Source of Information for Measurement

Project staff identified the potential source of information for the measurement of each construct. For instance, it was easy to determine that many factors related to agency policies and

practices could only be measured through the survey of agencies. Information regarding the environment external to the agency (e.g., level of crime, levels of criminogenic populations) would need to be measured through Census and UCR data.

(2) Develop the Survey

In the second practitioner focus group described above, we queried participants about how we might measure with an agency survey some of the factors that they identified as having an impact on levels of violence against police. This information was helpful in drafting the survey items. Another resource was existing surveys that had been developed by researchers to examine various policies/practices of agencies.

After project staff had developed a first draft of the survey, we again convened a focus group of local practitioners. We reviewed each proposed item with this group of practitioners obtaining feedback on clarity, validity and availability of agency information to respond. This input was used to develop a second draft of the survey which was sent to the project Advisory Board in advance of a meeting of this group in Washington, D.C. During a full-day board meeting we again reviewed each and every question and obtained feedback from this group that combined researcher and practitioner expertise.

After the survey was revised in accordance with the Advisory Board input, we piloted the instrument with 14 local police jurisdictions. Chiefs were contacted and they designated a person to assist that would likely be the person in the agency that would complete such a survey. The participants were mailed the survey and asked to complete it fully before attending a focus

group to review and discuss it. Frequently, pilots of surveys are conducted by sending the survey to a group of individuals and following up with each one separately to obtain their feedback (either in writing or through an interview). We have identified strong advantages of conducting a pilot that brings together a group to collectively review the instrument. In a group review, the facilitator can ask various members how they answered particular questions and determine whether group members interpreted the item the same way. Each question was reviewed in this fashion and input was obtained to ensure consistency of interpretation and validity of questions and response options. The information obtained from the pilot was used to finalize the instrument. The final version of the survey was transformed into Teleform, which is a software program that allowed us to later scan the completed surveys directly into an SPSS data base. Below we describe the items that were included in the survey to measure the constructs described above.

Only one exposure variable–*agency aggressiveness*–was measured through the survey. (The rest were measured using UCR and Census data.) We mentioned above the challenge we faced in trying to place agencies along a continuum of aggressive and nonaggressive. With the help of our practitioner and academic advisors we decided that one component of our attempt to measure this construct would be the measurement of accountability mechanisms. That is, we believe that nonagressive agencies will have more accountability mechanisms than will aggressive agencies. Four items in the survey provided information related to accountability. Item #6 pertained to the documentation of use of force. For a list of force types (e.g., Oleoresin Capsicum, baton strikes with injury), agencies indicated whether documentation was "mandatory," "optional," or "not required." If the type of force was not authorized for use, the

agency indicated "not permitted by policy." We did not list all types of force, but rather listed 12 types that might produce variation in reporting requirements across agencies. (Thus, for instance we did not list "shots fired that led to a death" since virtually all agencies require documentation of such incidents.)

Item #7 solicited information regarding the review of force incidents. For three types of force, agencies indicated the highest level at which those incidents would normally be reviewed for justification if no injury occurs. Options included "not reviewed," "first-line supervisor," "command level," "administration, above command level."

Item #8 on the survey assessed the existence of an early intervention (or "early warning") system, or more precisely, "a system that tracks data on the nature and extent of force used by individual officers." Agencies answered yes or no. If agencies reported the existence of an early warning system, they were then asked in item #10 about the frequency with which they reviewed the performance of officers whose use of force exceeds a set threshold. Response options included "regularly (e.g., quarterly, annually)," "when alerted," "both regularly and when alerted," and "as-needed basis."

In item #10 we sought to gauge the extent to which the department attempted to improve based on assessments of past performance. The item asked whether the department had "a written policy that calls for the evaluation and/or analysis of trends in the use of force over a period of time for the purpose of identifying training, policy, equipment and/or other needs." Agencies responded yes or no.

Another proxy measure of aggressiveness was provided through items #27 and 28 asking about the existence and makeup of a SWAT, SRT, ERU or other emergency response team. Item #27 asked if the agency had a SWAT team and whether members of that team were assigned full- or part-time to the unit. Question #28 solicited information about the activities conducted by the SWAT team if it existed. Agencies could mark any of the following that were applicable: "patrol high-crime areas," "serve search/arrest warrants," "respond to critical incidents," "wear utility clothing/BDU, boots and/or helmets," "receive training from active duty military personnel." Agencies could indicate "none of the above."

The survey measured social, physical and information/preparedness aspects of guardianship. Survey measures of social guardianship included items pertaining to one- versus two-person patrol vehicles, backup policies, dispatch follow-up, and community relations and trust.

A considerable amount of time was spent in the group meetings and by PERF staff to develop a question that would gauge differences across agencies in terms of their use of one- versus two-officer patrol vehicles. The extent to which one- or two-person vehicles are deployed by an agency may vary by day of the week, shift (i.e., time of day) and by whether or not there are special circumstances or events requiring increased deployment of sworn personnel. In an attempt to produce reliable and equivalent responses, item #17 read as follows: "Think back to a typical Saturday with NORMAL patrol activity (i.e., no special events). On that Saturday's evening shift, what percentage of patrol units were comprised of *one-person units*?" (Emphases

in original.) Agencies indicated whether the percentage was 0 to 20, 21 to 40, 41 to 60, 61 to 80 or between 81 and 100.

To assess differences across agencies in terms of backup policies, we listed in item #21 five incident types and asked the respondent to indicate whether it was agency practice to send two officers to the scene. (Agencies could also indicate that there was no such policy/practice because two-officer units are standard.) The events were selected because our advisors believed agency practices would vary across them. That is, we did not list an event like "robbery in progress" because presumably all agencies would send at least two officers to such incidents. The incident types listed were "domestic violence," "residential alarm calls," "disorderly person," "general disturbance," and "9-11 hang-ups."

Sometimes protection of officers comes in the form of the dispatcher checking in on him/her and sending assistance if trouble is indicated or no response is received. To assess the nature and extent of this practice we listed in item #18 four situations and asked the respondent to indicate for each situation whether follow-up by a dispatcher is "always required, required in certain situations, or occurs only at the officers request." Respondents could also indicate that there was "no policy/practice" to follow-up with officers in such situations. The four situations were "crime in progress," "completed crime calls," "after a particular length of time (e.g., 5 minutes, 10 minutes)" and "traffic stops."

As proxy measures of community relations and trust we sought to determine the extent to which sworn personnel reflected the racial/ethnic make up of the jurisdiction and we measured

the implementation of community policing. Our intention was to use item #1 on the survey regarding personnel to produce the demographic makeup of the agency and then compare that profile to the makeup of the jurisdiction as measured by the Census to assess the extent of representativeness. Because of relatively high levels of missing data for question #1, we were unable to produce this measure.

PERF has considerable experience measuring the implementation of community policing. We developed two questions that we believed would provide a rough gauge of the level of community policing implementation. (Other PERF measurements of this construct have involved full surveys with numerous questions.) In item #25 respondents indicated whether each of a list of programs, practices or policies were implemented at their agency as of January 2001. They indicated whether it was implemented by "most patrol officers," "some patrol officers/deputies," a "special unit," or "civilian personnel," or indicated "none/not applicable." The list of programs, practices and policies consisted of the following:

- Make door-to-door contacts in neighborhoods
- Develop familiarity with community leaders in area of assignment
- Work with citizens to identify and resolve area problems
- Teach residents how to address community problems
- Conduct crime analysis
- Meet regularly with community groups
- Work with other city agencies to solve neighborhood problems.

Item #26 solicited information regarding whether geographic assignments for patrol officers were "permanent," "regular, but not permanent assignments," or "fluctuating assignments."

Survey measures of physical guardianship included items addressing protective vests, use and provision of firearms and less-lethal weapons, protective vehicle barriers and handcuff policies.

Three items in the survey inquired about whether or not there was policy regarding the wearing of body armor, the content of that policy and the methods the agency used to promote the wearing of body armor. Item #11 asked whether the department had a written policy regarding the wearing of body armor. Item #12 asked about the body armor policy for four functions: uniform patrol, plainclothes enforcement, detective operation (excluding undercover) and tactical operation (e.g., SWAT). For each function, the respondent could indicate whether wearing body armor was "mandatory all of the time in the field," "mandatory for certain tasks or functions," or "optional." In item #13, respondents indicated the ways in which their department promoted the wearing of body armor. Options included "through education and/or encouragement," "written policy," "daily checks," "periodic checks," and "other."

Agency respondents indicated in item #5 whether they authorized and/or supplied revolvers and/or semi-automatic weapons. We believed enhanced protection of officers would be indicated by both the authorization and supply of the more powerful weapons, the semi-

automatics. (Results from this item produced little variation and thus the item was ultimate dropped from the analyses.)

Two items solicited information regarding the possession by officers of various less-lethal weapons. In question #3, respondents indicated for five types of weapons whether all, some or no uniformed officers carried them *on their persons*. Item #4 was identical except that it referred, not to carrying weapons *on their persons*, but carrying weapons *in their vehicles*. The five weapons listed in both items were Oleoresin Capsicum (OC), other chemical agents, some type of baton, electrical devices, and other impact devices.

In item #14, respondents indicated the "proportion of vehicles in which personnel are permitted to transport prisoners/suspects (that are) fitted with physical barriers." Response options were 0 to 20%, 21 to 40%, 41 to 60%, 61 to 80% and 81 to 100%.

In two items (#15 and #16) referencing adults and juveniles respectively, respondents indicated whether in "all physical custody arrests" and in situations involving "transportation of non-arrested suspects" handcuffing was "mandatory, barring specified exemptions," "optional" or not guided by policy ("no policy").

Survey measures of guardianship produced through information/preparedness addressed level and quality of training and information provided to officers regarding the calls to which they are responding.

Three questions were used to assess quantity and quality of academy and in-service training. Item #22 solicited information regarding the length of academy training. While more detailed information regarding the hours spent on topics such as officer safety and defensive tactics would have been more appropriate, most agencies do not conduct their own academies and thus do not have this more detailed information. Item #23 pertained to in-service training. In that item we listed 14 topics that were directly or indirectly related to officer safety and asked the respondent to indicate whether or not in-service training on that topic had been provided in the last two years to some or all in-service officers. We expected that requesting more detailed information (e.g., number of hours, number of officers served) would have produced considerable missing data. The fourteen topics were

- Community-oriented policing
- Cultural sensitivity or diversity training
- Domestic violence
- Physical fitness/health/wellness
- Physical combat skills (e.g., defensive tactics)
- Mediation skills/conflict management
- Use of non-lethal weapons
- De-escalation and defusing techniques
- Stop and approach skills
- Use of deadly force
- Professional ethics
- Officer survival training
- Communications with people with disabilities

- Terrorism/homeland security

In an attempt to assess the quality of training that pertained to officer safety, we listed in item #24 six advanced methods or conditions of firearms training and asked whether each was a component of the agency's post-academy firearms training. The methods/conditions were

- Night-time or reduced light
- Simulated stressful condition
- Qualification with off-duty weapon
- Live fire (e.g., Hogan's Alley)
- Computerized firearms training systems (e.g., FATS)
- Artificial rounds (e.g., paintball).

Question #20 attempted to determine the extent to and means by which agencies provide line officers with information about the call to which he or she is responding. For four types of information that might be helpful to an officer responding to a call, we asked whether information was available to the officer and, if so, how it was conveyed. The four types of information that might inform an officer's response to a call were: history of address (e.g., nature and recency of previous calls to the address), history of presence of weapons at the call address, previous suspect contacts with police and previous contacts by the police with the person reporting the incident. The four response categories were:

- Dispatch informs officer even without specific request from officer
- Dispatch informs officer only if the officer requests
- CAD database available to officer

- Information not available or transmitted.

Finally, falling outside the categories of social, physical and/or information/preparedness, we collected information on the survey regarding the education requirement of hirees and the extent of female representation among sworn personnel.

Respondents indicated in item #2 whether their agency's minimum level of education for hiring of sworn officers in 2001 was high school or GED, associate degree or minimum number of credits or some college, BA or BS Degree, other, or whether there was "no requirement."

Question #1 which asked for a breakdown of sworn personnel by gender and race/ethnicity categories produced information on the percent of sworn personnel who were women as of January 2001 and as of January 2003.

(3) Field the Survey

The survey was fielded in late 2003. We used four waves of communications with agencies in an attempt to achieve a high response rate from the target population. As described above, the target population was the 158 agencies that submitted NIBRS for 2001 and served populations of 50,000 or more. All communications were directed to the executive of the agency. The first mailing included a cover letter and a copy of the survey (see Appendix A). We requested that the survey be completed within three weeks. Agencies could either return hard or Faxed copies or complete the survey online. Four weeks after the first mailing, we had received 63 surveys (39.6%). The nonrespondents were sent a letter requesting that they submit

their surveys. (No survey was included in this mailing.) Two weeks following dissemination of that reminder, we had received a total of 80 surveys (50.6%). At that time, a second complete survey packet was sent to nonresponding agencies with a cover letter requesting a timely reply. After two weeks, calls were made to the executives requesting their cooperation and, if cooperation was assured, another survey was sent to the agency. As a result of the steps described above, we received 121 surveys for a response rate of 76.6 percent. On-line submissions and faxed submissions were automatically conveyed to the data base. Hard copy surveys were manually scanned into the data base.

(4) Ensuring Quality Data Through Follow-Up with Responding Agencies

Within three business days of receipt, each survey was reviewed by project staff. Staff identified missing, confusing or inconsistent data during these reviews. If a survey manifested any of these problems (approximately 60 percent manifested such problems), a project staff person called the agency person who was responsible for survey completion and attempted to gather missing data and clarify confusing or inconsistent data. Generally, these calls were successfully in resolving the data issues.

(5) Identify Relevant Census and UCR Data and Add Archival Data to Survey Data

While most of the information for the independent variables came from the agency survey, some key information was collected from the U.S. Census and NIBRS data. (A description of the key variables are described below.) Staff downloaded relevant information and merged these data with the survey data producing the full data set. Below we describe the data that were used to measure factors described above.

i. Sworn Officer Density

We calculated sworn officer density by dividing the number of sworn personnel in an agency as reported in the UCR by the number of jurisdiction residents as reported in the census. A more appropriate variable would have been *field* (not sworn) officer density because field personnel are, by definition, those officers who are assigned to the streets and thus exposed to potential assailants. This information is not available through the UCR. We considered asking for information on field personnel in Question #1 of the survey (that solicits information on total sworn personnel broken down by gender and race), but we knew from previous research experiences that agencies are not able to provide reliable information regarding the strength of their field personnel.

ii. Agency Size

To measure agency size, we used data in the UCR for both total sworn and total personnel (sworn and unsworn).

iii. Enhanced Exposure and Aggressiveness

Arrests for Part I crimes were used as one measure of agency aggressiveness and also as a measure of face-to-face exposure to motivated offenders. We obtained these numbers separately for Part I violent crimes and Part I property crimes so that we could test their independent effects.

iv. Crime in the Jurisdiction

A three-year average of the total Part I reported crime rate was produced for each jurisdiction. The data were obtained from the FBI's *Crime in the United States* for the years 2000, 2001 and 2002. In addition, a separate measure of percentage of Part I offenses involving the use of a firearm was also developed. The data for firearm use was extracted from the FBI's *Crime in the United States* for the same three-year period.

v. Criminogenic Conditions

Various socio-demographic variables have been consistently reported in the literature as correlated with level of crime in the jurisdiction. To capture these conditions linked to crime, census data for each jurisdiction included the following

- Percentage below poverty
- Median household income
- Percent unemployed
- Population density
- Percent female-headed household with children
- Population size
- Residential stability
- Racial heterogeneity
- Percent male
- Percent aged 15 to 24

Additionally, we created a Gini index of income inequality. The Gini Index (the Gini coefficient multiplied by 100) is designed to provide a measure of the equality (or inequality) of values within a distribution. It is mostly commonly used to assess the equality of income across samples. The Gini Coefficient varies between the values of 0 and 1, where 0 represents a distribution evenly spread across a population and 1 represents perfect inequality. The formula used for calculation of the Gini Coefficient is:

$$G = |1 - \sum_{k=1}^{n} (X_k - X_{k-1})(Y_k + Y_{k-1})|$$

G: Gini coefficient
X_k: cumulated proportion of the population variable, for k = 0,...,n, with $X_0 = 0$, $X_n = 1$
Y_k: cumulated proportion of the income variable, for k = 0,...,n, with $Y_0 = 0$, $Y_n = 1$

Census classifications were used to designate each jurisdiction as in the South or not.[26]

Table 3 (see Appendix B) summarizes information regarding the independent variables of exposure and guardianship. Within the categories of exposure and guardianship, we list each construct, indicate whether it is internal or external to the agency and report the source of the information (e.g., survey item number, U.S. census).

5. Combining Items and Variables

Composite measures were developed from individual (multi-component) survey items or combinations of survey items. For example, the construct PROMOTE is a composite measure of the five sub-items of Question #5 related to the departments' policies to promote the wearing of

[26] Per the U.S. Census, "South" includes the states of West Virginia, Virginia, Tennessee, Texas and South Carolina.

body armor. The five sub-items were structured with YES/NO response options. If the department answered with a YES for a sub-item it was given a score of one (1) if it answered NO it were assigned a score of zero (0) for that sub-item. The questions used to define the construct PROMOTE are:

Q13. Please indicate the ways in which your department promotes the wearing of body armor...THROUGH EDUCATION AND/OR ENCOURAGEMENT

Q13. Please indicate the ways in which your department promotes the wearing of body armor...WRITTEN POLICY

Q13. Please indicate the ways in which your department promotes the wearing of body armor...DAILY CHECKS

Q13. Please indicate the ways in which your department promotes the wearing of body armor...PERIODIC CHECKS

Q13. Please indicate the ways in which your department promotes the wearing of body armor...OTHER

The summed scores of all of the sub-items resulted in the measure PROMOTE with a range in values from 0 to 5. A frequency distribution of the composite measure PROMOTE is provided in Table 4 below.

Table 4: Policies to promote wearing of body armor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	.8	.8	.8
	1	26	21.3	21.3	22.1
	2	32	26.2	26.2	48.4
	3	43	35.2	35.2	83.6
	4	18	14.8	14.8	98.4
	5	2	1.6	1.6	100.0
	Total	122	100.0	100.0	

A similar process was used for questions with more than two responses. For instance, in survey question #6 respondents indicated their departments' policies regarding the submission of documentation for the various types of use of force. For each type of force listed, the respondents indicated whether submission of documentation was *Mandatory*, *Optional* (e.g., at the discretion of the supervisor), *Not Required*, or *Not Permitted by Policy*. Question #6 included 12 types of force: OC spray, other chemical agents, baton strikes with injury, electrical devices, other impact devices, bodily force resulting in injury or claim of injury, neck restraint, dog bite, vehicle ramming, vehicles shot at and hit, vehicles shot at but not hit, pointing weapon at individual. To create the composite measure each category of use of force was given equal weight in the calculation. The responses, however, were not given equal weight. A mandatory requirement to document the use of force is the strongest type of accountability available to law enforcement. Therefore, mandatory force reporting was assigned the value of 2. Optional reporting is less rigid and therefore lower on our accountability scale and received a value of 1. Not permitted by policy while not a reporting requirement is a policy prohibiting the particular type of force; not-permitted by policy was also coded with a value of 1. Finally, not required was given a value of zero since it represents no accountability in the form of documentation for the

force. To produce the measure "force," the values of 0, 1, or 2 (as described above) for each of the 12 types of force were summed. A frequency distribution of the resulting composite measure of force documentation is shown in Table 5 below.

Table 5: Policy for documenting the use of force

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	12	2	1.6	1.6	1.6
	16	5	4.1	4.1	5.7
	17	7	5.7	5.7	11.5
	18	9	7.4	7.4	18.9
	19	20	16.4	16.4	35.2
	20	17	13.9	13.9	49.2
	21	25	20.5	20.5	69.7
	22	21	17.2	17.2	86.9
	23	10	8.2	8.2	95.1
	24	6	4.9	4.9	100.0
	Total	122	100.0	100.0	

Above, we have provided examples of how composite measures were created. The details regarding the development of the remaining composite measures are contained in Table 6 (see Appendix C). Several variables were excluded because (1) they did not produce variation in response, (2) they consisted of considerable missing data, or (3) alternative variables measuring the same construct produced superior data. These excluded items pertained to representativeness (from Question 1), weapons authorized/supplied (from Question 5), early warning systems (Questions 8, 9, 10), physical barriers in cars (Question 14), handcuffing policies for adults and juveniles (Questions 15 and 16), and SWAT teams (Questions 27 and 28).

Factor analysis was used in an attempt to combine variables into factors measuring major theoretical constructs. For instance, the external exposure factor of criminogenic conditions was operationalized through a variety of environmental and ecological variables. The U.S. Bureau of the Census data for the year 2000 was used to collect ecological information at the jurisdictional level for each of the target agencies. Many of these measures were interrelated, such as percent of families living below the poverty level and income inequality. A Principal Components analysis using Varimax rotation with Kaiser Normalization was used to define the factors for use in the model. The results of the factor model are shown in Table 7 below.

Table 7: Rotated Component Matrix*

	Component	
	1	2
Percentage of Families below Poverty Line	.809	.504
Median Household Income	-.893	
Income Inequality Between White and All other Races		.664
Rate of 16+ years old unemployment per 100,000	.838	
Residential Stability (Mobility or Transient)	-.526	.558
Residential segregation		-.825
Percent Minority Population		.847

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

* Rotation converged in 3 iterations.

Two factors emerged through this model – structural disadvantage and economic disadvantage. The resulting factor scores were saved and used in a preliminary regression model. Unfortunately, when used in a regression model the results were consistently weak and the factors provided little in the way of clarification for defining the underlying constructs. As a

result, they were not included in the final analyses. We also used factor analysis in an attempt to produce "internal exposure" and "guardianship" variables, but found a poor fit.

6. Statistical Model

As mentioned previously, the analyses team rejected Ordinary Least Squares (OLS) regression because, even with transformations, the residuals were not normally distributed. In light of the skewed distribution of the dependent measure and the high percentage of zero incidents, the team chose negative binomial regression, an extension of the Poisson model, instead of OLS. Because factor analyses did not produce the desired theoretical factors, the analysis team used variables (or constructs produced from variables), instead of factors developed through factor analyses, in the negative binominal regression analysis. To produce a manageable number of variables to include in the model, the first step was to measure the strength of the relationship of each variable with the dependent variable – the rounded average count of LEOKA incidents in a jurisdiction for 2000 through 2002. The correlations were used to eliminate variables that had little or no association with the dependent measure as well as to test for multi-collinearity. Table 8 (see Appendix D) provides correlation data for the final model. To reduce further the number of variables, selections were made to ensure that the model included at least one measure from each of the theoretical construct categories. That is, theory was the basis for inclusion of certain variables in the model. Table 9 (see Appendix E) lists each variable included in the model and its corresponding relevant theoretical construct/dimension, classification, definition, source, source description and variable name.

III. RESULTS

1. Descriptive Data Analysis

In this section we describe the information provided by the responding agencies that pertain to the policies/procedures that might impact on the rate at which officers are killed or seriously assaulted and describe the jurisdiction environment through UCR/Census data. As indicated earlier, the data for this study are based on survey, U.S. Census, and NIBRS data from 158 local law enforcement agencies that submitted NIBRS data for 2000, 2001 and 2002 and that serve populations of 50,000 people or more. The data for the dependent variable, rates at which law enforcement officers are killed or assaulted (LEOKA), come from NIBRS data for the years 2000, 2001 and 2002. We differentiate below between factors that reflect "exposure" or "guardianship."

(1) Exposure Variables – Internal

Exposure factors could be (1) internal to the agency (e.g., agency aggressiveness) or (2) external to the agency (e.g., violent crime rate, poverty level).

Internal exposure constructs reflect the aggressiveness of the police department including level of arrests. Our measure of aggressiveness includes items on the use of Special Weapons and Tactics (SWAT) units, force reporting requirements, supervisory review of force, early warning systems (EWS) for use of force problems, and officer face-to-face exposure to Part 1 Crime arrestees. Some of these measures reflect our assumption that non-aggressive agencies

will have more accountability mechanisms than will aggressive agencies. Also, we expect that officers in aggressive agencies will have greater exposure to motivated offenders and therefore experience a higher rate at which officers are killed and seriously assaulted.

i. Use of SWAT or Other Similar Emergency Response Teams

Only 4 percent of the 159 law enforcement agencies in this study did not have a SWAT team. The largest group (74 percent) of departments in our sample have part-time SWAT units made up of members of the police force who are called up as needed. Nearly 13 percent of the departments in our sample have a SWAT unit consisting of full-time members, and another 9 percent of the agencies assign members to a multi-jurisdiction SWAT unit. The activities/characteristics of the SWAT unit are listed below in Table 10. As expected, nearly all of the departments in our sample with a SWAT team use them to respond to critical incidents (95.8 percent) and very few have them patrol high crime areas (11.7 percent).

Table 10: Activities performed by the SWAT/emergency response team on a regular basis

	Percent Yes
Patrol high-crime areas	11.7%
Serve search/arrest warrants	80.8%
Respond to critical incidents	95.8%
Wear utility clothing/BDU, boots and/or helmets	80.8%
Receive training from active duty military personnel	32.5%
None of the above	2.5%

ii. Police Officer use of Force Reporting/Documentation Requirements

For this survey question we did not list all types of force, but rather listed 12 types that might produce variation in reporting requirements across agencies. Most departments have mandatory reporting requirements for many types of force (see Table 11), including 90 percent

or more for bodily force resulting in injury or claim of injury (98 percent), use of OC spray (97 percent), baton strikes with injury (94 percent), and dog bites (90 percent). Also, for many departments some forms of force do not require reporting because it is not permitted by policy (e.g., 38% of the departments have mandatory reporting requirements for the use of a neck restraint/unconsciousness-rendering hold and nearly all the other departments [60%] do not permit this type of force by policy). There was one area where reporting requirements were less common; only about half of the departments have mandatory use of force reporting requirements for pointing a weapon at an individual.

Table 11: Department's policy regarding the submission of documentation for use of force

	Documentation of use of force				
Type of force	Mandatory	Optional	Not Required	Not Permitted by Policy	Total
Oleoresin Capsicum (OC)	96.8%	1.6%	0.0%	1.6%	100.0%
Other chemical agents	64.8%	1.6%	1.6%	32.0%	100.0%
Baton strikes with injury	94.4%	.8%	.8%	4.0%	100.0%
Electrical devices	51.2%	.8%	1.6%	46.4%	100.0%
Other impact devices	79.2%	1.6%	.8%	18.4%	100.0%
Bodily force resulting in injury or claim of injury	98.4%	.8%	0.0%	.8%	100.0%
Neck restraint/unconsciousness-rendering hold	37.6%	.8%	1.6%	60.0%	100.0%
Dog bite	90.3%	2.4%	0.0%	7.3%	100.0%
Vehicle ramming	57.6%	0.0%	0.0%	42.4%	100.0%
Vehicles shot at and hit	72.8%	0.0%	0.0%	27.2%	100.0%
Vehicles shot at but not hit	72.8%	0.0%	0.0%	27.2%	100.0%
Pointing weapon at individual	48.8%	16.0%	35.2%	0.0%	100.0%

iii. Supervisory Review of Force

This survey question explored three types of force and requested agencies to indicate the highest level at which those force incidents would normally be reviewed for justification if no injury occurs. (We did not ask about incidents where injury occurred because nearly all departments would review those cases at the highest levels.) Nearly all the departments in our sample require some level of supervisory review after OC spray is used, after an officer strikes someone with a baton, and after an intentional firearm discharge at a person that did not hit that person (see Table 12). Reviews of intentional firearms discharges are most likely to reach to the highest levels of the agency (84.0%). Within a plurality of agencies, reviews of OC spray and baton strikes reached this highest level. For both OC spray use and baton strikes (that did not produce injury), the highest level of review was at the command level for 30 percent of the agencies.

Table 12: Highest level the incident would normally be reviewed if no injury occurs

Type of force	Not Reviewed	First-line Supervisor	Command Level	Administration, Above Command Level	Total
OC spray used	2.4%	28.0%	29.6%	40.0%	100.0%
Baton strikes	4.0%	21.8%	30.6%	43.5%	100.0%
Intentional firearms discharge at a person that did not hit		.8%	15.2%	84.0%	100.0%

iv. Use of a System to Track Use of Force by Officers

We assessed the existence of systems that track data on force used by individual officers in the departments. The majority of departments (71.2 percent) report having a "system that

tracks data on the nature and extent of force used" by officers. Also, just over half of the departments (52.8 percent) have a written policy that calls for the evaluation and/or analysis of trends in the use of force over a period of time for the purpose of identifying training, policy, equipment and/or other needs.

v. Face-to-face exposure to Part 1 Crime arrestees

The average number of arrests for UCR Part 1 Crimes per officer for the departments in our sample is just under 7, with a range from 0 arrests to a high of 20 arrests.

(2) Exposure Variables – External

Exposure constructs external to the department include crime in the jurisdiction, criminogenic conditions, region in which the agency was located, agency size and sworn officer density. We hypothesized that agencies with higher exposure to criminogenic conditions would experience higher rates of violence against police.

i. *Crime in the Jurisdiction*

Crime in the jurisdiction was measured as the average total reported Part I crimes in 2000-2002, and serves as the exposure variable in our negative binomial model. The average Part 1 UCR Crime rate per 100,000 for the departments in our sample is 2,391, with a range from 34 per 100,000 to a high of 8,469 per 100,000. We also included a measure of the number of Part 1 UCR offenses involving a firearm. The average firearm index score for the departments in our sample is 4.9, with a range of 0.22 to 14.5.

ii. Criminogenic Conditions

Various socio-demographic variables have been consistently reported in the literature as correlated with level of crime in the jurisdiction. We included four measures of criminogenic conditions: Structural disadvantage as indicated by income inequality between whites and all other races, residential stability, percent female-headed households and presence of crime prone age cohort (percent male 15-24 years old).

The average income inequality ratio between whites and all other races for the departments in our sample is 1.34 to 1. The department with the lowest ratio shows whites lower than all the other races (.86). The department with the greatest disparity exhibits a ratio of whites to all other races of 2 to 1. The average residential stability score for the departments in our sample is 0.45, with a range from 0 to a high of 2.12. A high score indicates more residential stability in the jurisdiction (e.g., fewer residents moving to new addresses). The average percentage of female-headed households is 11 percent for the departments in our sample, with a range from 3 percent to a high of 27 percent. On average the populations of the communities served by our sample of departments are 7.7 percent males aged 15-24 years old, with a range from 4.7 percent to a high of 23.4 percent.

iii. Region

Census classifications were used to designate each jurisdiction as in the South or not. Less than half of the departments in our sample were from Southern states (42 percent).

iv. Agency Size and Sworn Officer Density per 100,000

The average number of full-time sworn officers for the departments in our sample was 228, with a range from 34 officers to a high of 1,916. Only 30% of our sample had fewer than 100 full-time sworn officers, about 40% of our sample had more than 100 officers but fewer than 200 officers, about 20% of our sample had more than 200 officers but fewer than 450 officers, and the remaining 10% of the sample had more than 450 officers (only five of those departments had more than 1,000 officers).

We calculated sworn officer density by dividing the number of sworn personnel in an agency as reported in the UCR by the number of jurisdiction residents as reported in the U.S. census. The average number of sworn officers per 100,000 for the departments in our sample was 145, with a range from 22 per 100,000 to a high of 391 per 100,000.

(3) Guardianship Variables

All guardianship factors are internal to the agency. Our measures included social, physical and information/preparedness aspects of guardianship.

i. Social Guardianship

Survey measures of social guardianship included items pertaining to one- versus two-person patrol vehicles, backup policies, dispatch follow-up, and community policing.

a. One-compared to two-person patrol units and backup policies. Most of the departments in our sample (84.8 percent) report that, on a typical Saturday evening shift, greater than 80 percent of the automobile patrol units are comprised of one-person units, about 10 percent of the departments report one-person patrol units in 61 to 80 percent of their automobile patrol units, and the remaining 5 percent of the departments report one person patrol units in 60 percent or less of their automobile patrol units. However, for certain calls such as domestic violence (96.8 percent), disorderly persons (79.2 percent), and residential alarms (68.8 percent), most departments have a policy of sending two officers to respond to the call (see Table 13).

Table 13: Does department policy or practice call for the dispatch of multiple officers?

Incident Type	Yes, a Policy/Practice Exists to Send Two Officers	No Policy/Practice Exists to Send Two Officers	No Policy/Practice Because Two-Officer Units Standard	Total
Domestic violence	96.8%	2.4%	.8%	100.0%
Residential alarm calls	68.8%	28.8%	2.4%	100.0%
Disorderly person	79.2%	18.4%	2.4%	100.0%
General disturbance	74.4%	23.2%	2.4%	100.0%
911 hang-ups	48.8%	49.6%	1.6%	100.0%

b. Dispatch follow-up. For the categories "crimes in progress" and "traffic stops," over 75 percent of the departments in our sample have policies/general practice always requiring dispatcher follow-up with officers responding to one of those types of calls as compared to the "completed crime calls" categories with a rate under 40 percent (see Table 14).

Table 14: Department's policy or general practice regarding dispatcher follow-up (radio contact) with officers responding to a call

	Always Required	Required in Certain Situations	At Officer's Request	No Policy/Practice
Crime in Progress	77.60%	13.60%	1.60%	7.20%
Completed crime calls	39.50%	33.90%	8.90%	17.70%
After a particular length of time	54.40%	32.00%	3.20%	10.40%
Traffic stops	75.20%	14.40%	2.40%	8.00%

c. Community policing. As proxy measures of community relations and trust we measured the implementation of community policing. First, an important aspect of most community policing efforts is the placement of patrol officers on permanent geographic assignments. Less than one-third of our sample of departments place officers on permanent assignments (31.2 percent); instead, nearly half of the departments use "regular, but not permanent assignments." The remaining 18.4 percent of the departments in our sample use "fluctuating assignments." Next, we queried respondents on whether each of a list of common community policing elements was implemented at their agency and by whom (see Table 15). Looking at the "most patrol officer" category, the most widely practiced feature of community policing across the largest percentage of departments in our sample (see Table 15) was working with citizens to identify and resolve area problems (44.0 percent of the departments have "most" of their patrol officers' carry out this activity). For the "most patrol officer" category, the least practiced activity by the departments in our sample, as seen in Table 15, is conduct crime analysis (only 4.8 percent of the departments have "most" of their patrol officers carry out this activity).

Table 15: Implementation of common community policing elements

	Most patrol officers	Some patrol officers	Special units	Civilian personnel	None/not applicable
Make door-to-door contacts in neighborhoods	18.4%	39.2%	33.6%	5.6%	28.0%
Develop familiarity with community leaders in area of assignment	30.4%	44.8%	40%	8%	10.4%
Work with citizens to identify and resolve area problems	44.0%	40.8%	47.2%	12.8%	4.8%
Teach residents how to address community problems	21.6%	38.4%	59.2%	12%	4.8%
Conduct crime analysis	4.8%	19.2%	60.8%	29.6%	10.4%
Meet regularly with community groups	14.4%	48.8%	60.0%	12.0%	2.4%
Work with other city agencies to solve neighborhood problems	18.4%	51.2%	54.4%	16.0%	4.8%

ii. Physical Guardianship

Survey measures of physical guardianship included items addressing protective vests, protective vehicle barriers, use and provision of firearms and less-lethal weapons and handcuff policies.

a. Protective vests. Most of the departments in our sample have a written policy regarding the wearing of body armor (89.6 percent). As seen in Table 16, of those agencies with a written policy, just over half include a mandate that body armor be worn by sworn personnel performing uniform patrol (56.3 percent); nearly all require vests during tactical operations (86.6 percent). The vast majority of departments promote the wearing of body armor through education and/or encouragement (84.8 percent) and written policy (76.0 percent). Other less

used strategies to promote the wearing of vests include daily checks (21.6 percent) or periodic checks (45.6 percent) and other means (17.6 percent).

Table 16: Written policies regarding the wearing of body armor by sworn personnel by functions

Functions	Mandatory all of the Time in the Field	Mandatory for Certain Tasks or Functions	Optional	Total
Uniform patrol	56.3%	14.3%	29.5%	100.0%
Plainclothes enforcement	3.6%	53.6%	42.9%	100.0%
Detective operation (excluding undercover)	1.8%	50.0%	48.2%	100.0%
Tactical operation (e.g., swat)	86.6%	9.8%	3.6%	100.0%

b. Protective barriers in vehicles. The vast majority of our sample (78.4 percent) of departments have over 80 percent of their transport vehicles for prisoners/suspects fitted with physical barriers. Ten percent of the departments have from 61 to 80 percent fitted with physical barriers, 5 percent of the departments have from 41 to 60 percent fitted with physical barriers, and the remaining 6 percent of departments have under 40 percent fitted with physical barriers.

c. Firearms and less-lethal weapons. All of the departments in our sample have authorized the use of semiautomatic weapons, and 90 percent of them supply it to the officers. Thirty-four percent of the departments in our sample have authorized the use of revolvers, and 8 percent of the departments supply revolvers to their officers. For the departments in our sample, the most commonly carried less-lethal weapon is OC spray; in 98 percent of the agencies some or all uniformed personnel carry OC spray on their person. Also high was the extent to which uniformed patrol officers carry batons on their person (95 percent reported "Some" or "All") (see Table 17). OC spray was also commonly carried in the vehicles of many of the officers in the

departments in our sample (61 percent have some or all of their officers carry it in their vehicles) (see Table 18).

Table 17: Percentage of uniformed patrol officers that carry the less-lethal weapons on their person

	All	Some	None
Oleoresin Capsicum (OC)	7.20%	91.20%	1.60%
Other chemical agents	9.70%	3.20%	87.10%
Some type of baton	16.10%	79.00%	4.80%
Electrical devices	30.60%	2.40%	66.90%
Other impact devices	0.00%	24.20%	75.80%

Table 18: Percentage of uniformed patrol officers that carry the less-lethal weapons in their vehicles

	All	Some	None
Oleoresin Capsicum (OC)	21.60%	39.20%	39.20%
Other chemical agents	33.10%	3.20%	63.70%
Some type of baton	19.20%	36.00%	44.80%
Electrical devices	33.10%	1.60%	65.30%
Other impact devices	62.40%	3.20%	34.40%

d. Policies on the mandatory use of handcuffs. For most departments in our sample (90.4 percent), the use of handcuffs is mandatory when executing a physical custody arrest of an adult (barring a specified exemption), with 81.6 percent of the departments having a similar mandatory policy for a physical arrest of a juvenile (see Table 19). Much smaller percentages of agencies mandated handcuffing for the transport of non-arrested adult and juvenile suspects. For approximately half of the agencies, handcuffing of non-arrested suspects (whether adult or juvenile) was optional; most of the rest had no policy governing this practice.

Table 19: Department's policy regarding whether handcuffing is mandatory or optional

	Mandatory, Barring Specified Exemptions	Optional	No Policy	Total
Adults				
All physical custody arrests	90.4%	7.2%	2.4%	100.0%
Transportation of non-arrested suspects	4.8%	51.2%	44.0%	100.0%
Juveniles				
All physical custody arrests	81.6%	16.0%	2.4%	100.0%
Transportation of non-arrested suspects	4.0%	52.0%	44.0%	100.0%

iii. Guardianship Produced Through Information/Preparedness

Survey measures for this area included level of education and training and information provided to officers regarding the calls to which they are responding.

a. Education and training. The majority of departments in our sample have a high school/GED requirement for hiring sworn officers (67.2 percent); 26.4 percent have an Associate's Degree as a minimum, 1.6 percent have a Bachelor's degree as a minimum, and 4.8 percent have some other minimum level of education.

The average number of hours of training recruits received at the last academy class across all the departments in our sample is 670 or 84 days, ranging from a low of 114 hours for one department to 1,440 for another department. A quarter of the participating departments have fewer than 500 hours of training, about half of the departments had fewer than 611 hours of

training, and three-quarters of the departments had fewer than 824 hours of training. Nearly all of the departments in the sample (see Table 20) provided in-service training during the previous two years covering the use of deadly force (97.6 percent), domestic violence (97.6 percent), use of non-lethal weapons (93.6 percent), and officer survival (90.4 percent). In–service training on physical fitness/health/wellness (62.4 percent) and communications with people with disabilities (65.6 percent) was covered by the fewest number of departments in our sample (see Table 20).

Table 20: Types of instruction provided to some/all in-service officers during the last two years

Types of instruction provided to some or all in-service officers during the last two years	In-service Provided
Community-oriented policing	79.2%
Cultural sensitivity or diversity training	87.2%
Domestic violence	95.2%
Physical fitness/health/wellness	62.4%
Physical combat skills	97.6%
Mediation skills/conflict management	72.8%
Use of non-lethal weapons	93.6%
De-escalation and defusing techniques	72.0%
Stop and approach skills	79.2%
Use of deadly force	97.6%
Professional ethics	78.4%
Officer survival training	90.4%
Communications with people with disabilities	65.6%
Terrorism/homeland security	86.4%

A variety of conditions, relevant to officer safety, are included in post-academy firearms training for the majority of departments in our sample. Over 90 percent of our sample of departments train under simulated stressful conditions (95.2 percent), train at night-time or in reduced light conditions (92 percent), and require qualification with off-duty weapons (91.2 percent). Sixty to 70 percent of our sample of departments use computerized firearms training systems (68 percent), use artificial rounds (63.2 percent), and/or train under live fire (60 percent).

b. Communication about calls for service. Nearly all of the departments in our sample (98.4 percent) have a CAD system that provides information to dispatchers that would be beneficial if shared with officers responding to a call (e.g., history for an address, previous contacts with suspect). For the information categories "history for an address" (66.9 percent) and "history of presence of weapons" (78.9 percent) a majority of the departments in our sample convey this type of information without a specific request from an officer (see Table 21).[27]

Table 21: Polices for providing officers different types of information at dispatch

	Dispatch informs officer without officer request	Dispatch informs officer if officer requests	CAD database available to officer	Info not available or transmitted
History of address	66.90%	28.20%	27.40%	3.20%
History of presence of weapons	78.90%	14.60%	22.80%	3.30%
Previous suspect contacts	44.40%	37.10%	23.40%	9.70%
Previous contacts with reporting party	37.10%	46.60%	25.80%	7.30%

iv. Guardianship – Other

Some research has indicated that females are superior at defusing potentially violent confrontations. Based on these findings, we included female representation on police forces as a variable with potential for guardianship value. The average percentage of female officers for the

[27] If the officer has CAD type information available in his/her car (third data column in Table 12), then it might be argued that it would be less necessary for dispatchers to convey this type of information. When examining this issue the results were not affected very much by whether the officers had this type of CAD information available in their car. For example, among those agencies that do not provide officers a CAD database in their car, 67% of these agencies have their dispatch inform the officer of history of address information without a request from the officer (compared to 66.9% from Table 12), 31% of these agencies have their dispatch inform officers of history of address information if the officer requests it (compared to 28.2% from table 12), and 4.4% of these agencies do not have history of address information available for transmitting (compared to 3.2% from Table 12).

departments in our sample was 10.6 percent, with a range from 1 percent to a high of 44.7 percent.

(4) Summary of Descriptive Data

First, we observed varying levels of internal exposure of officers to LEOKA, as measured by the aggressiveness of the police department and level of arrests. Nearly all of the departments in our sample have SWAT teams; they are more likely to be used to respond to critical incidents and serve search/arrest warrants than patrol high crime areas. Our agencies have accountability measures in place. Most departments have mandatory reporting requirements for many forms of use of force, especially bodily force resulting in injury, use of OC spray, and baton strikes with injury. The majority of departments in our sample have a system in place for tracking the nature and extent of force used by officers and over half have a written policy that calls for the evaluation and/or analysis of trends in the use of force. Nearly all the departments in our sample require some level of supervisory review after a number of forms of force are used, including the highest levels of the agencies for a number of forms of force (e.g., 84% for intentional firearm discharges and a plurality of agencies have the highest levels of their agencies reviewing use of OC spray and baton strikes).

The average Part 1 UCR Crime rate per 100,000 for the departments in our sample was 2,391. We described four measures of criminogenic conditions. The average ratio of income inequality between whites and all other races for the departments in our sample was 1.34 to 1. The average residential stability score for the departments in our sample was 0.45. The average percentage of female-headed households was 11 percent for the departments in our sample and,

on average, jurisdictions were comprised of 7.7 percent of males aged 15 to 24—the crime prone age/gender group.

Finally, we observed a somewhat uneven presence of social, physical and information/preparedness guardianship measures. The vast majority of the departments in our sample (85 percent) report using one-person patrol units. Many departments, however, have backup policies that require two officers to be sent to high-risk calls. Next, we observed a wide range of community policing activities. For example, while less than one-third of our sample of departments place officers on permanent assignments, a key feature of community policing, 44 percent of our sample of departments have "most" of their patrol officers' work with citizens to identify and resolve area problems (also a significant feature of community policing). Generally, the most common group to practice community policing are "special units," as opposed to patrol officers or civilian personnel.

Almost all of the departments in our sample supply their officers with semiautomatic weapons; 34 percent of the departments in our sample have authorized the use of revolvers; only 8 percent of the departments supply revolvers to their officers. While most of the departments in our sample have a written policy regarding the wearing of body armor (90 percent), only about half of them mandate the wearing of body armor by sworn personnel performing uniform patrol. The vast majority of departments (85 percent) promote the wearing of body armor through education and/or encouragement. The vast majority of our sample (78 percent) of departments has over 80 percent of their transport vehicles for prisoners/suspects fitted with physical barriers.

Nearly all of the departments in our sample have their officers carry less-lethal weapons (e.g., OC spray and some type of baton). For most departments in our sample, the use of handcuffs is mandatory when executing a physical custody arrest of either an adult or juvenile. The majority of departments in our sample have a high school/GED requirement for hiring sworn officers; many require some college credits and a few require a college degree. The average number of days of training recruits receive across all the departments in our sample was over 80. Also, nearly all of the departments in the sample provided in-service training during the prior two years covering the use of deadly force (98 percent), domestic violence (98 percent), use of non-lethal weapons (94 percent), and officer survival (90 percent). Also, a variety of conditions, relevant to officer safety, are included in post-academy firearms training for the majority of departments in our sample. Most of the departments in our sample had policies in place to enhance officer safety by requiring dispatcher follow-up (radio contact) with officers responding to certain calls (e.g., crimes in progress and traffic stops). Nearly all of the departments in our sample (98 percent) have a CAD system that provides information to dispatchers that would be beneficial if shared with officers responding to a call. Also, most of the departments in our sample provide "history of the address" and "history of presence of weapons" without a specific request from an officer.

In the next section, we describe the multivariate analyses used to determine which, if any, variables significantly predicted agency rates at which officers were killed or seriously assaulted.

2. Multivariate Data Analysis — Negative Binomial Model

We used a multivariate data analytic approach to assess whether we could model the number of annual LEOKA incidents. To accomplish this task we first considered the use of Ordinary Least Squares (OLS) regression to model the effects of several variables on the dependent variable. (This was the strategy called for in our original proposal to CDC.) OLS assumes normally distributed residuals. This assumption was checked for the dependent variable and it was found that it did not hold. A common method used to "normalize" skewed data is to apply a logarithmic transformation to the dependent variable. In this case a constant (1) was also added to the dependent variables prior to the transformation because of the possibility of the dependent variable taking on a meaningful value of 0. Normality was not achieved using the *ln + constant* transformation. OLS regression was thus deemed inappropriate for modeling the data.

To model the effect of the independent variables on the dependent variable, the negative binomial regression, an extension of the Poisson model, was used. The negative binomial regression model assumes that the dependent variable is a count of a phenomenon and overdispersion is present. Overdispersion is encountered when the conditional variance of the dependent variable is greater than the conditional mean. The negative binomial model is effective for data that is concentrated around zero (as is the case with the aforementioned dependent variable). Negative binomial models also allow for what is called an exposure variable. The inclusion of an exposure variable allows the researcher to take into account the

population that was "at risk" of the event happening to them. For our model, the average number of reported Part I crime in a jurisdiction from 2000-2002 was used as the exposure variable.

Descriptive statistics of the variables included in our model are provided in Table 22. Our dependent variable is the rounded average for the number of incidents of law enforcement officers killed or assaulted in a jurisdiction for 2000-2002. This variable is a computed average for each agency if that agency reported valid counts for 2000, 2001, and 2002 that is rounded to the nearest whole number. [28]

A variety of models were run using different indicators for each of these three constructs. Below we present the best fitting model that includes 14 variables, including two indicators of internal exposure, seven indicators of external exposure, and five indicators of guardianship.[29]

[28] As is typical when running negative binomial models, we used a rounded average.

[29] As stated earlier, we used factor analysis in an attempt to produce "exposure" and "guardianship" variables, but found a poor fit due to the lack of correlation among the independent variables. Given the absence of multicollinearity, we were able to include each of the 14 variables in the model. While we might have included additional variables between this set of 14 variables, we were not able to do so due to insufficient variability in these other variables.

Table 22: Variables in the negative binomial model

Type of Measure	Variable Name	Variable Definition	N	Mean	SD	Min	Max
Dependent variable	RNAVLEOKA	Rounded average count of LEOKA incidents in a jurisdiction for 2000-2002	101	10.77	13.97	0	76
Exposure – Internal	FORCE	Use of force level of review	101	9.96	1.95	6	12
Exposure – Internal	ARRESTS	Number of Part I arrests per officer	101	6.82	3.99	0.16	19.59
Exposure – External	FEMHOUSE	Percentage of female headed households in the jurisdiction	101	11.17	4.72	2.86	27.34
Exposure – External	SOUTHERN	Southern state (yes or no)	101	0.48	0.50	0	1
Exposure – External	FIREARM	Firearm index of number of Part I UCR offenses involving a firearm	101	4.87	3.25	0.22	14.46
Exposure – External	STABILI	Residential stability	101	0.45	0.37	0	2.12
Exposure – External	INCEQ2	Income inequality between whites and all other races	101	1.34	0.19	0.86	2
Exposure – External	OFFCAP	Number of officers in jurisdiction per 100,000 people	101	152.64	77.22	21.57	363.22
Exposure – External	PERMALE2	Percent of males in the jurisdiction aged 15 to 24	101	7.70	2.74	4.70	23.39
Guardianship	PROMOTE	Agency use of policies that promote the use of body armor	101	2.50	1.07	0	5
Guardianship	MULTOFF	Number of different type of offenses that the agency requires multiple officers to respond to	101	3.76	1.46	0	5
Guardianship	Q20SUM	Information provided to officer about dispatch call	101	6.79	2.54	0	12
Guardianship	STRENGTH	Strength of guardianship	101	13.33	3.28	4	16
Guardianship	PCTFEMOFF	Percent of sworn female officers in 2001	101	10.60	7.14	0.99	44.72

Table 23 presents the results of the negative binomial model. The -2 LOG L value for this model was –301.42 with 14 *df* (p = .008). The internal exposure variable, ARRESTS, was statistically significant. The external exposure variables FEMHOUSE and OFFCAP were statistically significant as was the guardianship variable PROMOTE.

Table 23: Results of the negative binomial model

Type of Measure	Variable Name	Variable Definition	b	z	P>z	%
Exposure – Internal	FORCE	Use of force level of review	-0.0651	-1.2	0.229	-6.3
Exposure – Internal	ARRESTS	Number of Part I arrests per officer	**-0.0671**	**-2.87**	**0.004**	**-6.5**
Exposure – External	FEMHOUSE	Percentage of female headed households in the jurisdiction	**0.0663**	**2.219**	**0.026**	**6.9**
Exposure – External	SOUTHERN	Southern state (yes or no)	0.0156	0.071	0.943	1.6
Exposure – External	FIREARM	Firearm index of number of Part I UCR offenses involving a firearm	0.021	0.482	0.630	2.1
Exposure – External	STABILI	Residential stability	0.0409	0.139	0.890	4.2
Exposure – External	INCEQ2	Income inequality between whites and all other races	-0.9645	-1.76	0.078	-61.9
Exposure – External	OFFCAP	Number of officers in jurisdiction per 100,000 people	**-0.0034**	**-2.05**	**0.040**	**-0.3**
Exposure – External	PERMALE2	Percent of males in the jurisdiction aged 15 to 24	0.0347	0.991	0.322	3.5
Guardianship	PROMOTE	Agency use of policies that promote the use of body armor	**0.3247**	**3.482**	**0.000**	**38.4**
Guardianship	MULTOFF	Number of different type of offenses that the agency requires multiple officers to respond to	0.123	1.599	0.110	13.1
Guardianship	Q20SUM	Information provided to officer about dispatch call	-0.0484	-1.27	0.204	-4.7
Guardianship	STRENGTH	Strength of guardianship	0.0159	0.532	0.595	1.6
Guardianship	PCTFEMOFF	Percent of sworn female officers in 2001	-0.0065	-0.46	0.646	-0.6

Interpretations of the significant variables come from the column in Table 23 labeled %. First, a higher level of internal exposure as measured by Part I Arrests [ARRESTS] was associated with fewer LEOKA incidents. A one unit increase in the number of arrests per officer leads to a 6.5 percent decrease in the number of LEOKA incidents. With regard to external exposure, a percentage increase in the female headed households (FEMHOUSE) in a jurisdiction was associated with a 6.9 percent increase in the number of LEOKA incidents. Higher levels of the external exposure variable of OFFCAP were associated with a lower number of LEOKA

incidents. A one unit increase in the total number of officers per 100,000 population [OFFCAP] leads to a 0.3 percent decrease in the number of LEOKA incidents. Finally, higher levels of the guardianship variable of PROMOTE were associated with a greater number of LEOKA incidents. A one unit increase in the promotion of wearing body armor leads to a 38.4 percent increase in the number of LEOKA incidents.

A second analysis was conducted with outliers removed. Two jurisdictions had LEOKA averages of over 70 incidents (one had 74 incidents and another 76). The model in Table 23 was rerun excluding these two cases and the results are presented in Appendix F in Table 24. Table 25 provides a summary of the included variables. Table 24 shows the results of the negative binomial model excluding the two outliers. The -2 LOG L value for this model was –290.88 with 14*df* (p = .008). The model remains the same as do the corresponding interpretations. Table 26 compares the results from the two models. The column labeled ALL is the model containing all of the cases; the column labeled MINUS eliminates the two outliers. The first row underneath each variable name is the raw beta coefficient. Below the beta is the p-value associated with that coefficient. There are no dramatic changes in the coefficients of the variables. Thus the interpretations of the model presented in the main text (Table 23) should remain the focus of this report.

IV. DISCUSSION AND CONCLUSION

1. Introduction

The number of law enforcement officers slain in the line of duty has decreased steadily since a peak in 1973. Even with this heartening downward trend, however, members of the police profession are still among the most victimized workers in the country. While data indicate that cab drivers are slain on the job more frequently than police, when both murders and serious assaults are considered, police are the most victimized.

1960s. The research in this realm, however has suffered two major deficiencies. First of all, studies have not assessed the impact of police policies/procedures on violence against police. Second, most of the multi-jurisdictional research has focused only on the subcategory of workplace violence incidents that result in death.

The downward trend in homicides in police coincides with major changes to police procedures and practices designed to enhance police safety and indeed commentators have attributed the decline to these changes. Despite this supposed link, research has not tested the impact of police policies and procedures on police victimizations. An important exception is the work of Kaminski (2004) who assessed the impact of police policies and practices on felonious killings of police (controlling for external factors). In order to explain and continue this downward trend, it is important to identify the interventions/efforts of police departments that are effective in enhancing officer safety.

Kaminski, like others who have conducted multi-jurisdictional research on this topic, used homicides of police as the dependent measure. This practice has been due to the lack of reliable data on assaults against police that is measured consistently across agencies. This dependent measure, however, has limited our understanding of violence against police. Whether an incidence of violence against police becomes a homicide or serious assault may be the result of only the location where the bullet hits (e.g., center of the vest or under the arm where the vest does not provide protection) or the speed at which emergency personnel get to the scene. Particularly in a study that examines police/policies practices, the distinction can be misleading and produce invalid results. Most polices/procedures designed to enhance officer safety are focused on reducing both homicides of and assaults against police (some exceptions are discussed below). As such it is important that the dependent measure encompass both results of violence.

This study remedied these two major deficiencies of prior work in this area. The major purpose of the study was to assess the impact of department policies/procedures on violence against police—encompassing both murders of and assaults against officers—controlling for factors external to the agency. Independent variables are categorized in two ways: (1) whether they are external to the agency (that is, considered generally outside the control of the agency such as criminogenic conditions and crime rate) or internal to the agency (representing policies and procedures to facilitate officer safety) and (2) whether they increase the officers "exposure" to violence (e.g., crime in the jurisdiction, aggressiveness of police department) or provide "guardianship" (e.g., quality training, promotion of vest wearing). Academics (and the academic

literature) and police practitioners (and the practitioner literature) were used to identify relevant factors in these categories.

Subject agencies were selected because they were able to provide valid and reliable data for the dependent measure. These agencies submitted NIBRS data for 2001 and served jurisdictions of 50k or more. Data to measure the external v. internal, exposure v. guardianship independent variables came from a national survey, U.S. Census Data and NIBRS data. The dependent measure, based on NIBRS data, was the weighted average number of law enforcement officers killed or assaulted in the line of duty for the years 2000, 2001, and 2002. The response rate to the survey was just under 66 percent producing a total of 121 agencies included in the analyses.

2. Findings

Negative binomial regression was used to develop the best fitting model that included 14 variables. Only four variables produced statistical significance. These were Number of Part I Arrests Per Officer (ARRESTS), Percentage of Female Headed Households in the Jurisdiction (FEMHOUSE), Number of Officers in the Jurisdiction per 100,000 People (OFFCAP), and Agency Use of Policies that Promote the Use of Body Armor (PROMOTE). Two were internal (ARRESTS and PROMOTE) and two were external (FEMHOUSE and OFFCAP); three had been categorized as "exposure" (ARRESTS, FEMHOUSE, OFFCAP) and one "guardianship" (PROMOTE). The relationship between three of the four to violence against police were in the opposite direction as hypothesized (ARRESTS, PROMOTE and OFFCAP).

In a section below, we discuss the caveats associated with the research that may have impacted on our ability to measure the impact of policies and procedures on violence against police, controlling for external factors. Here we discuss the possible meaning of the substantive results found.

(1) Internal Factors

Importantly, we found only two internal factors that impacted on violence against police. At first glance, one might interpret the fact that only two factors emerged to mean that department policies and procedures to enhance officer safety do not impact on the level of violence against department members. This interpretation would be inappropriate. There are many policies/procedures that virtually all agencies use to promote officer safety. This includes arming officers with guns, training them in their use, developing policies and providing training pertaining to tactics and verbal skills for effectively dealing with people, and so forth. Our methods do not measure the impact of these universal measures—indeed, we could not, because they would not be "variables" but rather, constants. Instead our methods, by necessity, attempted to identify the ways agencies varied in their practices; in so doing we were assessing the impact of non-universal "advanced methods" for reducing violence against police.

i. Arrests per Officer

A one unit increase in the rate of arrests was associated with a 6.5% decrease in incidents of violence against police. This result is in the unexpected direction in light of our classification of ARRESTS as an internal, exposure variable. We used ARRESTS as a measure of department aggressiveness, arguing (based on input from practitioners who attended our focus groups) that

aggressive departments were more likely to have violent incidents, including incidents in which officers were harmed.[30] This result may have been produced due to the caveats associated with the design and measures below, or alternatively it could be the case that high levels of aggressiveness serve as a safeguard to officers. In this conceptualization, people in a jurisdiction are disinclined to engage in a violent confrontation with police because of the department's reputation for aggressiveness.

ii. Promotion of Body Armor Use

A one unit increase in the variable that reflects agency promotion of body armor use is linked to a 38.4 percent increase in LEOKA incidents controlling for all other factors. Policy makers would certainly hope that the use of body armor would lead to a *decrease* in LEOKA incidents, not an increase. And, in fact, that expectation may explain our results. Ours is a cross-sectional study. The ideal study would have a longitudinal design, where researchers could assess levels of violence against police before and after safety-facilitating policies or procedures are adopted. The unexpected results pertaining to body armor use produced by our cross-sectional study may reflect chiefs/sheriffs experiencing high levels of violence implementing stronger body-armor-promotion policies and procedures in the hopes to bring the levels down. In this scenario, the causal sequence is reversed: agencies with high levels of violence adopt stronger vest-promoting policies/practices.

[30] Another way to conceive of the link between arrests and violence against police would still have it categorized as an internal exposure variable. In this view, the arrest rate isn't necessarily a measure of aggressiveness, but it does indicate the extent to which officers are face-to-face with offenders in potentially violent situations (Part I arrest).

It is also, however, important to point out that our dependent measure—which is overall a strength of the current study, is a detriment with regard to this independent variable. Policies that promote the use of body armor are designed, not to reduce overall violence against police, but rather to turn what might have been a homicide into the lesser harm, a serious assault. Since our dependent measure includes both homicides and serious assaults, we did not measure this predicted impact when we included PROMOTE in our larger equation. (Although Kaminsky, too, found that body armor use was positively related to violence against police, measured in his research as homicides.)

(2) External Factors

Just two factors that were categorized as external were statistically significant in the model. These are number of officers in the jurisdiction per 100,000 people (OFFCAP) and percentage of female-headed households in the jurisdiction (FEMHOUSE).

i. Officer Density

A one unit increase in officers per capita is associated with a 0.3 decrease in LEOKA incidents. First of all, it is important to note that, while significant, the substantive change in violence against police produced by OFFCAP is quite small (0.3 incidents). Second, this association is in the unexpected direction in light of our categorization of this variable as external exposure. With this classification we expected that more officers per population would mean that there are more officers at risk of violence (i.e., increased exposure). Alternatively, as pointed our earlier, we could argue that more officers per population might provide mutual

protection (guardianship). Viewing this variable as a guardianship measure would be consistent with our findings that higher guardianship (OFFCAP) reduces the number of LEOKA incidents.

ii. Female Headed Household

Percentage of female-headed households in the jurisdiction [FEMHOUSE] was the only factor to produce significance among the two related categories of crime in the jurisdiction and criminogenic conditions. A one percent increase in female headed households is associated with a 6.9 percent increase in incidents of LEOKA. FEMHOUSE served as a proxy measure for family/neighborhood instability. Family structure variables—such as percent divorced and percentage of children living in single-parent households—has been linked to violence against civilians (Land, McCall, and Cohen, 1990; Parker, McCall and Land, 1999). Having a higher proportion of female-headed households has been linked in other research to violence against police (e.g., Peterson and Bailey, 1988; Morrison and Meyer, 1974; Gaminski, Jefferis and Gu, 2003). Hence, as expected, we found that departments operating in jurisdictions with this type of higher criminogenic condition also experienced more LEOKA incidents. Six other external factors made it into the model because in bivariate assessments they were associated with violence against police. These include southern state (SOUTHERN), firearm index representing the proportion of Part I UCR offenses involving a firearm (FIREARM), residential stability (STABILI), income inequality between whites and all other races (INCEQ2), percent of males in the jurisdiction aged 15 to 24 (PERMALE2), and number of officers in the jurisdiction per 100,000 people (OFFCAP).

3. Weaknesses of the Current Study

This project advanced the study of violence in the workplace—particularly violence against law enforcement—in important ways. Key strengths are the use of a dependent variable that encompasses both homicides and serious assaults, a focus on the policies and procedures that may impact on police safety, a high-quality national survey and respectable response rate, and the use of theory and practitioner experience to guide the selection of model variables. This study, however, also has some weaknesses that may have impacted on our findings.

Our subject agencies do not reflect a representative sample of all agencies. Generally, PERF targets stratified random samples for its national surveys. That was not possible with this research because our subject agencies had to be selected based on their ability to provide us with reliable data on the dependent measure. This caveat is most relevant to the frequency data from the survey that conveys the extent to which agencies use the various policies/procedures presented in the survey. We cannot generalize these findings to agencies nationwide. Our analyses assessing the relationship between internal and external factors and our dependent measure would also be limited in terms of generalizeability if agency size (and other characteristics of NIBRS-generating agencies) interact with our internal variables in terms of their impact on violence against police. This is unknown.

Related to the purposive selection of participating agencies is the fact that the number of subjects is relatively small. While over 4,000 agencies from 26 states now submit NIBRS data to the FBI, a large proportion of these are medium-sized agencies that did not meet our criteria of

serving jurisdictions of 50,000 or more.[31] Not only does the small sample size reduce the power of our study, but, as above, the subject agencies are not representative of agencies of all sizes.

As with most studies in social science, we must be concerned about specification error. While we took great pains to identify the types of police policies and procedures as well as external variables that could impact on violence against police (consulting practitioners, academics and relevant literature), it is quite possible that a key factor was not included in our study.

Our cross-sectional design precludes us from assessing causal direction. The example provided above was our finding regarding agency promotion of body armor use. The positive association between promotion of body armor and violence against police could, theoretically at least, imply that (1) promotion of body armor causes violence against police to increase, or (2) agencies with high levels of violence against police promote the wearing of body armor. An ideal study would incorporate a longitudinal design so that researchers could capture the ordering in time of policies and practices and levels of violence against police. Note, however, that the "ideal" longitudinal study is likely impossible. Conducting such a study would require measures on independent and dependent variables back into the early 1970s at least. In the early 1970s there were no common and reliable measures of assaults across multiple agencies and likely there are inadequate departmental records of when policies and practices were put in place. Also, due to legal and ethical reasons, it would be impossible to randomly assign certain protective factors in an experiment to compare equivalent situations with and without the protective

[31] As conveyed above, this second criteria was necessary because violence against police, however, serious, is still a relatively low base rate phenomenon.

elements. Therefore, our knowledge of effectiveness in this area will always be necessarily limited.

Variables in the analyses were individual factors as opposed to theoretical constructs. The survey items produced over a hundred discrete variables. Some of these were combined to produce factors (e.g., community policing items were combined to produce a "community policing" factor) but, ideally, we would have reduced the data further into, for instance, constructs representing our theoretical constructs of guardianship and exposure. Despite attempts, we were unable to do this. As such, variables in the analyses were discrete factors as opposed to more comprehensive constructs. The use of many discrete variables instead of a smaller number of constructs, also raises a statistical concern. The more statistical tests conducted, all else equal, the greater the probability one has in finding a statistically significant relationship by chance. That is, by chance, we are more likely to find significant relationships by virtue of having more variables.

Also, we used a number of census-based variables (e.g., neighborhood instability) to serve as proxies for certain concepts. While this was the only practical approach available to our research team, better (more expensive) methods have been used to get at such concepts as neighborhood instability (e.g., neighborhood observational methods).

4. Future Research

Some of the weaknesses above help us to articulate additional research that is needed. For instance, as the NIBRS program expands, research similar to this (or even replicating this) could be conducted with a larger sample of agencies and maybe with a sample of agencies that are more representative of agencies nationwide. Another advantage of a future replication is the fact that the FBI has been making changes to the LEOKA data within NIBRS that will further improve the information available to research this topic. Beginning with submission of the January 1, 2003 NIBRS data, the FBI began accepting official LEOKA data through the NIBRS system. To accommodate this change the FBI modified the NIBRS Victim segment by adding three new variables directly related to killings and assaults against law enforcement. Currently, between 22% and 25% of the U.S. population is covered by the NIBRS system. To accommodate the remaining population the FBI will continue to use the original LEOKA data collection format as well. The addition of the three new LEOKA-specific data elements, when coupled with the original NIBRS data elements significantly enhances our ability to use NIBRS to understanding officers killed and assaulted in the line of duty. Among other changes the FBI will be collecting victim-level details on murder, aggravated assault, simple assault and intimidation against law enforcement.

Future research might incorporate more potential independent variables to address the possibility of specification error. For instance, members of the advisory board committee for the project have in retrospect suggested that we might have measured police legitimacy within jurisdictions and the level of force used by police. Regarding the former, while we incorporated

a measure of community policing, there may be better or additional ways to measure the relationship between the police and the community.

A strength of this research is our inclusion of both homicides and assaults as a dependent measure. However, as mentioned above, some agency interventions might increase one subset of violence against police and decrease the other. The example mentioned above is the promotion of vest usage. Agencies that are strong in this arena might push what would otherwise have been homicides into the serious assault subcategory. Future research might assess the impact of various independent variables on each of these measures separately as well as together.

This study took on one important aspect of the important topic of officer safety. We used agency-level data to assess the impact of polices/practices on violence against police. Also important for the understanding of violence against police is research that uses incidents as the level of analyses as opposed to departments. Incident-level studies have been conducted but overwhelmingly this work has been limited to a review of incidents which result in officer deaths (e.g., Fridell and Pate, 1995, 2001). Consistent with our study, incident level review should expand to look at, not just homicides, but serious assaults. A further advancement would be to look at the potentially violent incidents that do *and do not* result in violence against police (see the work of Binder and Scharf in the realm of police use of deadly force). This would allow us to identify the incident-level factors that increase or decrease the likelihood of violence against police. One step beyond that is research that looks not only at the likelihood of violence against police, but also the use of force by police. In this way, we could identify factors that increase or decrease the likelihood that an incident will result in force/violence by either or both parties.

This information could produce valuable information for reducing both the use of force by police and violence against police.

Finally, research needs to focus on the police in this country that are killed or injured as a result of *accidents*. Figure 1 (see literature review section) showed that the numbers of officers slain in 1972 and 2003 were 117 and 52, respectively. This greater than 50% reduction conveys the downward trend in slayings of police that we've reported several times. In contrast, officers *accidentally* killed in 1972 and 2003 were 41 and 80, respectively. Thus, whereas felonious killings have been cut in half, accidental killings have doubled. While we continue our work to understand violence against police, we must too, in our quest to enhance the safety of our law enforcement officers, examine accidents that kill and injure these professionals in the workplace.

5. Conclusion

Over 4500 officers have been slain in the line of duty since this phenomenon peaked at 134 in 1973. Fortunately, the number and rate of felonious killings of law enforcement officers has been reduced by over one-half since the early 1970s. Just 57 officers were slain in 2004, the most recent year for which data are available. While this trend is clearly a good one, law enforcement is still the most dangerous in terms of on-the-job violence when both homicides and assaults are considered. In order to understand and continue this downward trend in felonious killings and to reduce the rate at which officers are seriously assaulted, it is imperative that we identify the factors associated with violence against officers.

This project advanced the methods and focus of research in this area. Previous multi-jurisdiction research has focused primarily on killings of law enforcement officers. At the incident level, researchers have described the officer, subject and nature of the situation that led to the officers' deaths. At the jurisdiction level, researchers have examined the impact on police slayings of factors external to agencies (e.g., criminogenic factors, population density). The violence against police examined in this project encompassed both felonious killings and serious assaults. The study measured the impact of police agency policies, procedures and practices on rates of violence against police controlling for external factors.

We hope and expect that future research will build upon our work and that of others so that we can understand better how agency policies, practices, procedures, training and equipment facilitate the safety of officers on the job. These efforts may help us to reduce the number of officers who are slain or seriously hurt in service to their communities.

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Appendix A

Cover Letter and Survey

Cover Letter

Date

Title FirstName LastName
Street Address
City, State Zip

Dear Title LastName,

The Police Executive Research Forum (PERF), with funding from the Centers for Disease Control and Prevention, is conducting a study on organizational factors affecting police victimization. Specifically, we are interested in understanding what agency-level policies and practices influence the rate at which on-duty law enforcement officers are seriously assaulted or feloniously killed. We would like you or your staff to complete the enclosed survey that asks about various policies and practices that could impact on the rate at which officers are victimized.

We are sending this survey to only 160 carefully selected agencies across the United States and we are attempting to achieve as close to a 100 percent response rate as possible. Although your participation is voluntary, your agency's response is very important. We need and appreciate your cooperation so that we can produce results that are comprehensive, accurate, and timely. You will receive a summary of the results at a later date. **Please submit the survey by October ___.**

All agency responses will be kept confidential; no agency name will be linked to its responses in any public document.

There are three ways to respond to this survey:

1. *Internet*: An electronic version of this questionnaire is located on the Internet at http://survey.policeforum.org/cdcsurvey.pdf. If you choose to complete the survey via the Internet, please remember to enter your ID number in the space labeled "ID NUMBER" located at the top right corner of the screen. Your ID number is printed on the label affixed to this letter below. Without the ID number, you will not be able to complete the survey online.

2. *Fax*: You may fax your completed survey to PERF at (202) 466-7826, attention: Corina Solé Brito.

3. *Mail*: You may mail your completed survey using the enclosed self-addressed envelope.

This survey should take you or your staff approximately 1.5 hours to complete. Again, **we request that you submit the completed survey by October ____.** If you have any questions regarding this project, please feel free to contact me or Corina Solé Brito.

Thank you for your time and assistance.

Sincerely,

Lorie Fridell, Ph.D.
Director of Research

CDC Workplace Violence Survey

ID NUMBER

Thank you for agreeing to participate in PERF's study on organizational factors affecting police victimization. Your responses will help us understand what agency-level policies and practices influence the rate at which on-duty law enforcement officers are seriously assaulted or feloniously killed. This project will result in a report that will be sent to all survey respondents.
As a reminder, all agency responses will be kept confidential.

We appreciate your contribution to this very important project.

INSTRUCTIONS

- If you have any questions regarding the survey, please call or e-mail Corina Solé Brito from PERF at (202) 454-8333, solebrito@policeforum.org.
- Do not leave any items blank.
- Please use either blue or black ink and print as neatly as possibly using only CAPITAL letters.
- There are three ways to respond to this survey. If at all possible, we prefer that you use the Internet method as it reduces your data entry time and promotes accuracy. If completing the survey online, please make sure to enter your ID NUMBER, which is located at the top right of this page. Without the ID NUMBER, you will not be able to complete the survey online.
  - An electronic version of this questionnaire is located on the Internet at: http://survey.policeforum.org/cdcsurvey.pdf
  - Fax the completed survey to the Police Executive Research Forum at (202) 466-7826.
  - Mail the completed survey to:

    Corina Solé Brito
    Police Executive Research Forum
    1120 Connecticut Ave.
    Suite 930, NW
    Washington, DC 20036

- Please retain a copy of the completed survey for your records as project staff may call to clarify responses.

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CDC Workplace Violence Survey

ID NUMBER

1. Please indicate below the total number of sworn personnel, by race/ethnicity and by sex, in your department as of January 2001 and January 2003. (Please place a zero in the column, if applicable.)

	January 2001		January 2003	
	Male	Female	Male	Female
a. White, not of Hispanic origin				
b. Black, not of Hispanic origin				
c. Hispanic				
d. American Indian/Alaskan Native				
e. Asian/Pacific Islander				
g. Other:				
Check here if data is unavailable: →	Male 2001 unavailable ☐	Female 2001 unavailable ☐	Male 2003 unavailable ☐	Female 2003 unavailable ☐
h. TOTAL(Sum of lines 'a' through 'g')				

2. What was your agency's minimum level of education for hiring of sworn officers in 2001? *Mark (■) only one response.*

☐ High school or GED

☐ Associate Degree or minimum number of credits or some college

☐ BA or BS Degree

☐ Other (please specify):

☐ No requirement

3. For each of the less-lethal weapons listed below, please indicate if *all, some* or *no* uniformed officers assigned to respond to calls for service routinely carry them *on their person.*

	Carried on Person		
	All	Some	None
Oleoresin Capsicum (OC)	☐	☐	☐
Other chemical agents	☐	☐	☐
Some type of baton	☐	☐	☐
Electrical devices (e.g., Taser, stun gun)	☐	☐	☐
Other impact devices (e.g., soft projectiles, rubber bullets)	☐	☐	☐

CDC Workplace Violence Survey

ID NUMBER

4. For each of the less-lethal weapons listed below, please indicate if *all, some* or *no* uniformed officers assigned to respond to calls for service routinely carry them *in their vehicles.*

	Carried in Vehicle		
	All	Some	None
Oleoresin Capsicum (OC)	☐	☐	☐
Other chemical agents	☐	☐	☐
Some type of baton	☐	☐	☐
Electrical devices (e.g., Taser, stun gun)	☐	☐	☐
Other impact devices (e.g., soft projectiles, rubber bullets)	☐	☐	☐

5. For each weapon, indicate both whether it is *authorized* for use by and/or *supplied* by your agency to on-duty uniformed patrol officers.

	Authorized		Supplied	
	Yes	No	Yes	No
Revolver	☐	☐	☐	☐
Semi-automatic	☐	☐	☐	☐

6. Please indicate your department's policy regarding the submission of documentation of the various types of force listed below. That is, for each, indicate whether the documentation of use of force is *mandatory, optional,* (e.g., at the discretion of a supervisor) or *not required.* If your department does not permit the use of the type of force listed, please mark "Not Permitted by Policy." *Please mark (■) only one answer per type of force.*

	Documentation of Use of Force			
Type of Force	Mandatory	Optional	Not Required	Not Permitted by Policy
Oleoresin Capsicum (OC)	☐	☐	☐	☐
Other chemical agents	☐	☐	☐	☐
Baton strikes with injury	☐	☐	☐	☐
Electrical devices (e.g., Taser, stun gun)	☐	☐	☐	☐
Other impact devices (i.e., projectile or non-projectile)	☐	☐	☐	☐
Bodily force resulting in injury or claim of injury (e.g., hitting, striking, kicking, punching)	☐	☐	☐	☐
Neck restraint/unconsciousness-rendering hold	☐	☐	☐	☐
Dog bite	☐	☐	☐	☐
Vehicle ramming	☐	☐	☐	☐
Vehicles shot at and hit	☐	☐	☐	☐
Vehicles shot at but not hit	☐	☐	☐	☐
Pointing weapon at individual	☐	☐	☐	☐

CDC Workplace Violence Survey

ID NUMBER

7. For each of the following types of force listed, please indicate the *highest level* at which these incidents would normally be reviewed for justification if *no injury occurs*.

Type of Force	Not reviewed	First-line supervisor	Command level	Administration, above command level
OC spray used	☐	☐	☐	☐
Baton strikes	☐	☐	☐	☐
Intentional firearms discharge at a person that did not hit	☐	☐	☐	☐

8. Do you have a system that tracks data on the nature and extent of force used by individual officers?

☐ Yes

☐ No (Please skip to Question 10)

9. How frequently do you review the performance of officers whose use of force exceeds a set threshold? *Please mark (■) one box to indicate the occurence of the review.*

☐ Regularly (e.g., quarterly, annually) ☐ Both regularly and when alerted

☐ When alerted ☐ As-needed basis

10. Does the department have a written policy that calls for the evaluation and/or analysis of trends in the use of force over a period of time for the purpose of identifying training, policy, equipment and/or other needs?

☐ Yes

☐ No

11. Does your department have a written policy regarding the wearing of body armor?

☐ Yes

☐ No (Please skip to Question 13)

12. What is your department's written policy regarding the wearing of body armor by sworn personnel performing the following functions? *Please mark (■) one response for each function.*

Function	Mandatory all of the time in the field	Mandatory for certain tasks or functions	Optional
Uniform patrol	☐	☐	☐
Plainclothes enforcement	☐	☐	☐
Detective operation (excluding undercover)	☐	☐	☐
Tactical operation (e.g., SWAT)	☐	☐	☐

CDC Workplace Violence Survey

ID NUMBER

13. Please indicate the ways in which your department promotes the wearing of body armor. *Please mark (■) "Yes" if the method is used and "No" if it is not for each method.*

Method	Yes	No
Through education and/or encouragement	☐	☐
Written policy	☐	☐
Daily checks	☐	☐
Periodic checks	☐	☐
Other	☐	☐

14. What proportion of the vehicles in which personnel are permitted to transport prisoners/suspects is fitted with physical barriers (e.g., shields, cages)? *Please mark (■) only one response.*

☐ 0-20%
☐ 21-40%
☐ 41-60%
☐ 61-80%
☐ 81-100%

15. For the two situations listed below, please indicate your department's policy regarding whether handcuffing adults is mandatory or optional. If no policy exists, mark (■) "No policy."

ADULTS	Mandatory, barring specified exemptions	Optional	No policy
All physical custody arrests	☐	☐	☐
Transportation of non-arrested suspects	☐	☐	☐

16. For the two situations listed below, please indicate your department's policy regarding whether handcuffing juveniles is mandatory or optional. If no policy exists, mark (■) "No policy."

JUVENILES	Mandatory, barring specified exemptions	Optional	No policy
All physical custody arrests	☐	☐	☐
Transportation of non-arrested suspects	☐	☐	☐

17. Think back to a typical Saturday with NORMAL patrol activity (i.e., no special events). On that Saturday's evening shift, what percentage of automobile patrol units were comprised of *one-person units? Please mark (■) only one response.*

☐ 0-20%
☐ 21-40%
☐ 41-60%
☐ 61-80%
☐ 81-100%

CDC Workplace Violence Survey

ID NUMBER

18. For the following situations listed below, indicate your department's policy or general practice regarding dispatcher follow-up (radio contact) with officers responding to a call. Please indicate for each situation whether follow-up by a dispatcher is *always required, required in certain situations,* or *occurs only at the officer's request.* As an example, if an officer is responding to a crime in progress, is a dispatcher ALWAYS REQUIRED per policy or practice to follow up to check on the officer? Required to follow up in some situations? Expected to follow up only at the officer's request? If no policy or general practice exists, please mark "No policy/practice." *Please mark (■) one response for each situation.*

	Always required	Required in certain situations	At officer's request	No policy/practice
Crime in progress	☐	☐	☐	☐
Completed crime calls	☐	☐	☐	☐
After a particular length of time (e.g., 5 minutes, 10 minutes)	☐	☐	☐	☐
Traffic stops	☐	☐	☐	☐

19. Do you have a CAD system that provides information to dispatchers that would be beneficial if shared with officers responding to a call (e.g., history of calls to address, previous police contacts with suspect)?

☐ Yes

☐ No

20. For each type of information related to a call listed below (e.g., history of address) indicate whether and how the information gets to the officer responding to the call. For instance, is "history of address" conveyed to the officer by the dispatcher even without a specific request from the officer? Is it conveyed by the dispatcher only if the officer requests it? Does the officer have direct access to the information through a database? For each type of information listed at left, *please mark (■) all that apply.* If the information is not available or transmitted, please check "Information not available or transmitted."

Information	Dispatch informs officer even without specific request from officer	Dispatch informs officer only if officer requests	CAD database available to officer	Information not available or transmitted
History of address	☐	☐	☐	☐
History of presence of weapons	☐	☐	☐	☐
Previous suspect contacts	☐	☐	☐	☐
Previous contacts with reporting party	☐	☐	☐	☐

CDC Workplace Violence Survey

ID NUMBER

21. For each incident type listed below, please indicate whether your department policy or practice calls for the dispatch of multiple officers (not necessarily multiple units) to the various types of calls listed. If two-officer units are standard, check "No policy/practice because two-officer units standard." *Please mark (■) one response per type of call.*

Incident type	Yes, a policy/practice exists to send two officers	No policy/practice exists to send two officers	No policy/practice because two-officer units standard
Domestic violence	☐	☐	☐
Residential alarm calls	☐	☐	☐
Disorderly person	☐	☐	☐
General disturbance	☐	☐	☐
911 hang-ups	☐	☐	☐

22. Please provide the total number of training hours recruits received at the last academy class. (Do not include any field training.)

☐☐☐☐ Hours

23. Please indicate which of the following types of instruction have been provided to some or all in-service officers during the last two years. We understand that these titles may not match your course titles and the list is not comprehensive. *Please mark (■) one response for each topic.*

Topic	In-service training: Provided	In-service training: Not provided
Community-oriented policing	☐	☐
Cultural sensitivity or diversity training	☐	☐
Domestic violence	☐	☐
Physical fitness/health/wellness	☐	☐
Physical combat skills (e.g., defensive tactics)	☐	☐
Mediation skills/conflict management	☐	☐
Use of non-lethal weapons	☐	☐
De-escalation and defusing techniques	☐	☐
Stop and approach skills	☐	☐
Use of deadly force	☐	☐
Professional ethics	☐	☐
Officer survival training	☐	☐
Communications with people with disabilities	☐	☐
Terrorism/homeland security	☐	☐

CDC Workplace Violence Survey

ID NUMBER

24. Please indicate which of the following conditions are included in your post-academy firearms training of officers. *Please mark (■) one response for each condition.*

Condition	Included	Not included
Night-time or reduced light	☐	☐
Simulated stressful condition	☐	☐
Qualification with off-duty weapon	☐	☐
Live fire (e.g., Hogan's Alley)	☐	☐
Computerized firearms training system (e.g., FATS)	☐	☐
Artificial rounds (e.g., paintball)	☐	☐

25. Which of the following organizational programs, practices or policies were implemented at your agency and by whom as of January 2001? *Please mark (■) all that apply.*

	Most patrol officers	Some patrol officers/ deputies	Special unit	Civilian personnel	None/Not applicable
Make door-to-door contacts in neighborhoods	☐	☐	☐	☐	☐
Develop familiarity with communuity leaders in area of assignment	☐	☐	☐	☐	☐
Work with citizens to identify and resolve area problems	☐	☐	☐	☐	☐
Teach residents how to address community problems	☐	☐	☐	☐	☐
Conduct crime analysis	☐	☐	☐	☐	☐
Meet regularly with community groups	☐	☐	☐	☐	☐
Work with other city agencies to solve neighborhood problems	☐	☐	☐	☐	☐

26. What is your department's general practice regarding geographic assignments for patrol officers? *Please mark (■) one response.*

☐ Permanent assignments

☐ Regular, but not permanent assignments

☐ Fluctuating assignments

CDC Workplace Violence Survey

ID NUMBER

27. Does your agency have a SWAT, SRT, ERU or other similar emergency response team? *Please mark (■) the response that best describes the makeup of your unit.*

- ☐ No (Please skip to Question 29)
- ☐ Yes, a part-time unit that consists of members from other positions within the agency who are called up as needed
- ☐ Yes, a unit consisting of full-time members
- ☐ Yes, our agency assigns members to a multi-jurisdictional unit

28. Does your department's emergency response team perform the following activities on a regular basis? *Please mark (■) all activities that apply or mark "None of the above."*

- ☐ Patrol high-crime areas
- ☐ Serve search/arrest warrants
- ☐ Respond to critical incidents (e.g., hostage negotiations, terrorist threats)
- ☐ Wear utility clothing/BDU, boots and/or helmets
- ☐ Receive training from active duty military personnel
- ☐ None of the above

29. Please describe any innovative strategies, programs or policies that your agency uses or has used to reduce assaults or felonious killings of officers.

The following questions pertaining to the chief executive of your agency are required by our funding agency, the Centers for Disease Control (CDC). For all of the projects it funds, the CDC gathers demographic information regarding the subjects of research. For this project, they consider the agency executive the "subject."

30. What is the chief executive's gender?

- ☐ Male
- ☐ Female

31. Please indicate whether the chief executive is Hispanic or Latino.

- ☐ Hispanic or Latino
- ☐ Not Hispanic or Latino
- ☐ Unknown

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CDC Workplace Violence Survey

ID NUMBER

32. Please mark (■) one box to indicate the chief executive's racial background.

- ☐ American Indian/Alaskan Native
- ☐ Asian
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Black or African American
- ☐ White
- ☐ More than one race
- ☐ Unknown

Thank you for taking the time to participate in this survey!
Please do the following:

1. Provide the information requested below. We will use this information only if necessary for purposes of calling to clarify information or learn more about one or more of your initiatives. Again, all of your responses will remain confidential.

TITLE

LAST NAME

FIRST NAME

TELEPHONE ( ) - EXT.

2. Attach, if relevant, documentation related to the innovative program(s) to which you referred in Question 29.

3. Place this survey and your attached policies in the enclosed self-addressed envelope. If this envelope has been misplaced, mail or fax your completed survey to:

Corina Solé Brito
Police Executive Research Forum
1120 Connecticut Ave.
Suite 930, NW
Washington, DC 20036
(202) 466-7826 (FAX)

OR complete the survey online at:
http://survey.policeforum.org/cdcsurvey.pdf

Please direct any questions or comments to either Corina Solé Brito (solebrito@policeforum.org) or Lorie Fridell (lfridell@policeforum.org) or at PERF (202-466-7820).

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Appendix B

Table 3: Constructs and Measures

Table 3: Constructs and Measures

This table lists all independent variables grouped under the major constructs and provides (at right) the source for the information (e.g., the PERF survey of agencies, census, UCR). Variables are designated as either External or Internal to the agency.

Major Construct	**Minor Construct**	**Measure/Source** (Survey items are listed in parentheses)
Exposure	**EXT:** Sworn officer density	UCR: Sworn personnel Census: Jurisdiction population
	EXT: Overall agency size	UCR: Total sworn and unsworn personnel
	INT: (1) Face-to-face exposure to criminal element and/or (2) Aggressiveness of PD (3) SWAT unit	UCR: Arrests per officer for Part I Crimes Survey: Swat unit (#27-28)
	EXT: Crime in the jurisdiction	Reported crimes per UCR: 1) Part I crimes 2) Gun-related crime index
	EXT: Southern subculture of violence	Census: South or not

Major Construct	Minor Construct	Measure/Source (Survey items are listed in parentheses)
	EXT: Criminogenic Conditions; Pools of Offenders	Census: 1) Percentage below poverty 2) Income inequality – Gini index 3) Median household income 4) Percent unemployed 5) Pop density 6) % Female-headed w/ children 7) Pop size 8) Residential stability 9) Racial heterogeneity 10) Percent divorced/separated of persons over age 15 11) Percent non-Hispanic black 12) Percent male 13) Percent aged 15-29
	INT: Aggressiveness, Non-aggressiveness (measured through accountability measures)	Survey: 1) Force reporting requirements (#6) 2) Supervisory review of force incidents (#7) 3) Early Warning System (#8) 4) Incident debriefing (#10)
Guardianship [All internal]	1- v. 2-person units	Survey: Percent 1 v. 2-officer vehicle patrol (#17)
	Dispatch follow-up	Survey: Policy on dispatch follow-up to check on officers (#19)
	Backup Policies	Survey: Backup policies (#21)
	Protective vests	Survey: 1) Wear policies (#11, 12) 2) Enforcement practices (#13)

Major Construct	Minor Construct	Measure/Source (Survey items are listed in parentheses)
	Protective barriers in vehicles	Survey: Vehicles of various types with barriers (#14)
	Handcuffs	Survey: When handcuffs required (#15-16)
	Training	Survey: (1) Hours of academy training (#22) (2) In-service training by topics (#23) (3) Training methods (e.g., simulation) (#24)
	Educational level of officers	Survey: Hiring requirement (#2)
	Firearms	Survey: Semiautomatic versus revolver (#5)
	Less-lethal Weapons	Survey: Less-lethal weapons carried by line personnel (#3-4)
	Communication about calls for service	Survey: Information provided to officers regarding dispatched call (#18, 20)
	Community relations/trust: Representativeness	Survey: Sworn personnel breakdowns by race (#1) Census: Residents broken down by race
	Community relations/trust: Relationship building, Community Policing	Survey: Officers given permanent assignments; level of Community Policing implementation (#25-26)
	Females on force	Survey: Percent female sworn (#1)

Appendix C

Table 6: Composite Measures

Table 6: Composite Measures

Theoretical Construct	Construct Dimension	Construct Classification	Construct Definition	Source	Source Description	Composite Measure	Composite measure coding scheme	Mean, SD, and Range of resulting measure
Guardianship	Internal	None	Minimum educational requirements for hiring	Survey Question #2	Minimal educational requirements for hiring recruits	Min_edu	HS or GED = 1 Beyond HS = 2	Mean = 1.31 Standard deviation = 0.47 Minimum value = 1 Maximum value = 2
Guardianship	Internal	Physical	Firearms and less-lethal weapons	Survey Question #3 (5-item matrix question)	Less lethal weapons carried by officers	wpn_on_person	All = 2 Some = 1 None = 0 Sum of 5 items	Mean = 4.38 Standard deviation = 1.101 Minimum value = 2 Maximum value = 7
Guardianship	Internal	Physical	Firearms and less-lethal weapons	Survey Question #4 (5-item matrix question)	Less lethal weapons carried in vehicles	wpn_in_vehicle	All = 2 Some = 1 None = 0 Sum of 5 items	Mean = 3.39 Standard deviation = 2.319 Minimum value = 0 Maximum value = 10
Exposure	Internal	Accountability	Accountability for use of force	Survey Question #6 (12-item matrix question)	Policy regarding the documentation for the use of force	force	Mandatory = 2 Optional = 1 Not Permitted by Policy = 1 Not Required = 0	Mean = 17.54 Standard deviation = 3.80 Minimum value = 8 Maximum value = 24
Exposure	Internal	Accountability	Accountability for use of force	Survey Question #7 (3-item matrix question)	Use of force level of review	Force_A	Not reviewed = 1 First line supervisor = 2 Command level = 3 Above command level = 4 Sum of 3 items	Mean = 10.02 Standard deviation = 1.88 Minimum value = 6 Maximum value = 12
Guardianship	Internal	Physical	Protective vests	Survey Questions #11 (yes/no) and #12 (4-item matrix)	Body armor policy (yes/no); requirements by personnel group	wear	No to Q #11 = 0 Optional = 1 Mandatory, but = 2 Mandatory = 3 Sum of 4 items	Mean = 7.38 Standard deviation = 3.10 Minimum value = 0 Maximum value = 12
Guardianship	Internal	Physical	Protective vests	Survey Question #13 (5-item Yes/no matrix question)	Ways the department promotes the wearing of body armor	promote	Education/encouragement = 1 Daily checks = 2 Written policy = 1 Periodic checks = 1 Other (undefined) = 0	Mean = 2.47 Standard deviation = 1.062 Minimum value = 0 Maximum value = 5

Table 6: Composite Measures

Theoretical Construct	Construct Dimension	Construct Classification	Construct Definition	Source	Source Description	Composite Measure	Composite measure coding scheme	Mean, SD, and Range of resulting measure
Guardianship	Internal	Social	One- versus two-person patrol vehicles	Survey Question #17	What % of automobile patrol units were comprised of one-person units	sat1pers	0-20% = 1 21-40% = 2 41-60% = 3 61-80% = 4 81-100% = 5	Mean = 4.75 Standard deviation = 0.742 Minimum value = 1 Maximum value = 5
Guardianship	Internal	Social	Dispatch follow-up	Survey Question #18 (4-item matrix question)	Policy or practice regarding dispatcher follow-up	Strength	Always required = 4 In certain situations = 3 At officer's request = 2 No policy/practice = 0 Sum for 4 items	Mean = 13.43 Standard deviation = 3.146 Minimum value = 4 Maximum value = 16
Guardianship	Internal	Information/ preparedness	Communication	Survey Question #20 (4-item matrix question) (Q #19 is screener)	Information provided to officer about dispatched call	Q20sum	Informed without request = 2 Only if requested = 1 Database available = 1 Information not available = 0 Sum of 4 items	Mean = 6.75 Standard deviation = 2.488 Minimum value = 0 Maximum value = 12
Guardianship	Internal	Social	Backup policies	Survey Question #21 (5-item matrix question)	Policy or practice to dispatch multiple officers	multoff	Policy exists = 1 Two-officer unit standard = 1 No policy/practice = 0 Sum of 5 items	Mean = 3.78 Standard deviation = 1.429 Minimum value = 0 Maximum value = 5
Guardianship	Internal	Information/ preparedness	Recruit Training Hours	Survey Question #22	Number of training hours in academy for recruits	trnghrs	No transformation	Mean = 669.84 Standard deviation = 232.44 Minimum value = 114 Maximum value = 1440
Guardianship	Internal	Information/ preparedness	Recruit Training Topics	Survey Question #23 (14-item matrix question)	Training topics for recruits pertaining to officer safety	Train1	Not provided = 0 Provided = 1 Sum of 14 items	Mean = 11.58 Standard deviation = 2.61 Minimum value = 1 Maximum value = 14

Table 6: Composite Measures

Theoretical Construct	Construct Dimension	Construct Classification	Construct Definition	Source	Source Description	Composite Measure	Composite measure coding scheme	Mean, SD, and Range of resulting measure
Guardianship	Internal	Information/ preparedness	Quality of Firearms Training	Survey Question #24 (6-item matrix question)	Types of firearms training provided	Train2	Not included = 0 Included = 1 Sum of 6 items	Mean = 4.70 Standard deviation = 1.23 Minimum value = 1 Maximum value = 6
Guardianship	Internal	Social	Community Relations/ Trust	Survey Question #25 (7-item matrix question)	Community programs, policies, practices	Q25sum	Most patrol officers = 3 Some patrol officers = 2 Special unit = 1 Civilian personnel = 1 None = 0 Sum of 7 items	Mean = 14.75 Standard deviation = 6.357 Minimum value = 0 Maximum value = 29
Guardianship	Internal	Social	Community Relations/ Trust	Survey Question #26	Permanent, regular or fluctuating assignments	Geo_assn	Permanent assignment = 3 Regular assignment = 2 Fluctuating assignment = 1	Mean = 2.13 Standard deviation = 0.70 Minimum value = 1 Maximum value = 3
Guardianship	Internal	Social	Community Relations/ Trust	Questions #25 and #26 Combined	Composite measure of community policing	Q25Q26SU	Sum of Q25sum (Q #25) and Geo_assn (Q #26)	Mean = 16.85 Standard deviation = 6.55 Minimum value = 1 Maximum value = 32

Appendix D

Table 8: Correlation Table for Variables in Final Model

Correlation Table for Variables in Final Model

		Average LEOKA incidents for 2000, 2001, and 2002	Percentage Female Head of Household no husband	Q7 - Use of force level of review	Arrests for part1 offenses per officer	southern subculture	Part 1 offenses involving the use of a firearm	Residential Stability (Mobility or Transient)	Income Inequality Between White and All other Races	Officer Per 100,000	Percentage Male 15-24 years old	Policies to promote wearing of body armor	Q21 - Require dispatch of multiple officers	Information provided to officer about dispatch call	Strength of guardianship - Q18 dipatcher follow-up	Percent of sworn officers who are female in 2001
Average LEOKA incidents for	Pearson Correlation	1														
	Sig. (2-tailed)															
	N	122														
Percentage Female Head of Household no	Pearson Correlation	0.510	1													
	Sig. (2-tailed)	0.000														
	N	120	120													
Q7 - Use of force level of review	Pearson Correlation	-0.110	-0.103	1												
	Sig. (2-tailed)	0.226	0.265													
	N	122	120	122												
Arrests for part1 offenses per officer	Pearson Correlation	0.073	0.089	0.140	1											
	Sig. (2-tailed)	0.429	0.340	0.129												
	N	119	117	119	119											
southern subculture	Pearson Correlation	0.224	0.153	0.010	-0.155	1										
	Sig. (2-tailed)	0.013	0.095	0.913	0.092											
	N	122	120	122	119	122										
Part 1 offenses involving the use of a firearm	Pearson Correlation	0.368	0.568	-0.099	-0.016	0.460	1									
	Sig. (2-tailed)	0.000	0.000	0.280	0.861	0.000										
	N	120	118	120	117	120	120									
Residential Stability (Mobility or	Pearson Correlation	0.075	-0.054	-0.146	0.003	0.044	-0.158	1								
	Sig. (2-tailed)	0.415	0.560	0.112	0.970	0.637	0.088									
	N	120	120	120	117	120	118	120								
Income Inequality Between White	Pearson Correlation	0.128	0.262	-0.115	0.006	0.189	0.146	0.348	1							
	Sig. (2-tailed)	0.163	0.004	0.210	0.947	0.039	0.115	0.000								
	N	120	120	120	117	120	118	120	120							
Officer Per 100,000	Pearson Correlation	0.424	0.546	-0.011	0.185	0.152	0.344	0.215	0.375	1						
	Sig. (2-tailed)	0.000	0.000	0.909	0.046	0.101	0.000	0.020	0.000							
	N	117	117	117	117	117	115	117	117	117						
Percentage Male 15-24 years old	Pearson Correlation	0.046	0.030	-0.031	0.145	-0.135	-0.068	-0.013	0.277	0.221	1					
	Sig. (2-tailed)	0.619	0.747	0.740	0.118	0.140	0.462	0.891	0.002	0.016						
	N	120	120	120	117	120	118	120	120	117	120					
Policies to promote wearing of body	Pearson Correlation	0.011	-0.007	0.144	0.156	0.129	0.074	-0.008	0.019	-0.043	-0.043	1				
	Sig. (2-tailed)	0.905	0.939	0.112	0.091	0.157	0.424	0.933	0.835	0.649	0.641					
	N	122	120	122	119	122	120	120	120	117	120	122				
Q21 - Require dispatch of multiple officers	Pearson Correlation	0.142	0.030	0.072	0.193	-0.073	-0.074	0.260	0.121	0.343	0.011	-0.106	1			
	Sig. (2-tailed)	0.118	0.747	0.432	0.036	0.425	0.421	0.004	0.186	0.000	0.904	0.247				
	N	122	120	122	119	122	120	120	120	117	120	122	122			
Information provided to officer about	Pearson Correlation	-0.107	-0.151	0.004	0.006	-0.073	-0.183	0.010	-0.065	-0.212	-0.046	0.116	0.052	1		
	Sig. (2-tailed)	0.243	0.102	0.969	0.945	0.426	0.047	0.911	0.482	0.022	0.617	0.205	0.570			
	N	121	119	121	118	121	119	119	119	116	119	121	121	121		
Strength of guardianship - Q18 dipatcher	Pearson Correlation	-0.172	-0.085	-0.014	0.017	-0.003	-0.023	-0.092	-0.055	-0.130	-0.248	0.190	0.016	0.161	1	
	Sig. (2-tailed)	0.059	0.352	0.881	0.855	0.973	0.802	0.318	0.554	0.164	0.006	0.036	0.864	0.077		
	N	122	120	122	119	122	120	120	120	117	120	122	122	121	122	
Percent of sworn officers who are female	Pearson Correlation	0.143	0.197	-0.177	-0.022	0.033	0.194	0.160	0.096	0.093	-0.018	0.275	-0.010	-0.058	0.037	1
	Sig. (2-tailed)	0.144	0.046	0.070	0.827	0.738	0.048	0.105	0.337	0.352	0.857	0.005	0.917	0.559	0.707	
	N	105	103	105	105	105	104	103	103	103	103	105	105	104	105	105

Appendix E

Table 9: Variables Used in the Analyses

Table 9: Variables Used in the Analyses

Theoretical Construct	Construct Dimension	Construct Classification	Construct Definition	Source	Source Description	Operationalized Variable name
Exposure	Internal	Accountability	Accountability for use of force	Survey Question #7 (3 item matrix question)	Use of force level of review	force_A
Exposure	Internal	Aggressiveness	Aggressiveness, Face-to-Face exposure	NIBRS/UCR	Arrests for part1 offenses per officer	arrests_per_officer
Exposure	External	Criminogenic conditions	Gun Crime	NIBRS/UCR	Number of Part I Index offenses involving the use of a firearm	firearm
Exposure	External	Criminogenic conditions	Economic disadvantage	Census	Percent of female headed households with children	poverty
Exposure	External	Criminogenic conditions	Structural disadvantage	Census	Income inequality between white and all other races	inceq2
Exposure	External	Criminogenic conditions	Structural disadvantage	Census	Residential Stability	stabili
Exposure	External	Criminogenic conditions	Subculture of violence	Census	Southern subculture of violence	Southern
Exposure	External	Criminogenic conditions	Crime prone age cohort	Census	Percent Male 15-24 years old	permale2
Exposure	External	Criminogenic conditions	Officers per capita	UCR/Census	Number of officers in jurisdiction per 100,000 population	Offcap

Theoretical Construct	Construct Dimension	Construct Classification	Construct Definition	Source	Source Description	Operationalized Variable name
Guardianship	Internal	Social	Dispatch follow-up	Survey Question #18 (4 item matrix question)	Policy or practice regarding dispatcher follow-up	strength
Guardianship	Internal	Physical	Protective vests	Survey Question #13 (2 item matrix question)	Policies to promote wearing of body armor	promote
Guardianship	Internal	Information/preparedness	Communication	Survey Question #20 (4 item matrix question)	Information provided to officer about dispatch call	Q20sum
Guardianship	Internal	Other	Percent of female officers	Survey Question #1	Total number of sworn female personnel in department	pctfemoff

Appendix F

Table 24: Results of the negative binomial model excluding skewed cases

Type of Measure	Variable Name	Variable Definition	b	z	P>z	%
Exposure – Internal	FORCE	Use of force level of review	-0.0714	-1.288	0.198	-6.9
Exposure – Internal	**ARRESTS**	**Number of Part I arrests per officer**	**-0.0672**	**-2.826**	**0.005**	**-6.5**
Exposure – External	**FEMHOUSE**	**Percentage of female headed households in the jurisdiction**	**0.0694**	**2.261**	**0.024**	**7.2**
Exposure – External	SOUTHERN	Southern state (yes or no)	0.0362	0.161	0.872	3.7
Exposure – External	FIREARM	Firearm index of number of Part I UCR offenses involving a firearm	0.027	0.603	0.547	2.7
Exposure – External	STABILI	Residential stability	0.0321	0.107	0.915	3.3
Exposure – External	INCEQ2	Income inequality between whites and all other races	-0.9785	-1.761	0.078	-62.4
Exposure – External	**OFFCAP**	**Number of officers in jurisdiction per 100,000 people**	**-0.0035**	**-2.062**	**0.039**	**-0.4**
Exposure – External	PERMALE2	Percent of males in the jurisdiction aged 15 to 24	0.0374	1.051	0.293	3.8
Guardianship	**PROMOTE**	**Agency use of policies that promote the use of body armor**	**0.3167**	**3.336**	**0.001**	**37.3**
Guardianship	MULTOFF	Number of different type of offenses that the agency requires multiple officers to respond to	0.1393	1.749	0.08	14.9
Guardianship	Q20SUM	Information provided to officer about dispatch call	-0.0543	-1.387	0.165	-5.3
Guardianship	STRENGTH	Strength of guardianship	0.0126	0.396	0.692	1.3
Guardianship	PCTFEMOFF	Percent of sworn female officers in 2001	-0.0055	-0.377	0.706	-0.5

Table 25: Variables in the negative binomial model excluding skewed cases

Type of Measure	Variable Name	Variable Definition	N	Mean	SD	Min	Max
Dependent variable	RNAVLEOKA	Rounded average count of LEOKA incidents in a jurisdiction for 1999-2001	99	9.47	10.64	0	42
Exposure – Internal	FORCE	Use of force level of review	99	9.99	1.95	6	12
Exposure – Internal	ARRESTS	Number of Part I arrests per officer	99	6.85	4.03	0.16	19.59
Exposure – External	FEMHOUSE	Percentage of female headed households in the jurisdiction	99	11.01	4.58	2.86	27.34
Exposure – External	SOUTHERN	Southern state (yes or no)	99	0.46	0.5	0	1
Exposure – External	FIREARM	Firearm index of number of Part I UCR offenses involving a firearm	99	4.75	3.15	0.22	14.46
Exposure – External	STABILI	Residential stability	99	0.45	0.37	0	2.12
Exposure – External	INCEQ2	Income inequality between whites and all other races	99	1.34	0.19	0.86	2
Exposure – External	OFFCAP	Number of officers in jurisdiction per 100,000 people	99	150.42	76.24	21.57	363.22
Exposure – External	PERMALE2	Percent of males in the jurisdiction aged 15 to 24	99	7.71	2.77	4.7	23.39
Guardianship	PROMOTE	Agency use of policies that promote the use of body armor	99	2.52	1.07	0	5
Guardianship	MULTOFF	Number of different type of offenses that the agency requires multiple officers to respond to	99	3.75	1.47	0	5
Guardianship	Q20SUM	Information provided to officer about dispatch call	99	6.85	2.54	0	12
Guardianship	STRENGTH	Strength of guardianship	99	13.43	3.17	4	16
Guardianship	PCTFEMOFF	Percent of sworn female officers in 2001	99	10.55	7.18	0.99	44.72

Table 26: Comparison of models with and without skewed data

Variable	ALL	MINUS
FEMHOUSE	0.06632	0.06937
	0.027	0.024
SOUTHERN	0.01560	0.03618
	0.943	0.872
FIREARM	0.02095	0.02704
	0.630	0.547
FORCE	-0.06505	-0.07144
	0.229	0.198
ARRESTS	-0.06710	-0.06715
	0.004	0.005
PROMOTE	0.32472	0.31672
	0.001	0.001
MULTOFF	0.12301	0.13931
	0.110	0.080
Q20SUM	-0.04840	-0.05426
	0.204	0.165
STRENGTH	0.01588	0.01261
	0.595	0.692
PCTFEMOFF	-0.00651	-0.00546
	0.646	0.706
STABILI	0.04090	0.03210
	0.890	0.915
INCEQ2	-0.96446	-0.97848
	0.078	0.078
OFFCAP	-0.00341	-0.00351
	0.041	0.039
PERMALE2	0.03468	0.03738
	0.322	0.293
CONSTANT	-5.50846	-5.46059
	0.000	0.000

Appendix G

PHS-2590

Principal Investigator/Program Director (Last, First, Middle):

Inclusion Enrollment Report

This report format should NOT be used for data collection from study participants.

Study Title: The Impact of Agency Policies and Practices on Violence Against Police

Total Enrollment: 125 **Protocol Number:**

Grant Number: 5 R01 OH007946-02

PART A. TOTAL ENROLLMENT REPORT: Number of Subjects Enrolled to Date (Cumulative) by Ethnicity and Race

Ethnic Category	Sex/Gender			
	Females	Males	Unknown or Not Reported	Total
Hispanic or Latino	0	3	0	3 **
Not Hispanic or Latino	3	118	0	121
Unknown (individuals not reporting ethnicity)	0	0	0	
Ethnic Category: Total of All Subjects*	3	121		124 *
Racial Categories				
American Indian/Alaska Native	0	0	0	
Asian	0	0	0	
Native Hawaiian or Other Pacific Islander	0	0	0	
Black or African American	0	8	0	8
White	3	113	0	116
More Than One Race	0	0	0	
Unknown or Not Reported	0	0	0	
Racial Categories: Total of All Subjects*	3	121		124 *

PART B. HISPANIC ENROLLMENT REPORT: Number of Hispanics or Latinos Enrolled to Date (Cumulative)

Racial Categories	Females	Males	Unknown or Not Reported	Total
American Indian or Alaska Native	0	0	0	
Asian	0	0	0	
Native Hawaiian or Other Pacific Islander	0	0	0	
Black or African American	0	0	0	
White	0	3	0	3
More Than One Race	0	0	0	
Unknown or Not Reported	0	0	0	
Racial Categories: Total of Hispanics or Latinos**		3		3 **

* These totals must agree.
** These totals must agree.