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USING COMPETING THEORIES TO EXPLAIN VARIATIONS IN U.S. POLICE DEPARTMENTS' REPORTED USE OF FORCE COUNTS

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ABSTRACT

Using data from the 2013 Law Enforcement Management and Administrative Statistics (LEMAS) survey, the current study provides a cross-sectional analysis of U.S. police departments' reported use of force. The goal of this study was to examine the extent to which departments' reported force counts were explained by rational bureaucratic and/or institutional theory. Given the stark variations in reported force counts, a hurdle model was used to examine the potential effects of the theories on departments' likelihoods of reporting force and the frequency in which they reported it. The results highlighted the significance of both theories. In terms of rational bureaucratic theory, the results illustrate that the absence of a collective bargaining agreement and greater professionalism requirements reduced departments' likelihoods of reporting force, while less restrictive administrative policies increased departments' likelihoods of reporting force and the frequencies in which they reported it. In terms of institutional theory, the results revealed that black officer representation reduced both the likelihood of reporting force and the frequency of force reported. However, increases in jurisdictions' population and crime rates, for the most part, increased force reports. Combined the theories explained over one-fifth of the variations in departments' reported use of force for the observed year. The findings suggest that successful efforts to reduce force-related injuries and deaths should consider the contextual environments in which rules and regulations regarding force are made.

Contribution/Originality: This research is the first to treat reported force as a two-part process. It employed a hurdle model to explain variations in departments' likelihoods of reporting force and their reported force counts. In addition, this research examined the extent to which two competing theories explained variations in a national sample of police departments reported uses of force.

1. INTRODUCTION

In recent years, police use of force has gained considerable attention. This attention has been sparked, in part, by increased media coverage of excessive force used in the cases of unarmed citizens such as George Floyd and Hunter Brittain during police-citizen encounters. However, despite increased coverage, deaths resulting from police-citizen encounters are rare, and statistics illustrate that only a small fraction of encounters result in either the threat or use of force (Tuttle, 2014). Similarly, Hickman, Piquero, and Garner (2008) found, in a review of thirty-six urban police organizations, force was used in only 1.7 percent of police-citizen encounters.

According to the National Institute of Justice (2020) one of the main problems contributing to this misrepresentation is data on lethal and less lethal force are difficult to obtain due to the absence of a national database on officer-citizen force-related encounters (National Institute of Justice, 2020). Further exacerbating the issue lacks a single, universally agreed-upon definition of use of force (National Institute of Justice, 2020). While the International Association of Chiefs of Police describes use of force as "the amount of effort required by police to compel compliance by an unwilling subject," definitions across police agencies vary (National Institute of Justice, 2020). In addition, use of force policies also vary by agency (National Institute of Justice, 2020). According to the National Institute of Justice (2020) officers receive force guidance from their agencies without any universal set of rules to guide them on when or how much force to use.

Moreover, public perceptions regarding crime are also incorrect. According to Siegel (2016) the media is reporting crime more and in new ways. Contrastingly, the Federal Bureau of Investigation (FBI) reported the United States witnessed a 55 percent reduction in property crimes, and a 49 percent reduction in violent crimes from 1993 to 2019 (Gramlich, 2020). Yet, despite the evidence, many Americans feel that crime and police use of force rates are higher than they are. According to a survey conducted by Pew Research Center in 2016, 57 percent of respondents felt that crime had increased since 2008 (Gramlich, 2016). Similarly, a survey conducted by the Cato Institute during the same year found that one-third of respondents felt that police officers' tactics were too harsh, while one-half felt police were too quick to use force (Ekins, 2016).

Even when force is used, only 10 to 20 percent of force incidents result in injuries to either civilians or police officers (National Institute of Justice, 2020). According to data compiled by the FBI in 2017, only 1,900 of over 10 million police arrests resulted in deaths (Rosen, 2020). Of the 1,900 deaths that resulted from police arrests in 2017, less than two-thirds were homicides (Rosen, 2020).

Misguided perceptions of police-citizen experiences can thwart public safety and police-citizen relations by promoting greater mistrust in police. Although most departments treat force as measures along a continuum, rules, and regulations regarding when to use different levels of force often vary by police department. Interestingly, research on the use of lethal and less lethal force maintains that individual and situational characteristics determine not only whether an officer will use force but also the amount of force (Alpert & McDonald, 2001; Friedrich, 1980). Still, understanding differences in reported use of force incidents involves understanding the environments in which rules and regulations regarding force are made. Consequently, this research asks to what extent can variations in police departments' reported use of force counts be explained by elements of rational bureaucratic or institutional theory? Moreover, this research asks whether the factors that explain variations in departments' likelihoods of reporting force also explain variations in departments' reported force counts?

2. LITERATURE REVIEW

2.1. Rational Bureaucratic Theory

Classical research on police use of force has roots in rational bureaucratic theory. According to Max Weber, rational bureaucratic organizations maximize efficiency with their hierarchical structures, divisions of labor, specialized tasks, objective standards, and formal rules and procedures. According to Crank (2003) this research stemmed from normative ideas regarding "best practices" for reducing crime and combating recurring problems. A major component of this theory is the ability of administrative policies and standards, leadership, and organizational structure to control police outcomes.

Similarly, Davis (1971) maintained, administrative policy was the best method for controlling discretion (White, 2001). Since Davis (1971) work, agencies have used administrative policy as a mechanism to control police field discretion in the handling of domestic calls, foot and vehicle pursuits, and the use of force (White, 2001). Terrill and Paoline (2017) found that officers working within agencies with more restrictive policies regarding the discretionary use of less lethal force used force less than officers who worked in more permissive policy

environments. Moreover, Shjarback, White, and Bishopp (2021) found the implementation of a firearm pointing policy requiring officers to document when they directly pointed their guns at citizens gradually reduced perception failure shootings in which an officer mistook an item for a gun.

In the 1990s, research regarding vehicle pursuits found officers used lethal force more during foot and motor vehicle pursuits (Alpert, Kenney, & Dunham, 1997; Stroshine & Brandl, 2021). The results of this research led to significant policy changes in which many police agencies adopted more restrictive pursuit policies. These policy changes were aimed at reducing the number of deaths and injuries resulting from police pursuits.

Another policy standard that research has analyzed is that of agencies' technological use and use of force. Analyzing the implementation of body worn cameras in a single U.S. police department over time, Koslicki, Makin, and Willits (2019) found the use of body worn cameras reduced police use of lethal and less lethal force. Yet, the effects were temporary, returning to pre-implementation levels in under three years. This finding is consistent with Todak, Gaub, and White (2018). Still, little is known regarding the use of vehicle cameras and the use of lethal and less lethal force. For example, current literature on in-car cameras has primarily focused on the link between video footage and dismissed vs. sustained citizen complaints (Sahin & Cubukcu, 2022). However, the results from this research this technology has been used more often to sustain police accounts rather than those of citizens (Sahin & Cubukcu, 2022).

Moreover, research on the use of force has analyzed the influence of departments' and officers' professionalism on lethal and less lethal use of force. In the literature, professionalism has often been measured as having a college education or having undergone various methods of recruitment, selection, and/or training (Shjarback et al., 2021; Willits & Nowacki, 2014). While Rydberg and Terrill (2010) found higher education lowered police use of lethal and less lethal force, Lee, Jang, Yun, Lim, and Tushaus (2010) found the number of training hours a department mandated increased officers' use of lethal and less-lethal force.

Similarly, research analyzing pilot trainings have found more positive results. For example, Wood, Tyler, and Papachristos (2020) found procedural justice training strategies reduced not only citizen complaints against police but also police use of lethal and less lethal force in Chicago over a two-year period. In addition, Andersen and Gustafsberg (2016) found participants in a psychological training program exhibited better physiological control, situational awareness, and performance when confronted with stressful critical incidents. Yet, in a review of 64 de-escalation training evaluations over forty years, Engel, McManus, and Herold (2020) found slight-to-moderate individual and organizational improvements. However, the researchers concluded that the effectiveness of de-escalation trainings were limited by the questionable quality of evaluation research designs.

Finally, research analyzing force has examined the effects of organizational structure on officers' use of force. Agency size has been typically used as a proxy for size. For example, Willits and Nowacki (2014) found evidence to suggest that organizational characteristics were more salient in predicting officers' use of lethal force in larger cities than smaller ones.

2.2. Institutional Theory

Contrary to rational bureaucratic theory, Langworthy (1986) argued that the search for "best practices" failed to account for the mediating effects of context. According to Langworthy (1986), what might work well for some police agencies, might not work well for others. Similarly, Crank and Langworthy (1992) argued that reform failure among police often failed because reformers failed to account for the constraining and enabling effects of the institutional environment on police agencies. Similarly, Smith (1984) argued, "Any theory of legal control that ignores the organizational context in which police operate cannot adequately account for police behavior across different organizational contexts" (33). Thus, research analyzing lethal and less lethal force should examine the institutional environments in which police officers work.

According to Frederickson, Smith, Larimer, and Licari (2012), organizations are "bounded social constructs of expectations, norms, roles, and rules that constrain individual and group choice and behavior."

Meyer and Rowan (1977) maintain, formal structure emerges in organizations as organizations adhere to institutional norms and beliefs within their environment. As an organization adopts these elements, they become codified into the rules and practices that comprise its formal structure (Meyer & Rowan, 1977). These rules and practices are born out of institutional pressures of the organization to appear legitimate (Meyer & Rowan, 1977).

Central to this idea, is the notion that there is a "social contract" between the police and the citizens they serve (Ariel, Farrar, & Sutherland, 2015). In exchange for granting police the right, power, and responsibility to use force, citizens expect the police to only exercise force when it is necessary and to only use the amount of force that is reasonable, proportional, and appropriate for the situation (Ariel et al., 2015). Consequently, police are tasked with the responsibility to what the public perceives to be legally and morally "right".

One reform effort that has been designed to increase police legitimacy, improve officer-citizen relations, and reduce incidents of lethal and less lethal force is community policing. The Office of Community Oriented Policing Sercices (2014) defines community policing as a "philosophy that promotes organizational strategies that support the systematic use of partnerships and problem-solving techniques to proactively address the immediate conditions that give rise to public safety issues such as crime, social disorder, and fear of crime" (3). However, despite the goals of community policing, findings regarding community policing behaviors and force vary. One reason for this variation is that definitions regarding community policing are often vague with little in terms of clearly defined, uniformly implementable or measurable strategies (Koslicki., Lytle, Willits, & Brooks, 2021; Sheehan & Cordner, 1995). However, researchers analyzing the effects of community policing typically examine police practices such as informal contacts with the public, foot patrol, permanent beat assignment, discretionary power, and problem-solving strategies. Still, research examining these practices has found little evidence to suggest that they reduce crime or the use of lethal and less lethal force (Cordner, 2014; Klahm & Tillyer, 2010; Koslicki. et al., 2021). For example, Koslicki. et al. (2021) found departments with at least eight hours of community policing training for recruits and those with permanent beats had higher rates of lethal force.

In addition to concerns for legitimacy, police agencies operate in complex, unique social environments that can have distinct influences on their behavior. Research on use of lethal and less lethal force has found correlations between the crime rates in an area and police use of force. In a longitudinal study of police-related fatalities in counties from 2000 to 2014, Kopkin (2019) found police-related fatalities were strongly correlated with murder rates, property crime rates, and assaults on officers. Similarly, in an analysis of city police organizations, Lee., Vaughn, and Lim (2014) found district crime levels were also positively associated with police use of lethal and less lethal force.

Moreover, research examining the social contexts with which officers work has also examined the potential of gender, ethnicity, and race to influence police-citizen encounters. However, research examining the effects of representation have found varied results. For example, in a review of use of force literature, Herrera (2019) found little evidence to suggest that greater minority representation led to less use of force against minority groups. Contrastingly, Wright and Headley (2020) found gender and race representation in police agencies reduced use of force. However, Deller and Deller (2019) found departments with more female field officers reported a higher number of police-caused deaths. Moreover, Headley (2021) found the effect of minority representation to be stronger when the department also had a civilian review board.

The literature suggests that force decisions are likely based on a plethora of factors. However, previous research regarding force has analyzed these theories and others in a vacuum, dismissing the notion that multiple theories might explain force decisions. This research seeks to address this issue by analyzing the potential of the theories to explain variations in reported force incidents in 2012.

3. METHODOLOGY

3.1. Data

This research analyzes the extent to which rational bureaucratic and institutional factors explain variations in a national sample of police departments' reported force counts in the United States. Departments' organizational data were obtained from the 2013 Law Enforcement Management and Administrative Statistics (LEMAS) survey which included data on 2,826 police departments in boroughs, cities, counties, states, townships, and villages across the United States in 2012 (Bureau of Justice Statistics, 2015). Population estimates were obtained from the U.S. Census Bureau (2022) database, while crime data for each department's jurisdiction were obtained from the Federal Bureau of Investigation (2022). To ensure time order, both estimates were lagged.

3.2. Methods

In this research, the dependent variable is measured as the aggregate number of force incidents reported by each police department in 2012. In the LEMAS survey, force counts were defined as "situations where officers used physical [coercion] to control individuals or to prevent the escalation of conflicts" (Bureau of Justice Statistics, 2015). However, counts were not differentiated by action or weapon used or lethal or less lethal status. For the observed year, departments' reported use of force ranged from 0 to 4,383 counts. While previous research suggests that police rarely use force, this research provides contradictory evidence. Of the 2,826 departments in the sample, 1,351 departments reported zero force counts for the observed year, while 1,341 departments reported using force. 134 observations were dropped due from the analysis due to missing data. Table 1 displays the number of police departments that reported various force counts.

Table 1. Number of police departments by reported use of force counts.

Reported Use of Force Counts	Number of Departments
0	1,351
1-5	306
6-10	175
11-15	131
16-20	62
21-25	59
26-30	58
31-35	41
36-40	32
41-45	22
46-50	36
51-75	72
76-100	64
101-500	235
501-1000	36
1001-2000	9
2001-3000	2
3001-4383	1
Total	2,692

3.3. Hurdle Models

Hurdle models are useful in cases with dependent variables with dispersion and excessive zero counts.[1] These models assume that positive counts are observed once a threshold is cleared. If the hurdle is not cleared, a zero

[1]Zero inflated negative binomial (ZINB) regression models are also useful for count data with dispersion. However, the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) scores for the ZINB model were higher than those in the hurdle model. AIC and BIC are penalized-likelihood information

count is observed. These models assume that subjects fall into one of two categories. The first category consists of those who never experience the outcome variable, and the second consists of those who experience the outcome at least once. The use of a hurdle model allows for the comparison of various institutional factors on departments that did and did not report use of force. Unlike previous research, this research assumes that the departments differ; and, therefore, the institutional factors affecting them also differ.

In the model, the presence of reported force was modeled using a probit regression, while the frequency of reported force was modeled using an exponential regression. For example, consider the relationship $y_i = s_i h_i^*$, *where* y_i is the observed aggregated value of reported use of force counts (Craig, 1971). The selection variable, s_i, is 1 if the reported use of force is not bounded and is 0. In the hurdle model, the lower limit that binds the dependent variable is 0. Therefore, the selection model is $s_i = \{1 \text{ if } z_i \gamma + \varepsilon_i > 0, 0 \text{ if otherwise}\}$ (Craig, 1971). Here, z_i is a vector of explanatory variables, γ is a vector of coefficients, and ε_i is the standard normal error term (Craig, 1971). The continuous latent variable h_i is observed only if $s_i = 1$ (Craig, 1971). Thus, the latent model can be written as follows: $h_i^* = \exp(X_i\beta + v_i)$, where X_i is a vector of explanatory variables, β is a vector of coefficients, and v_i is an error term (Craig, 1971).

3.4. Factors Determining Departments' Likelihood of Reporting Force

This research hypothesizes that the use of physical coercion is a last resort action for police. Consequently, it assumes that departments will rarely use force, whether less lethal or lethal. Hence, this research hypothesizes that police departments' likelihoods of reporting force are influenced by rational bureaucratic factors that work to constrain their use of force. Rational bureaucratic factors include administrative policies, professionalism standards, leadership, collective bargaining status, internal capacity, and department size.

Like Terrill and Paoline (2017) this research assumes that restrictive administrative policies will lower departments' likelihoods of reporting force. Proxies used for restrictive administrative policies included the number of restrictions on foot pursuits (Stroshine & Brandl, 2021), the number of weapons requiring documentation when used (Shjarback et al., 2021) the number of technologies used for information gathering (Koslicki et al., 2019) and the presence of community policing as a core objective within the departments' mission statements. The expectation is that departments that place community policing as a core objective in their mission statements will conduct more community policing strategies to reduce the likelihood of officers in that department reporting force.

Although prior research has used college education and trainings as proxies for officers' professionalism (Rydberg & Terrill, 2010; Shjarback et al., 2021; Willits & Nowacki, 2014) this research utilizes the number of direct hires and the number of pre-service hires within a department to gauge professionalism. The expectation in the likelihood model is that departments with greater numbers of these officers will have greater likelihoods of reporting force due to officers' limited education and training in high-stress situations.

While use of force literature has omitted the potential impacts of leadership, collective bargaining status, and internal capacity, this research hypothesizes that these factors have influence. For example, collective bargaining and union contracts provide protections to police officers that limit disciplinary action from leadership, even in the event of an unjustified shooting (Walker, 2008). Moreover, Hickman and Piquero (2009) found the percentage of complaints sustained against police officers was lower in departments where officers could collectively bargain compared to non-bargaining agencies. Thus, this research posits that the absence of a collective bargaining agreement will deter officers from reporting force. A binary measure for this absence was included.

Similarly, while current literature on use of force has examined the impact of gender on officers' use of force (Deller & Deller, 2019; Wright & Headley, 2020) the literature has failed to examine whether gender composition

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criteria that indicate a model's goodness of fit. Both estimates control over-fitting. Lower AIC and BIC scores are indicate greater model specification. Thus, the hurdle model was selected..

in departments' leadership affects use of force. To address this limitation, this research uses the number of female supervisors within a department as a proxy for gender composition in leadership. The expectation is that if female field officers use force under pressures to "fit in" and appear legitimate (Deller & Deller, 2019) female supervisors might do the same, invoking more permissive stances toward the use of force and therefore increasing the likelihood of departments' reporting force.

Police departments' size might also impact departments' likelihoods of reporting force. In their analysis, Willits and Nowacki (2014) found organizational and structural factors were better predictors of force in larger cities than in small cities. Because this finding might result in part to variations in these jurisdictions to use force in the first place, this research hypothesizes that smaller departments, located in smaller jurisdictions, will have lower likelihoods of reporting force than larger departments with more officers. Consequently, a binary variable for agencies with under fifteen sworn officers was included.

In addition, turnover rates can have significant implications on organizational outcomes. Without adequate, skilled personnel, organizations cannot meet their objectives. Police departments are no different. Turnover has the potential to significantly affect police outcomes because they reflect immediate changes to police departments' internal capacities to serve and protect. Layoffs can cause major changes to organizations' budgets, structure, and size. As a result, these personnel changes might result in fewer crimes being detected. With fewer crimes detected, the chances for force to be used in police-citizen encounters goes down. Thus, this research hypothesizes that as departments' layoff rates increase, their likelihoods of reporting force will decrease.

In addition to rational bureaucratic factors, this research hypothesizes that institutional factors might also impact police departments' likelihoods of reporting force. Consistent with prior research regarding civilian review boards lowering officers' use of force (Headley, 2021) this research includes a binary measure for the presence of an external review board. The expectation is that influence of external review whether by civilians or other third-party stakeholders will lower departments' propensities to report force. Moreover, given findings that race and ethnicity influence use of force encounters (Kahn, Steele, McMahon, & Stewart, 2016; Wright & Headley, 2020) this research expects the black officer-to-black citizen ratio and Hispanic officer-to-Hispanic citizen ratios to reduce departments' likelihoods of reporting force since force is more frequently used in encounters against members of these groups (Kahn et al., 2016).

Literature on use of force has identified crime rates per 100,000 residents as significant correlates of use of force (Kopkin, 2019). To account for the impact of violent and property crime rates on force, measures for each were included. The expectation is that as these rates increase within a jurisdiction, police departments' likelihoods of reporting force will increase to combat them.

While research on force has not examined the potential influences of jurisdiction type and region on use of force. Controls for these variables are included. The omission of these variables are worrisome given previous findings regarding the use of force in different city and county police departments. To address this potential limitation, this research includes binary measures for county and state departments, leaving city departments as the reference category. Research on crime has found significant correlations between region and different types of crime. Particularly, research has found murder rates to be higher in the South and West than in other regions. Moreover, research has also found variations in the sentencing of crime by region with the South often being more punitive on crimes than other regions (Irwin, Davidson, & Hall-Sanchez, 2013). Given these differences, it is plausible that regional variations exist in the use of force. To access if these variations exist, this research includes binary measures for Midwest, South, and West with the North as the reference category. The expectation is that departments in the South and West will have greater likelihoods of reporting force than departments in other regions.

3.5. Factors Determining Departments' Use of Force Counts

While the likelihood model contains more rational bureaucratic factors, the frequency model contains more institutional factors. The expectation is that once departments report force, the frequency of force reported will be influenced less by rational bureaucratic factors and more by institutional factors. Yet, like the likelihood model, the frequency model expects the following rational bureaucratic factors to influence departments' reported force counts: administrative policies, leadership, internal capacity, department size, and jurisdiction type.

Although previously assumed to restrict departments' likelihoods of reporting force, administrative policies can also increase the frequencies with which departments' report force. Consistent with Terrill and Paoline (2017) this research hypothesizes that departments with more permissive administrative policies, or those which allow for a larger number of authorized weapons, will have higher reported force counts. Moreover, like Alpert et al. (1997) and Stroshine and Brandl (2021) this research hypothesizes that a higher number of vehicle pursuits will also be associated with a greater number of reported force counts. To control for these effects, measures of both were included in the frequency model.

Table 2. Descriptive statistics for factors influencing police departments' likelihoods of reporting force.

Variables	Hypothesized Direction of Influence	Mean	Standard Deviation	Minimum	Maximum
Dependent Variable					
Force Count		44.981	172.884	0	4,383
Rational Bureaucratic Variables					
Administrative Policies					
Number of Restrictions Applied to Foot Pursuits	-	0.798	1.956	0	7
Number of Weapons that Require Documentation When Used	-	2.524	4.397	0	14
Number of Information Technologies Used	-	2.970	1.522	0	8
Community Policing as Part of Department's Mission Statement	-	0.139	0.347	0	1
Professionalism					
Number of Direct Hires	+	3.924	10.155	0	280
Number of Pre-Service Hires	+	1.573	12.473	0	600
Leadership					
Number of Female Supervisors	+	3.513	23.248	0	1004
Department Size					
Departments with less than 15 full-time sworn officers	-	0.303	0.459	0	1
Collective Bargaining Status					
Absence of a Collective Bargaining Agreement	-	0.450	0.498	0	1
Institutional Variables					
Internal Capacity					
Layoff Rates within the Department	-	0.130	2.077	0	38.095
External Review					
External Review Board	-	0.172	0.377	0	1
Representation					
Ratio of Black Officers to Black-Citizens	-	233.374	380.384	0	
Ratio of Hispanic Officers to Hispanic Citizens	-	159.631	245.646	0	
Crime Rates					
Violent Crime Rate per 100,000 persons, 2011	+	203.224	192.350	0	2701.6
Property Crime Rate per 100,000 persons, 2011	+	268.283	188.725	0	1660.4
Jurisdiction Type					
City	+	0.729	0.445	0	1
County	-	0.254	0.435	0	1
State	+	0.018	0.132	0	1
Region					
Midwest	-	0.280	0.449	0	1
North	-	0.176	0.381	0	1
South	+	0.391	0.488	0	1
West	+	0.153	0.360	0	1

Moreover, the expectations in the frequency model regarding leadership, internal capacity, department size, and jurisdiction type were also like those in the likelihood model. Thus, measures for these variables are included in this model as well. However, there are two exceptions. First, in the frequency model, department size is measured as the number of police officers. Second, voluntary turnover is expected to have a greater impact on force counts than layoffs. Here the expectation is that voluntary turnover will cause officers within these departments to rely on force more to cope with increased demands. Thus, a measure for departments' voluntary turnover rates was also included.

Table 3. Descriptive statistics for factors influencing police departments' reported force counts.

Variables	Hypothesized Direction of Influence	Mean	Standard Deviation	Minimum	Maximum
Dependent Variable					
Force Count		44.982	172.885	0	4,383
Rational Bureaucratic Variables					
Administrative Policies					
Number of Weapons Authorized for Use	+	6.953	2.504	0	11
Number of Vehicle Pursuits	+	11.110	52.854	0	1949
Leadership					
Number of Female Supervisors	+	3.513	23.248	0	1004
Department Size					
Number of Patrol Officers to Citizens	_	133.447	169.407	0	4545.455
Internal Capacity					
Voluntary Turnover Rates within the Department	+	4.947	11.0827	0	100
Institutional Variables					
Representation					
Ratio of Black Officers to Black Citizens	-	233.373	3803.844	0	182000
Ratio of Hispanic Officers to Hispanic Citizens	-	159.631	2456.463	0	113150
Population					
Population, 2010	+	212,907.4	1,278.507	196	3.80e+07
Crime Rates					
Violent Crime Rate per 100,000 persons, 2011	+	203.224	192.350	0	2701.6
Property Crime Rate per 100,000 persons, 2011	+	268.283	188.724	0	1660.4
Jurisdiction Type					
City	+	0.729	0.445	0	1
County	-	0.254	0.435	0	1
State	+	0.017	0.132	0	1
Region					
Midwest	-	0.280	0.449	0	1
North	-	0.176	0.381	0	1
South	+	0.391	0.488	0	1
West	+	0.153	0.360	0	1

Like the rational bureaucratic factors analyzed, many of the institutional factors analyzed in the likelihood model are also present in the frequency model. These factors include racial representation, crime rates, and region. However, different from the likelihood, the frequency model jurisdictions with larger populations will have greater police-citizen encounters and thus higher reported uses of force. To control for this potential effect, a measure of the jurisdiction's population was also included in the model.

4. FINDINGS

Table 2 presents the descriptive statistics for each variable hypothesized to influence police departments' likelihoods of reporting force, while Table 3 presents the descriptive statistics for each variable hypothesized to influence police departments' reported force frequencies or counts. In both tables, the statistics reflect variables in their natural form before any log transformations.

Table 4 presents the findings regarding departments' reported force counts. The results are presented using marginal effects. These effects illustrate the average effect each independent variable has on the dependent variables holding other variables at their means. The factors analyzed explained 22 percent of the variation in departments' reported force for 2012. Results are robust to heteroskedasticity.

4.1. Factors Influencing Police Departments' Likelihood of Reporting Force

The results from the likelihood model produced statistically significant support for rational bureaucratic factors influencing departments' likelihoods of reporting force. The model's results produced mixed support regarding the potential for administrative policies to constrain departments' likelihoods of reporting force. For example, the results revealed that while more restrictions on foot pursuits reduced the likelihood of departments' reporting force, greater documentation requirements for weapons used increased the likelihoods of departments' reporting force. While the first finding is consistent with Terrill and Paoline (2017) the latter contradicts (Shjarback. et al., 2021) finding that greater documentation reduced the usage of force. Similarly, the results found the more technological devices a department used to gather information, the greater the likelihood the department reported using force. In addition, a positive correlation was also found regarding the presence of community policing in a departments' mission statement and its likelihood of reporting force. These findings demonstrate that administrative policies regarding force can have consequences that counter their original objectives.

Different from the results regarding administrative policies, the results regarding professionalism were like their hypothesized effect. The results revealed that departments with larger shares of direct and pre-service hires were more likely to report using force than departments with fewer of these hires. The findings are consistent with Paoline and Terrill (2007) who found officers' education levels and field experiences were inversely related to their uses of verbal and physical force.

Interestingly, the results revealed that female leadership increased the likelihood of police departments' reporting force. This finding suggests that female leaders might advocate tougher stances on crime than their male counterparts. In addition, the results are the first to find a correlation between collective bargaining status and reported usages of force. Specifically, the results show that the absence of a collective bargaining agreement reduced the likelihood of a department reporting force.

Unlike prior research, the findings are the first to link turnover to use of force. For example, the results revealed that as departments' layoff rates increased, their likelihoods of reporting force decreased. This finding is the first to suggest that fluctuations in departments' internal capacities effect how officers' utilize force. Moreover, the results also yielded support for the contention that smaller agencies were less likely to report using force than agencies with more than 15 sworn field officers. Contrary to Willits and Nowacki (2014) findings, this finding suggests that organizational characteristics are also important in small departments.

In addition, the likelihood model produced support for the influence of institutional factors on department' likelihoods of reporting force. While the results failed to yield support for the presence of an external review board impacting departments' likelihoods of reporting force, they did yield support for the effects of black-officer-to-citizen representation in reducing the likelihood of reporting force. However, no support was found for the influence of Hispanic-officer-to-citizen representation in reducing departments' likelihoods of reporting force.

Table 4. Hurdle model results for departments' use of force.

Probit Model of Departments' Likelihoods of Reporting Force		**Exponential Model of Departments' Reported Force Counts**	
Marginal Effects Reported at Means		**Marginal Effects Reported At Means**	
Rational Bureaucratic Variables		***Rational Bureaucratic Variables***	
Administrative Policies		***Administrative Policies***	
Log (Number of Restrictions on Foot Pursuits)	-0.002+ (0.001)	Log (Number of Weapons Authorized for Use by Sworn Officers)	0.022*** (0.006)
Log (Number of Weapons that Require Documentation When Used)	0.006*** (0.001)	Log (Number of Vehicle Pursuits)	0.050*** (0.010)
Log (Number of Information Technologies Used)	0.084+ (0.048)	*Leadership*	
Community Policing as Part of Department's Mission Statement	0.119+ (0.073)	Log (Number of Female Supervisors)	0.003 (0.015)
Professionalism		*Department Size*	
Log (Number of Direct Hires)	0.068** (0.024)	Log (Number of Patrol Officers-to-Citizens per 100,000 Residents)	0.060*** (0.014)
Log (Number of Pre-Service Hires)	0.089+ (0.048)	*Internal Capacity*	
Leadership		Log (Voluntary Turnover Rate)	0.036*** (0.010)
		Institutional Variables	
Log (Number of Female Supervisors)	0.067+ (0.037)	*Representation*	
Department Size		Log (Ratio of Black Officers-to-Citizens)	-0.00003** (0.000)
Less than 15 Sworn Officers	-0.359*** (0.065)	Log (Ratio of Hispanic Officers-to-Citizens)	0.004 (0.007)
Collective Bargaining Status		*Population*	
Absence of a Collective Bargaining Agreement	-0.131** (0.051)	Log (Population, 2010)	0.242*** (0.012)
Internal Capacity		*Crime Rates*	
Log (Layoff Rates within the Department)	-0.214+ (0.120)	Log (Violent Crime Rates per 100,000 Residents, 2011)	0.041** (0.013)
Institutional Variables			
External Review Board		Log (Property Crime Rate per 100,000 Residents, 2011)	0.051** (0.018)
External Review Board	-0.051 (0.0640	*Jurisdiction Type*	
Representation		County	-0.155*** (0.036)
Log (Ratio of Black Officers-to-Citizens)	-0.004*** (0.000)	State	-0.729*** (0.078)
Log (Ratio of Hispanic Officers-to-Citizens)	0.002 (0.016)	*Region*	
Crime Rates		South	-0.007 (0.033)
Log (Violent Crime Rate per 100,000 Residents, 2011)	-0.055* (0.027)	Midwest	0.044 (0.033)
Log (Property Crime Rate per 100,000 Residents, 2011)	0.084* (0.040)	West	0.048 (0.038)
Jurisdiction Type			
County	-0.267*** (0.059)		
State	0.368+ (0.199)		
Region			
South	0.120 (0.077)		
Midwest	0.015 (0.077)		
West	0.047 (0.091)		
Observations		2,826	
Log Likelihood (Null)		-3,218.952	
Log Likelihood (Model)		-2,499.656	
Degrees of Freedom		39	
AIC		5,077.31	
BIC		5,309.23	
Pseudo R^2		.223	

Notes: Statistical significance is reported as follows: + .10 level, *.05 level, ** at the .01 level, and *** at the .001 level. Robust standard errors are reported in parentheses.

Contrary to expectation, the results demonstrate that for the observed year, increases in the violent crime rate of a jurisdiction reduced the likelihood of police departments' reporting force. However, increases in the property crime rate had the opposite effect, suggesting that crime rates might not impact force decisions in the same way. Moreover, the results revealed that departments' likelihoods of reporting force also differed by their jurisdiction type. For example, the results showed while county departments were less likely than city departments to report using force, state departments were more likely to report using force. The lack of support for region suggests that for the observed year, departments' propensities to report force did not differ by region.

4.2. Factors Influencing the Frequency in which Police Departments' Reported Using Force

Different from expectation, the results of the frequency model did not yield greater support for the influence of institutional factors than rational bureaucratic factors on department's reported force counts. Instead, support was found for the influence of both factors in this model as well. In terms of rational bureaucratic factors, the results revealed that less restrictive administrative policies and practices resulted in greater reported uses of force. Specifically, the results revealed that as the number of weapons authorized increased, so did departments' reported force counts. The same association was also found regarding vehicle pursuits. These findings highlight the ability of administrative policies to allow and constrain behavior.

Unlike the likelihood model, the frequency model did not yield support for the influence of leadership on departments' reported force counts. This lack of support suggests that while female leadership may increase the likelihood of a department reporting force, female leadership does not exacerbate the number of force counts departments' report. Moreover, like the likelihood model, the frequency model found support for the association between turnover and use of force. Specifically, the results revealed that as departments' voluntary turnover rates increased, their reported counts of force increased, suggesting that changes in internal capacity might exacerbate tensions between police and citizens.

In addition, the results yielded support for department size. For example, the results revealed that as the number of patrol officers-to-citizens increased, departments' reported use of force counts increased. This finding suggests as police officers' presence increases, so do their interactions with citizens, thus, increasing departments' reported force counts.

In terms of institutional factors, the frequency model revealed support for the influence of the black-officer-to-citizen ratio in reducing departments' reported force counts. This finding coupled with the finding from the likelihood model suggest that racial representation works to reduce not only departments' likelihood of using force but also the frequency with which they report using it. Not surprisingly, the results revealed that as a jurisdiction's population increased, the number of force counts also increased.

Furthermore, the results for the frequency model also found support for jurisdiction type. Specifically, the results revealed that county and state police departments reported fewer force counts than city police departments. However, consistent with the likelihood model, the frequency model also failed to yield support for regional variations in reports of force. This finding further demonstrates that for the observed year the regions did not differ in their reported counts of force.

5. CONCLUSIONS AND IMPLICATIONS

This research is the first to reveal that police departments' likelihoods of reporting force and their reported force counts are not explained by the same factors. Using a hurdle model, this research reveals that rational bureaucratic and institutional factors explained over one-fifth of police departments' variations in reported force. The findings suggest that both theories have explanatory power and should be analyzed simultaneously in future research regarding force. Therefore, practitioners concerned with reducing force should consider how police

departments' internal and external environments affect their likelihoods of reporting force and their reported counts of force.

Given the findings, this research recommends several actions. First, this research recommends that the national government establish standardized policies for using and reporting force. Second, this research recommends the universal adoption of more stringent pursuit and weapons policies. Third, this research recommends that police departments use technologies not only to gather information regarding criminal activity but also to hold officers accountable and gauge how they use force. Fourth, this research recommends that departments identify strategies to reduce police turnover. And last, but not least, this research recommends that law enforcement agencies make diversity a priority in hiring decisions.

Despite the robustness of this research's findings, the results must be accepted with caution. The LEMAS survey contains departments' self-reports of force which might not reflect their actual counts. Moreover, the cross-sectional nature of this analysis might only provide an understanding of departments' force reports for the observed year. Thus, future research should examine reported force counts in police departments that have responded to LEMAS in two or more survey years to assess the validity of these findings. In addition, subsequent research should analyze new, competing theories to determine how different factors correlate with departments' self-reports of force. Finally, additional research should explore how these factors correlate with different types of force and actions or weapons used. To date, there is no large database that provides this information across police departments. Until these issues are addressed, our understanding of force will remain limited. Still, this research suggests that police decisions do not occur in a vacuum, but result, in part, from the internal and external environments in which police operate.

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