Controlling Police Decisions to Use Deadly Force: Reexamining the Importance of Administrative Policy

Michael D. White

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Prior research has sought to identify appropriate mechanisms that can effectively control police officers' decisions to use deadly force. Using data from Philadelphia for a period of more than two decades, this article employs interrupted time series analysis (ARIMA) to examine the impact of two changes in administrative policy on monthly levels of deadly force in Philadelphia. Findings support prior deadly force research suggesting that administrative policy can be an effective deadly force discretion control, but the Philadelphia experience indicates that formal policy can be outweighed by the personal philosophies and policies of the chief, and that its impact is limited to elective encounters.

In Davis' (1971) seminal piece, *Discretionary Justice: A Preliminary Inquiry*, he argues that administrative policy is the best method for controlling discretion. "The procedure of administrative rulemaking is . . . one of the greatest inventions of modern government" (Davis, 1971, p. 65). Since that time, administrative policy has been used to address a number of justice decision-making problems including pretrial release and detention, charge bargaining, and sentencing practices (see Gottfredson & Gottfredson, 1988; McCoy, 1993; Walker, 1993). Administrative policy has also been used as a discretion control for police field behavior in a number of different areas, such as the handling of domestic violence calls (e.g., mandatory arrest policies), high-speed pursuits, and the use of force, including deadly force. This article investigates the impact of changes in administrative policy on decisions to use deadly force.

Prior research on the police decision to use deadly force highlights three sets of variables that can influence police shooting behavior: environmental, organizational and situational. Fyfe (1987) argues that environmental, organizational, and situational variables comprise the external and internal police working environments. The external environment includes factors outside of the police organization, such as crime rates and degree of danger to the police, as well as situational variables such as citizens' demeanor or the pres-

MICHAEL D. WHITE: Research Associate, Crime and Justice Research Institute.

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ence of a weapon (Fyfe, 1987). The internal working environment refers to factors within the police organization but is best described as the degree of license given to police officers to use deadly force (via administrative policy, informal peer group norms, policies and philosophies of the chief, etc.). Prior deadly force research suggests that the internal police working environment, particularly administrative policy, is an effective control of police shooting behavior, if properly enforced (Fyfe, 1979, 1988; Gain, 1971; Geller & Scott, 1992; White, 1999).

This research employs a conceptual model that modifies Fyfe's (1987) work by isolating the situation as a distinct category of influences that play a critical mediating role in the decision-making process, affecting how the officer perceives the situation and determines the appropriate response to the suspect's actions (see Figure 1). White (1999) found that the relative importance of internal and external working environments and situational variables varies based on whether the shooting is elective or nonelective. A nonelective shooting is characterized by a police officer using deadly force to protect against the threat of imminent serious injury or death. In nonelective encounters, situational factors largely dictate an officer's decision to use deadly force and outweigh the relative influence of the working environments. As the amount of danger facing the police officer generally decreases, decisions to use deadly force are more elective.[1] The internal and external working environments play a more prominent role in elective encounters, whereas situational factors are less important (White, 1999).

This article examines the impact of the internal police working environment on police shooting behavior from a different perspective, using interrupted time series analysis (ARIMA) and over two decades of shooting data (1970-1992) to test the impact of internal changes on monthly levels of deadly force in Philadelphia. Two changes in the internal police working environment are examined: the removal of a restrictive administrative deadly force policy in 1974 and the reinstatement of a restrictive administrative policy in 1980.

This article seeks to improve our understanding of the role and potential importance of discretion control mechanisms in the internal police working environment for police shooting behavior. Examination of the impact of the different types of methods for controlling use of deadly force is important because each method implies a certain understanding of how deadly force discretion operates. Thus, analysis of the impact of control measures, or the absence of them, not only sheds light on the effectiveness of control policies but also provides indirect evidence of the nature of deadly force use and the influence of police working environments.

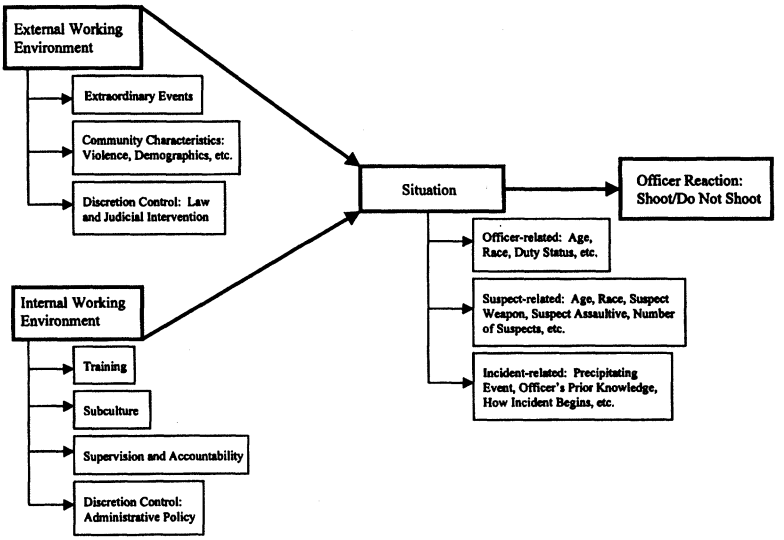

Figure 1: The Research's Conceptual Model

Prior Research on Deadly Force and Administrative Policy

Until the past 30 years, most departments gave their officers little guidance with regard to when to use deadly force. The President's Commission on Law Enforcement and the Administration of Justice (1967) expressed its concern over the absence of administrative guidance with regard to deadly force. Chapman (1967) examines deadly force policies and cites examples of policies that are ambiguous at best:

- Never take me out in anger; never put me back in disgrace.
- Leave the gun in the holster until you intend to use it.
- It is left to the discretion of each individual officer when and how to shoot.

Unclear and widely discretionary administrative policies were commonplace in police departments because most jurisdictions adhered to the "fleeing felon" rule. The "fleeing felon" rule allows police officers to use whatever force is necessary, including deadly force, to effect an arrest. Consequently, there was little reason for police departments to develop clear, restrictive administrative policies governing their officers' use of deadly force.

In the early 1970s, a number of urban departments developed administrative policies and sought to create professional standards to guide officers' dis-

cretion. A number of contemporary factors contributed to the movement to tighten restrictions on police use of deadly force, including the American Bar Foundation's series of studies on the administration of criminal justice in America (American Bar Association, 1956), the President's Commission on Law Enforcement and Administration of Justice (1967), the National Advisory Commission on Civil Disorders (1968), and a developing body of research (i.e., Bittner, 1970; Fyfe, 1978, 1979).[2]

Implementation of more practical and restrictive deadly force policies in the 1970s and 1980s allowed for a wealth of social research that studied its effects on the prevalence and frequency of deadly force incidents. In 1972, the New York City Police Department created new, more restrictive guidelines governing the use of deadly force. Fyfe (1978, 1979) examined the impact of that directive on the frequency, nature, and consequences of shootings from 1971 to 1975. His analysis showed significant decreases (after the directive was implemented) in both the use of deadly force and in officer injury and death (Fyfe, 1979). Administrative policies demonstrated similar effects on police shooting behavior in Oakland, Omaha, Kansas City, Los Angeles, Dallas, Memphis, and Philadelphia (Gain, 1971; Geller & Scott, 1992).[3]

Fyfe (1988) concludes that organizational philosophies, expectations, and policies heavily influence the use of deadly force, and levels of community violence and variations in the law only marginally affect police shooting behavior (see also Blumberg, 1989; Reiss, 1980; Walker, 1993). Walker (1993) notes,

> These data support the conclusion that administrative rules have successfully limited police shooting discretion, with positive results in terms of social policy. Fewer people are being shot and killed, racial disparities in shootings have been reduced, and police officers are in no greater danger because of these restrictions. Officers appear to comply with the rules. This is an accomplishment of major significance and one that provides a model for other discretion control efforts. (p. 32)

PHILADELPHIA'S EXPERIENCE WITH ADMINISTRATIVE POLICY

In 1973, the Pennsylvania state legislature modified its statute governing justifiable homicide, essentially abandoning the fleeing felon rule for the much more restrictive defense-of-life standard.[4] The defense-of-life standard permits the use of deadly force only in response to an immediate threat to life or to apprehend violent felons who will pose a threat unless arrested immediately.

The change in Pennsylvania law was, in part, an effort by state government to exercise control over the shooting behavior of Philadelphia police officers. The Philadelphia Police Department (PPD) changed its policy to conform to this law, but the degree to which this policy was followed and enforced is questionable. Certainly, this restrictive shooting policy did not follow ex-Police Commissioner/Mayor Frank Rizzo's personal philosophy on the treatment of criminals: *spacco il cappa*, in his words, or "to bust their heads" ("It was a long and colorful career," 1991).

In December 1974, the PPD removed all ambiguity by abolishing the restrictive policy it had put in place a year earlier. Police Commissioner Joseph O'Neill and Mayor Rizzo argued that the State Legislature had failed to adequately define *forcible* or *violent* felonies and that, until they did so, the state law was invalid (United States Civil Rights Commission, 1979, pp. 181-183, 215-218). Consequently, the department abolished the restrictive deadly force policy, and the PPD operated without a formal policy for the next 6 years.

By the end of 1979, Frank Rizzo had served two terms as mayor, which was all that the city's charter permitted. Subsequently, Bill Green won the mayoral election in 1979, and as part of Green's effort to ease racial tensions, he brought in a reform police commissioner (Morton Solomon) who initiated several organizational changes, including vigorously enforced restrictions on the use of deadly force.[5] The new administrative policy adopted in 1980 authorized officers to use deadly force in the following circumstances:

1. In defense of life; and
2. When no alternative exists, to apprehend fleeing felons known to be in possession of deadly weapons that they have used or threatened to use, or who have committed forcible felonies (such as murder, voluntary manslaughter, rape, robbery, kidnapping, involuntary deviant sexual intercourse, arson, burglary, and aggravated assault).

The 1980 policy was essentially the same administrative policy that the PPD operated under through the end of 1974 when Rizzo abolished it. Although the policy did not meet the immediacy requirement of the defense-of-life standard, it certainly represented a quantum change from the nonexistent policy of the mid-1970s.

DATA AND METHOD

This study examines 982 police shootings in Philadelphia over a period of more than two decades, from 1970 through 1992. The data consist of actual police reports and investigations of all PPD shootings resulting in injury or

death from 1970 to 1978 and from 1987 to 1992; and summary data (describing annual injurious firearms discharge frequencies) from 1979 to 1986.[6] Because the PPD did not require reports or investigations into noninjurious shootings from 1970 to 1979, the primary focus of analysis is shootings causing injury or death.[7]

INTERRUPTED TIME SERIES ANALYSIS (ARIMA)

The article uses interrupted time series analysis (ARIMA) to test the impact of changes in the internal police working environment on levels of deadly force in Philadelphia. Time series analysis attempts to account for or explain the values in the dependent variable, monthly levels of deadly force in this case (Babbie, 1992).[8] There are two components to interrupted time series analysis. First, the analysis models the dependent variable (police shootings) as a time series, making inferences about the underlying process in the data (McDowall, McCleary, Meidinger, & Hay, 1980).[9] The second stage of ARIMA is called impact assessment.[10]

> For all practical purposes, the time series analyst is interested in "predicting the future" of a social process, that is, in measuring the past "change" in a social process to extrapolate that "change" into the future. (McCleary & Hay, 1980, p. 23)

THE LIMITATIONS OF CRIMINAL JUSTICE DATA FOR INTERRUPTED TIME SERIES ANALYSIS

Because this research relies only on police shooting data, and it is simply not possible to control for all events occurring in the city during the study period, there is the opportunity for uncontrolled events to influence deadly force (e.g., history as a threat to validity). Ideally, this study would conduct a multivariate time series analysis to address the historical threat to validity, using other dependent variables such as arrests for violent crime, city population levels, and homicides. The research would chart changes in the other dependent variables over time, and their influence on levels of deadly force would become much more clear. However, in criminal justice research these data are simply not available at the level of detail required for time series analysis.

White (1999) offered several measures to address this weakness in the available data and each serves equally well here. White's (1999) efforts to address the historical threat to validity include acknowledging the problem and presenting a timeline of critical events, describing annual plots of several important environmental influences and comparing them to levels of deadly force, and testing the impact of one historical event on police shooting behavior, in essence, testing a historical threat to validity.[11] Also, this study of deadly

force is framed in the context of a discretion problem, and emphasis is placed on those events that represent direct attempts to control or influence police shooting behavior.[12]

The article addresses several research questions:

Do administrative philosophy and policy make a difference in deadly force decision making?
Did the abolition in 1974 of a restrictive deadly force policy affect the frequency and nature of police shootings in Philadelphia?
Did the establishment in 1980 of a restrictive deadly force policy affect the frequency of police shootings in Philadelphia?

First, the article examines the impact of the abolition of a restrictive policy in 1974. Prior research focusing on the impact of administrative policy has almost exclusively examined implementation of more restrictive policies. This analysis studies deadly force after the removal of a restrictive policy. Because this research first examines policy change in the opposite direction, it tests whether Philadelphia police officers used deadly force more freely and frequently when the department removed the restrictive policy. The natural assumption in this line of thinking is that the restrictive administrative policy was controlling police shooting behavior in the first place, and that removal of the control gave police unfettered discretion in the use of their firearms. Given findings from prior research, the assumption of effective control and the expectation that shootings (at least, elective shootings) will become more frequent following the policy change are certainly reasonable.

The second important question involves the potential impact of a subsequent new, restrictive policy that the department implemented after nearly 6 years of operating with what appeared to be no formal policy. Again, findings from this analysis are tied to the assumption of control above. Their behavior during the policy-free period largely determines the impact of the 1980 policy change (i.e., whether PPD used deadly force more freely and frequently during the six year period with no policy). Essentially, at this point, there is an assumption of *lack of control* that seems within reason.

ANALYSIS AND RESULTS

MODEL IDENTIFICATION

Figure 2 shows that levels of deadly force varied substantially over time. Incident levels remained high throughout most of the 1970s before decreas-

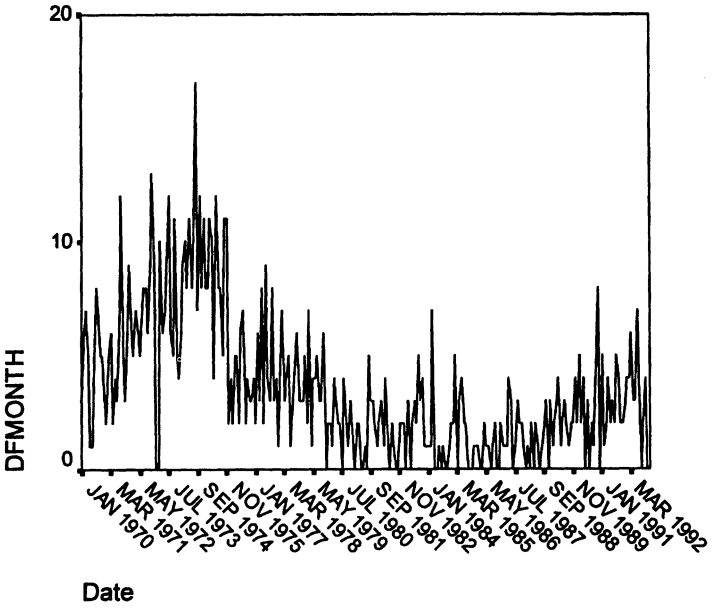

Figure 2: Monthly Totals of Police Shootings in Philadelphia, 1970-1992

ing and remaining at a low level through the early and mid-1980s. However, deadly force incidents started to increase again at the end of the time period.

The goal of the identification phase is to identify a tentative model for the time series. ARIMA analysis identified the model (0,1,1)(0,1,1) with regular and seasonal moving averages (note: the periodicity is 12 months). The presence of seasonality indicates that levels of deadly force vary month by month, but that there are patterns within that variation (e.g., shootings typically are more frequent during summer months). The other components are indicative of which factors affect each data point of the dependent variable.[13]

TESTING THE IMPACT OF THE 1974 POLICY CHANGE ON USE OF DEADLY FORCE

ARIMA analysis examines the 1974 policy change by adding a dummy variable (called *policy1*) to the existing model, using an abrupt, temporary pattern. The analysis selected a temporary pattern because the department reinstated a restrictive policy in April 1980. The ARIMA output shown in

TABLE 1: Impact Assessment of Model (0,1,1)(0,1,1)12 With *policy1* as an Abrupt, Temporary Intervention

Model: MOD_22
Split group number: 1 Series length: 274
Number of cases skipped at end because of missing values: 2
Number of cases containing missing values: 37
Number of rejected data values due to transform: 39
Kalman filtering will be used for estimation.

Conclusion of estimation phase.
Estimation terminated at iteration number 6 because sum of squares decreased by less than .001 percent.

Final Parameters

Number of residuals:	224
Standard error:	.54413133
Log likelihood:	-197.17052
AIC:	400.34104
SBC:	410.57598

Analysis of Variance

	DF	*Adjusted Sum of Squares*	*Residual Variance*
Residuals	221	75.587036	.29607891

Variables in the Model

	B	*SEB*	*T-Ratio*	*Approximate Probability*
MA1	.86702925	.03257303	26.618013	.00000000
SMA1	.96045906	.10424505	9.213474	.00000000
POLICY1	.45699471	.20765568	2.200733	.02879025

NOTE: AIC = Aikaike information criterion; SBC = Schwartz Bayesian criterion; DF = degrees of freedom; MA1 = moving average, first order; SMA1 = seasonal moving average, first order.

Table 1 includes an abrupt, temporary intervention lasting for 11 months (Dec. 1974-Nov. 1975).[14]

The important indicators of the impact of the policy change are its probability value and the Aikaike information criterion (AIC) and Schwartz Bayesian criterion (SBC) values. Table 1 shows that the independent variable has a significant probability level and the AIC value has decreased. The SBC value has not changed.[15] Thus, it would seem that the abolition of the restrictive administrative policy in 1974 was followed by a statistically significant increase in police shootings.[16]

A CLOSER LOOK AT DEADLY FORCE INCIDENTS AND THE 1974 POLICY CHANGE

Table 2 illustrates the types of shootings before and after the policy change according to a danger-based typology, which classifies incidents based on the type of assault against the officer.[17] There appears to be a significant change in types of deadly force incidents following the intervention: Specifically, the percentage of nonassaultive incidents was nearly halved (26.1% through December 10, 1974; 15.2% for December 11, 1974, through December 31, 1978).

Although the percentage of physical assaults remained unchanged, the percentage of each type of nonelective encounter (gun assault, knife assault, and other weapon assault) increased. The monthly rate per 1,000 officers for most types of shootings decreased, particularly nonassaults (from .22 to .09). Findings here contradict time series results indicating an increase in use of deadly force and suggest that the PPD engaged in many fewer elective incidents (shootings of either physically assaultive or nonassaultive suspects) after the policy change.

These findings are supported by additional ARIMA analyses involving a slightly different version of the dependent variable, the bi-monthly percentage of elective shootings.[18] This time series uses data from 1970 to 1978 only and seeks to determine if the impact on deadly force generally is associated with elective shootings, nonelective shootings, or both. Results here found a significant decrease in elective shootings (like the danger-based typology), suggesting that the increase in levels of deadly force associated with the removal of the restrictive policy involved an increase in nonelective shootings. Essentially, nonelective shootings increased, but elective shootings did not. Consequently, the PPD officers showed more restraint in their decisions to use deadly force after the restrictive administrative policy was abolished, although nearly one third of shootings still involved elective encounters. Perhaps more important, these data suggest that the PPD officers were not following the administrative policy prior to its removal, and the department was not holding them accountable for their violations. As a result, it appears as if the assumption of control discussed previously may have been inaccurate, as the pattern of engaging in elective police shootings existed both before and after the policy change (although slightly less frequently after).

TESTING THE IMPACT OF THE 1980 POLICY CHANGE ON USE OF DEADLY FORCE

A dummy variable (called *policy2*) represents the April 1980 policy change, using an abrupt, temporary pattern. The intervention pattern that had

TABLE 2: Classifying Deadly Force Incidents Before and After the 1974 Administrative Policy Change

	1 Jan 1970 - 10 Dec 1974[a]		*11 Dec 1974 - 31 Dec 1978*	
Gun assault	40.1% (158)	0.33	42.8% (107)	0.27
Knife assault	10.7% (42)	0.09	16.4% (41)	0.10
Other weapon assault	8.6% (34)	0.07	11.2% (28)	0.07
Physical assault	14.5% (57)	0.12	14.4% (36)	0.09
Nonassault	26.1% (103)	0.22	15.2% (38)	0.09
	$n = 394$		$n = 250$	

a. Each shooting category is represented three ways: the percentage of the total, the total number (n), and the monthly rate per 1,000 officers. The monthly rate per 1,000 officers is calculated by dividing the number of shootings by the mean number of sworn personnel during the years of interest, multiplying that figure by 1,000, and dividing it by the number of months.

the greatest statistical influence on the existing model is an abrupt, temporary pattern lasting 116 months or 9 years and 8 months (hardly temporary).[19] Again, the important indicators of the impact are its probability value, which is significant, and the AIC and SBC values. The AIC value has decreased, but the SBC value has not.[20] Despite the increase in the SBC value, this analysis indicates that the April 1980 change in administrative policy led to an immediate and substantial decrease (note the negative B weight) in the use of deadly force by the PPD officers, an impact lasting for 10 years. This finding supports prior research suggesting that administrative policy can be an effective deadly force discretion control.

CHANGING DEADLY FORCE PATTERNS AFTER 1989

Time series analysis of the 1980 deadly force policy change shows that the impact of the intervention ends in November 1989. This finding suggests that the nature and/or frequency of police shootings changed during that month. Table 3 classifies police shootings in two periods using the danger-based typology: January 1987 to November 1989 (the end of the intervention's impact, according to ARIMA findings) and December 1989 to December 1992 (the period following the impact).[21]

Several things are notable when examining Table 3. First, the end of the impact breaks down the last 6 years of the study period into approximately equivalent 3-year periods. However, the second period (December 1, 1989 through December 31, 1992) experienced almost twice as many shooting incidents: 107 compared to 57. In addition, the later period reflects a substantial increase in the percentage of gun assaults, about 15% (62% compared to

TABLE 3: Classifying Deadly Force Incidents Before and After the Period of Impact for the 1980 Intervention

	1 Jan 1987 - 30 Nov 1989		*1 Dec 1989 - 31 Dec 1992*	
Gun assault	45.6% (26)	0.18	61.7% (66)	0.28
Knife assault	22.8% (13)	0.06	10.3% (11)	0.05
Other weapon assault	12.3% (7)	0.03	14.0% (15)	0.06
Physical assault	12.3% (7)	0.03	6.5% (7)	0.03
Nonassault	7.0% (4)	0.02	7.5% (8)	0.03
	n = 57		*n* = 107	

NOTE: Each shooting category is represented three ways: the percentage of the total, the total number (n), and the monthly rate per 1,000 officers. The monthly rate per 1,000 officers is calculated by dividing the number of shootings by the mean number of sworn personnel during the years of interest, multiplying that figure by 1,000, and dividing it by the number of months.

46%). Similarly, the percentages of knife assaults and physical assaults dropped by 13% and 5%, respectively (note the small number of cases).[22] The most notable change in monthly rates per 1,000 officers occurs with gun assaults, where the rate increases from 0.18 to 0.28.

This analysis reveals notable shifts in the nature and frequency of shootings after the end of the impact of the 1980 policy change. It is interesting that the shift occurs with nonelective incidents, particularly gun assaults, where officers generally have no other options at their disposal and are facing grave danger. This analysis indicates that as the 1990s began, Philadelphia police officers were getting involved in a much greater number of incidents where their lives were in immediate danger. Findings also suggest that the discretion control policies of the internal working environment, most notably administrative policy, may not be effective controls of nonelective shooting incidents. Specifically, gun assaultive deadly force incidents increased substantially despite the restrictive administrative policy that was in place.

Further analysis shows that post-1989 incidents differed in three additional important ways. First, the data indicate that officers involved in incidents after 1989 are younger and more heavily armed than before.[23] Second, post-1989 incidents appear more likely to be drug-involved. From 1987 to November 1989, no officers assigned to the Stakeout unit and only one officer assigned to Narcotics discharged their firearms.[24] From December 1989 through the end of the study period, 4 officers assigned to Stakeout and 11 officers assigned to Narcotics used deadly force (nearly one fifth of all shootings post-1989). In addition, the well-documented link between drug dealing and gun violence, the well-publicized nationwide *War on Drugs*, and the substantial increase in gun assaults against police officers after 1989 seem to indicate an increase in drug-involved shooting incidents.

Third, precipitating events may have changed as well after 1989. The data indicate that the percentage of incidents beginning with an officer observing some behavior or acting on citizen information increased by 13%. Incidents beginning proactively (i.e., officer witnessing suspicious behavior and intervening) may be more likely to end in violence because the officer starts the encounter at a much more critical stage. The suspect may still be engaged in the commission of a crime, and his focus is on successfully completing the act, rather than escaping. Officers beginning incidents reactively (i.e., responding to radio calls) often find that the suspect is no longer at the scene, or if still there, the crime is more likely to be completed and his focus is on escape.[25]

Last, important shifts occurred during the late 1980s in the annual rates of sworn police personnel, arrests for violent felony offenses, and homicides per 100,000 residents. Table 4 shows that the rate of sworn police per 100,000 residents increased throughout the 1970s, peaking at 473 officers in 1978, before dropping during the 1980s (from 443 in 1980 to 366 in 1988). However, starting in 1989, there is an increase in the annual rate of sworn personnel per 100,000 residents for the first time in more than a decade.

Arrests for violent felony offenses serve as a good measure of police exposure to danger. Theoretically, as police exposure to danger increases, so does the likelihood that officers will resort to violence to settle police-citizen encounters. The annual rate of arrests for violent felony offenses had been declining throughout the latter half of the 1980s, particularly after 1982. In fact, the annual rate of arrests bottomed out in 1989 (at 604), but then quickly rose in 1990 and 1991, before dropping slightly in 1992. Increases in violent felony arrests in 1990 and 1991, and the concomitant increase in police exposure to danger, may have contributed to the shifting patterns in use of deadly force in late 1989.

Similarly, homicides are a good measure of public violence.[26] Table 4 shows that, from 1981 to 1988, the annual homicide rate per 100,000 residents remained fairly stable, ranging from 16 to 22. In 1989, however, the annual rate jumped to 29 homicides per 100,000 residents, then peaked at 31 in 1990 before dropping off in 1991 and 1992, although the rate was still at its highest level since 1980. This increase in homicides also may have contributed to the change in deadly force patterns during this time.

More likely, all of these events (as well as other events not mentioned) played a role in the noted shifts in the frequency and nature of deadly force incidents. Nevertheless, the 1980 administrative policy, which placed restrictions on the use of deadly force, may have influenced police shooting behavior for nearly a decade. Although there was a larger effort to reform the police department, the data suggest that the administrative policy served to reduce

TABLE 4: Annual Rates of Sworn Police Personnel, Arrests for Violent Felony Offenses, and Homicides per 100,000 Residents in Philadelphia, 1970-1992

Year	Police Shootings	Sworn Police Personnel	Violent Felony Arrests	Homicides
1970	2.82	399.26	324.54	18.06
1971	3.28	393.16	414.08	22.63
1972	4.70	431.79	397.71	21.79
1973	4.01	429.57	396.28	23.01
1974	6.35	447.70	471.65	24.11
1975	5.40	445.48	536.39	23.97
1976	2.63	456.00	459.41	18.96
1977	3.01	464.86	450.15	18.34
1978	2.71	473.23	489.32	20.23
1979	2.46	462.73	506.58	22.54
1980	1.49	443.38	564.31	25.99
1981	1.13	442.96	615.24	21.52
1982	1.07	437.14	640.57	19.67
1983	1.54	426.50	608.97	18.44
1984	0.84	424.28	614.08	15.77
1985	1.22	424.73	615.27	16.71
1986	0.61	417.47	638.18	20.85
1987	1.15	406.10	641.40	20.49
1988	0.91	365.84	607.08	22.39
1989	1.63	379.07	604.29	28.81
1990	1.96	406.67	649.73	31.53
1991	2.21	406.41	657.11	27.75
1992	2.35	398.07	644.77	26.94

the violence that marked the 1970s. Even as drugs and violence ravaged many cities throughout the 1980s (such as Miami, Los Angeles, and New York), the PPD managed to reduce its use of deadly force. It was not until the beginning of the 1990s that levels of police violence started to increase by noticeable amounts.

CONCLUSIONS

Impact assessment findings indicate that the 1974 policy change led to a significant increase in police shootings. Additional analyses indicate that the percentage of nonassaultive incidents decreased after the removal of the administrative policy, suggesting that the increase in deadly force is associ-

ated with nonelective shootings. Thus, the PPD used deadly force with more restraint when they operated with no formal administrative policy.

The official removal of the restrictive departmental policy in December 1974 had a smaller than expected impact on police shooting behavior in elective encounters (in the opposite direction) because it appears that the policy had been routinely superseded by the police leadership's customs and informal practices in the months and years prior to the change. Officers had been engaged in a pervasive pattern of unnecessary, excessive use of force in the years before the policy change. Essentially, findings suggest that few noticed when the department formally removed the policy because they were not adhering to it anyway.

The PPD did not sanction officers administratively because their police shooting behavior was in accordance with the personal policies and philosophies of ex-Commissioner/Mayor Rizzo (i.e., to "bust their heads"), which established an organizational environment that permitted officers to use deadly force freely and without consequence, despite the restrictive departmental policy and state law. Mayor Rizzo and Commissioner O'Neill refused to hold officers accountable for their use of firearms.[27]

Consequently, the experience of PPD during this early part of the 1970s illustrates how the personal policies and philosophies of the commissioner (and, in this case, the mayor also) can outweigh official departmental policy. The police leadership has the responsibility of enforcing the existing policies and holding officers accountable for their actions. If the police leadership fails to enforce existing rules, the official policies become meaningless. Instead, line officers tend to act in accordance with the informal rules established by peers and supervisors. In the case of the PPD during the 1970s, these informal organizational rules tolerated a heavy-handed approach to resolving police-citizen encounters, often involving use of the officer's firearm.

Rizzo's control of the Philadelphia Police Department and the attitudes and behavior that it fostered among its officers throughout the 1970s led the Civil Rights Division of the United States Department of Justice to file suit against the PPD in 1979 for tolerating brutality.[28] As part of that suit, James J. Fyfe was commissioned to examine PPD's use of deadly force from 1975 to 1978 (Fyfe, 1980). Fyfe (1980) compared the PPD's experience to that of the New York City Police Department (NYPD) and concluded,

> Stated simply, PPD fares badly on these comparisons. It has a shooting policy, but there is little evidence that it is enforced. It has a training academy, but the research offers no evidence that it effectively transmitted department policy or the basic tenets of safe and humane police practice to many of the officers included in this data set. Perhaps most important, the evidence also indicates

> that PPD suffers from an organizational culture which promotes police-citizen violence. (p. 103)

Conversely, the Green/Solomon policy implementation in 1980 was accompanied by vigorous enforcement and did make a difference. It also marked a more general change from a hard-line philosophy to a more progressive administrative environment. Consequently, findings here suggest that, absent meaningful enforcement, administrative policies that purport to control officers' discretion are mere homilies rather than guides to action.

Still, the influence of administrative rulemaking could not affect the relationship between crime/arrests and deadly force. Potentially important shifts occurring during this time include increases in both violent felony arrests (a measure of police exposure to violence) and homicides (a measure of public violence). Together, these situational and environmental shifts may have overcome the controlling influence of the internal working environment on deadly force discretion. This finding suggests a limited role for the internal working environment in controlling deadly force discretion in primarily nonelective encounters (e.g., gun assaults), where external situational and environmental factors such as those described above are more likely to influence police shooting behavior. Moreover, the continued pattern of few nonassaultive and physically assaultive incidents suggests that the administrative policy continued to control deadly force discretion in elective police-citizen encounters.

RECONSIDERING THE ROLE OF POLICE WORKING ENVIRONMENTS FOR POLICE SHOOTING BEHAVIOR

The findings here suggest clarification in the way we understand the factors influencing police use of deadly force and the kinds of mechanisms that can help control it. The conceptual model (Figure 1) describes implicit causal relationships between the internal and external police working environments, situational factors, and the use of deadly force.

The dynamics of nonelective and elective deadly force incidents and their implied causal relationships are unique and the conceptual model illustrates them separately (shown in Figure 3; see White, 1999, for a more detailed discussion). Their relative size in the two models illustrates differences among the causal relationships of the situation and internal and external working environments for nonelective and elective deadly force encounters. The internal and external working environments are the primary causal influences in elective encounters, whereas situational factors are less important. The internal working environment, in particular, plays a critical causal role in influencing deadly force discretion in elective encounters. However, in nonelective

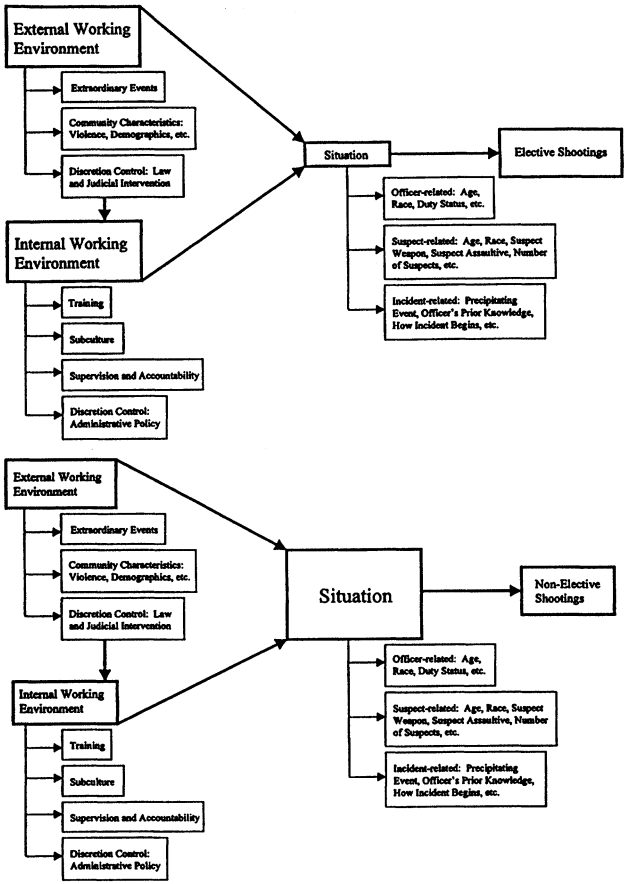

Figure 3: Conceptual Models for Elective and Nonelective Shootings

encounters, situational factors and, to a lesser extent, certain environmental influences largely dictate an officer's decision to use deadly force and outweigh the relative influence of the working environments. In both models, the arrow from external discretion controls to the internal working environment represents the mediating role of the internal environment as a causal influence on use of deadly force (see White, 1999).

In sum, this study examined the impact of administrative policy on police shooting behavior from a different perspective, using interrupted time series analysis and 23 years of shooting data. Findings support prior deadly force

research suggesting that administrative policy can be an effective deadly force discretion control, but the Philadelphia experience indicates that formal policy can be outweighed by the personal philosophies and policies of the chief (or commissioner), and that its impact is limited to elective encounters. Additional research is needed to study how the internal working environment can affect the frequency of nonelective shooting incidents and overcome the impact of both situational factors and larger environmental influences (such as the prevalence of crime and violence), perhaps through policies that guide officers' behavior in earlier stages of potentially violent encounters and minimize the likelihood of nonelective deadly force decisions.

NOTES

1. That is, the officer can resolve the encounter with other less lethal means.

2. According to Geller and Scott (1992), most of these national commissions and professional organizations responded directly or indirectly to the Civil Rights movement and its fight for racial equity. Notably, police use of force sparked many of the riots that occurred throughout the 1960s.

3. Fyfe (1980, 1988) examined the Philadelphia Police Department's (PPD) use of deadly force during the 1970s, and he concluded that annual shooting rates were greatly affected by Frank Rizzo, as police commissioner and mayor, and his style of policing. This article focuses on administrative policy changes associated with Rizzo but uses advanced statistical analyses and deadly force data spanning 23 years.

4. See White (1999) for a more detailed discussion of this law change and its impact on deadly force.

5. However, PPD continued to operate without a specific policy governing off-duty handling and use of firearms.

6. PPD discharge reports for the years 1979 to 1986 could not be located. The author used archives of *The Philadelphia Inquirer* to determine monthly deadly force totals during those years.

7. Certain types of shootings are excluded from the analysis, such as suicides, shootings of animals, and noninjurious shootings.

8. Because monthly totals of deadly force serve as the unit of analysis, there are 276 data points in the time series.

9. The three-stage model building process is identification, estimation, and diagnosis. In the identification stage, the autocorrelation and partial autocorrelation functions are examined. In estimation, parameter estimates are identified. Finally, the last stage involves examining the error residuals.

10. Impact assessment is conducted by adding the intervention as a dummy variable to the existing model identified in the first stage of interrupted time series analysis (ARIMA). Interventions vary by onset, abrupt or gradual, and duration, temporary or permanent.

11. White (1999) treats the 1985 MOVE bombing as a culmination of more than a decade of tension and violence between MOVE and Philadelphia. Of all the historical threats to validity that are reviewed, this event seems most likely to influence the dependent variable. The police department was intimately involved, police officers used deadly force on an extraordinary scale,

and the event placed the city and police department under tremendous external scrutiny and pressure. By testing the impact of the MOVE bombing, the study acknowledges historical threats to validity through treatment of one of the most troublesome events in Philadelphia policing history. White (1999) finds that the incident had no impact on Philadelphia police shooting behavior, which alleviates some of the concern about the historical threat to validity. White (1999) also finds that the annual plots of key environmental influences, including city population, sworn police personnel, arrests for violent felony offenses, and homicides, do not appear to be associated with use of deadly force by Philadelphia police officers.

12. Moreover, the selected interventions or discretion control efforts seem to coincide with several of the major changes or shifts in the data. Essentially, the study looks at two important points in the data where significant change appears to occur. Of course, this examination of key points does not include every event that might have affected the data.

13. The presence of first order regular and seasonal moving averages means that each observation is determined by the average of the current disturbance, the previous disturbance, and the corresponding disturbance from the previous year. Thus, shootings in January 1992 are primarily determined by the disturbance in that month, the previous month (December 1991), and the corresponding month from the previous year (January 1991).

14. Abrupt, temporary models were run with varying lengths of impact, from 1 to 12 months. Only the 11-month impact improved the statistical significance of the model. Variations of other patterns were examined and rejected (two gradual, permanent models were significant but were rejected based on theory).

15. Probability level is .029. The Akaike information criterion value dropped from 403.6 to 400.3. The Schwartz Bayesian criterion value changed from 410.4 to 410.6.

16. The direction of the impact (increase or decrease in monthly levels of deadly force) is determined by examining the "B weight" of the intervention. Negative values indicate a decrease, positive values an increase. Policy1's B weight is .46.

17. The first period comprises the beginning of the study period to the policy change. The second time period comprises the day of the policy change to the end of 1978. This typology was first developed by Fyfe (1982). For these purposes, gun, knife, and other weapon assaults are considered nonelective, and physical assaults and nonassaults are elective.

18. The bi-monthly percentage of elective shootings is calculated by dividing the number of nonassaultive and physically assaultive incidents by the total number of incidents for 2-month periods. Analyses are not shown here.

19. At first, a permanent pattern was selected because the 1980 policy change represented a dramatic shift in overall philosophy of the police department. Multiple variations of both abrupt and gradual, permanent models were run, but none were significant. Three abrupt, temporary models were found to be significant (all of similar duration), and the 116-month pattern was most significant. Although 116 months is hardly temporary, the impact ends prior to the end of the study period, and in technical terms is considered temporary. The ARIMA output is not shown here.

20. Probability value is .03. The AIC value dropped from 403.6 to 401.8. The SBC value increased from 410.4 to 412.1. The intervention's B weight is –.40.

21. Recall that the research has aggregate data only for the years 1979 to 1986, which prevents the author from describing shootings during those years in greater depth.

22. Viewed more generally, the percentage of nonelective shootings increased by 5% (from 81% to 86%).

23. The median age for post-1989 shootings is 32, compared to 36 for shooters in 1987-1989. Post-1989 shooters more frequently used semiautomatic pistols, rather than the .38 caliber revolver, which was the standard issue throughout the study period (semiautomatic: 31% vs. 7%).

24. The Stakeout unit is responsible for serving warrants and conducting high-risk searches. They are, in effect, the PPD's SWAT team.

25. Two other findings support this argument for a change in precipitating events. First, an analysis of opponent position at the time of the shooting finds that suspects in post-1989 incidents were more likely to be in an aggressive position, such as standing, advancing, or crouching (16% increase). Second, the percentage of incidents involving off-duty officers increased from 19% to 29%.

26. Kania and Mackey (1977) argue that police violence is related to violence in the community. That is, in violent areas of town, police are more likely to use violence themselves.

27. See White (1999) for a more detailed discussion of Frank Rizzo, his style of policing, and his impact on both the PPD and the city of Philadelphia.

28. This was the first time ever that the Department of Justice had filed suit against a police department for tolerating brutality.

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