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The impact of neighborhood crime levels on police use of force: An examination at micro and meso levels ☆

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ABSTRACT

Purpose: Neighborhood contextual factors have gained a considerable amount of attention, relating neighborhood crime levels to police force. Prior research mainly examined the relationship either at the police district level or at the city level. The current study intends to investigate the relationship at lower levels of geographic aggregation.
Methods: Using Geographic Information System techniques, the current study utilized four radial buffer zones around each use of force incident location to measure the impact of neighborhood violent criminal activities at the micro level on the level of police force used. In addition, hierarchical linear modeling using neighborhood crime rates within police command areas allowed for a comparison study to measure the impact of neighborhood criminal activities at the meso level on police force.
Results: The current study found that neighborhood crime levels have a significant and positive effect of increasing the level of police force used at the micro level.
Conclusions: The current study supports the work of Black and Smith, concluding that more training and supervision are required for officers working in high crime areas.

Introduction

Since the 1980s scholars have produced a substantial body of research that examines the causes, consequences, and controlling methods of police use of force. Scholars in this field have examined the role of individual and situational characteristics on police use of force, highlighting the importance of race, gender, age, and resistance of suspects in officers' decisions to use force at individual encounter levels (Alpert, Dunham, & MacDonald, 2004; Engel, Sobol, & Worden, 2000; Garner, Buchanan, Schade, & Hepburn, 1996; Gau, Mosher, & Pratt, 2010; Lawton, 2007; Lee, Jang, Yun, Lim, & Tushaus, 2010; Smith, 1986; Terrill & Mastrofski, 2002; Worden, 1989). Based on this research scholars have posited that elevated levels of police force are likely to be applied when officers perceive higher risks of danger or threats to their safety—much of these perceptions result from neighborhood contextual factors (Klinger, 1997; Mastrofski, Reisig, & McCluskey, 2002; Schafer, Huebner, & Bynum, 2003; White, 2003). Inclusion of neighborhood context in analytic models considers that levels of police force may vary across urban neighborhoods (Smith, 1986). Relatively recently, and to a lesser extent, some researchers have expanded their investigation to determine the impact of neighborhood crime levels on police use of force (Lawton, 2007; Lee et al., 2010; Terrill & Reisig, 2003). These studies suggest a positive, although weak, relationship between neighborhood crime levels and police force. That is, as perceptions of the dangerousness of neighborhoods increase so does the likelihood that higher levels of force will be used by police when interacting with suspects.

This finding about an area's impact on use of force, however, must be interpreted with caution. When measuring neighborhood crime levels, most previous research used high levels of geographic aggregation, such as police districts (Lawton, 2007; Terrill & Reisig, 2003) or cities (Lee et al., 2010). These studies using levels of aggregation larger than neighborhoods may not fully capture the true effect of neighborhood crimes on the level of police force because not all segments in a district or city with higher violent crime rates are equally dangerous.

To further previous research, the current study examines police use of force incidents and neighborhood violent crimes at the street level of geographic aggregation. By doing so, the present study fills a gap in research that requires an analysis at lower levels of aggregation regarding the effect of neighborhood violent crimes on police use of force. The current microspatial analysis joins the "crime at places" literature initiated by Eck and Weisburd (1995), arguing that "neighborhoods and/or communities are far from being spatially homogeneous with

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regard to criminal activity" (Anderson & Malleson, 2011, p. 59). As most criminal activities are clustered in a few chronic places (mostly street segments), research in the current field accordingly has to examine the effect of crime levels on police use of force at micro levels. The study also examines the relationship between levels of police force and neighborhood violence levels at the police district level.[1] These two approaches at the street level, as well as at the district level, more precisely appraise the impact of neighborhood violent crimes on the level of force used by police officers.

Literature review

Researchers have paid considerable attention to providing a theoretical basis for explaining police use of force over the last few decades (Worden, 1995). Four major types of approaches have been developed to examine the individual, sociological, neighborhood contextual (ecological), and organizational aspects of police use of force. As the current study does not include any police organizational variables, the literature review only focuses on the first three factors.

Individual approach

The individual approach directs attention to variations among individual police officers when predicting their use of force practices. Police officers' personalities and backgrounds, including age, gender, race, and education level, are thought to produce different behavioral outcomes (Crawford & Burns, 1998; Kane & White, 2009). Of the various personality traits shared by police officers, authority has been the most frequently studied to understand its link with officers' behavior (Crank, 1998). Authority is one of the most important values for the police; therefore, police officers with authoritarian personalities have difficulty tolerating citizens who display a disrespectful demeanor (Westley, 1953, 1970).[2]

Potential danger and authority associated with police occupational culture drive police officers to foster a unique working personality (Crank, 1998; Micucci & Gomme, 2005; Skolnick, 1966). One form of a police officers' working personality is the development of "a perceptual shorthand to identify certain kinds of people as symbolic assailants, that is, as persons who use gesture, language, and attire that [police officers have] come to recognize as a prelude to violence" (Skolnick, 1966, p. 45). Therefore, police officers disproportionately stop, search, arrest, and use force against those symbolic assailants, many of whom are at the bottom of the social hierarchy (Micucci & Gomme, 2005). It is thought that the more an officer adopts this working personality, the more likely they are to use force when interacting with certain types of citizens (i.e., those they define as being defiant).

Sociological approach

One of the most frequently applied perspectives to understanding police use of force proposes that officer behavior is shaped by the dynamic context of police-citizen encounters (Alpert et al., 2004; Worden, 1995). Two main aspects of police encounters with citizens constitute the sociological approach: (1) who the citizens are and (2) what the citizens do during their confrontation with the police (Terrill & Mastrofski, 2002).

Among various sociological perspectives, the most prominent explanation regarding law enforcement activities can be obtained from conflict theories (Thompson & Lee, 2004). Conflict perspectives posit that the political nature of crime and the application of legal systems that protect the powerful result in harsher treatment of lower social class individuals (Chambliss, 1969). Under conflict theories, the powerless or the poor take the position of a threat to the ruling class (Chambliss, 1969; Quinney, 1973; Spitzer, 1975).

Instead of emphasizing wealth and class, some conflict theorists maintain that powerful members of societies perceive racial minorities as a threat to themselves (Blalock, 1967; Hawkins, 1987; Jackson & Carroll, 1981). Indicating that Whites are in political and economic control in the United States, a substantial amount of research reports that racial minorities, especially African-Americans, experience disproportionate victimization during encounters with the criminal justice system (Holmes, 2000; Jacobs & O'Brien, 1998; Liska, Chamlin, & Reed, 1985).

Blalock (1967), in his power-threat theory, presented a more detailed explanation about how race and national origin play a role in becoming easy targets of police force under the premise that every group competes for political and economic control over others. When minority populations increase, majority groups perceive African-Americans, and other non-White minority groups, as a threat to their vested interests. Then, the dominant groups as a response to increased fear of losing political and economic control demand punitive sanctions against the minority groups. Criminal laws and criminal justice systems are used as tools to control the minority groups that are considered to be a threat to those in power (Crow & Johnson, 2008). Therefore, racial and ethnic minorities are exposed to a variety of discrimination, including unjust policing of minority neighborhoods (Chambliss, 2001; Ousey & Lee, 2008).

Black's (1971, 1976) sociological theory of law also offers a useful framework to understanding police decision-making regarding use of force. The main theme of his theory is that quantification of law is possible because "the quantity of law is known by the number and scope of prohibitions, obligations, and other standards to which people are subject, and by the rate of legislation, litigation, and adjudication" (Black, 1976, p. 3). Under his definition of law—governmental social control between a state and citizens—police decisions are also quantifiable because more law represents more arrests, or in this case more use of force (Black, 1980).

Black (1976) also noted that the quantity of law varies in accordance with six social aspects of life: stratification, morphology, culture, organization, social control, and anarchy. Explaining morphology, Black (1976) assumed that social distance between the police and the public determines the amount of law applied, meaning that law is less likely to be applied to individuals who are closer to the police. Therefore, Black's theory develops a hypothesis regarding social asymmetry between police officers and citizens, in which characteristics of both parties in a social setting will determine the amount of law applied against citizens during their encounter with the police (Lawton, 2007). Because White police officers have a relatively wider distance to minority citizens, a greater amount of police force can be expected when White police officers encounter non-White citizens (Lawton, 2007). Further, Black's theory suggests that the ultimate outcomes of police-citizen encounters can be affected by the status of other citizens with which the police interact, including citizens' age, gender, social class, sobriety, offense severity, relationship with complainants, and demeanor; the number of police officers present at the scene and neighborhood characteristics are also relevant (Worden, 1995).

Neighborhood contextual approach

Those who take an ecological approach seek to assess how the type of neighborhood where police-citizen encounters occur affects police discretionary decisions, including use of coercion against citizens (Smith, 1986). Based on Shaw and McKay's (1942) social disorganization theory, researchers have examined police behavior within the context of neighborhood characteristics. While Black's theory focused mainly on the impact of individual level factors, it also hinted to a link between neighborhood context and police use of force; citizens' social and demographic characteristics and neighborhood environmental factors determine the amount of law applied (Black, 1971; Black & Reiss, 1970). Smith (1986, p. 315) clarified Black's theory with respect to the ecological impact on police behavior:

> The less social distance between police and the public, the more police would adopt a helping orientation in their encounters with

citizens. As the social distance increased, two adaptations were possible: police might respond more formally to citizens or, alternatively, be reluctant to become involved at all.

Based on these assumptions, Smith (1986) expanded the application of Black's theory to the neighborhood contextual level. He evaluated the impact of several neighborhood characteristics on police behavior, using observational data collected in 60 neighborhoods in three metropolitan areas. Measures of police behavior included coercive authority, arrest, report, proactive investigation, and proactive assistance. For the neighborhood context, eight variables were adopted in multivariate analyses: crime rates, socioeconomic status, residential stability, interaction, household composition, racial heterogeneity, income heterogeneity, and neighborhood instability. In cases of exercising coercive authority, the inclination to use police coercion is not affected by the race of the suspect encountered but by the overall racial composition of the area where police-citizen encounters occur (Smith, 1986). He also found a negative relationship between police arrest decisions and neighborhood socioeconomic status; that is, arrests were more likely to occur in communities with lower neighborhood socioeconomic status. With these results, Smith (1986) concluded that there was an interaction between police use of force and neighborhood context: the propensity of police to use coercive authority can be influenced by both who the suspect is and where the interaction occurs.

Meanwhile, some research has proposed an opposite hypothesis that less legal authority is applied in lower class and high-crime areas. The "stability of punishment" assumption explains that "society tries to impose a fairly constant level of punishment" (Blumstein & Cohen, 1973, p. 207). In other words, when society becomes more deviant, only serious deviant acts result in punishment. Similarly, the "overload hypothesis" posits that the certainty of punishment decreases when crime rates increase because of the limited capacity of the criminal justice system (Geerken & Gove, 1977; Pontell, 1978).

In addition to these earlier efforts, Klinger (1997) developed an ecological theory of police work, accounting for differential law enforcement during encounters with citizens across neighborhoods. In support of the "overload hypothesis," Klinger (1997) argued that police officers are less likely to apply vigorous formal authority in districts with higher levels of deviance. Klinger's theory might be applied to explain police use of force in accordance with neighborhood context. As Terrill and Reisig (2003) indicated, the applicability of Klinger's theory is open to debate. Regardless of the direction of the influence of neighborhood context, it is evident that there is a link between police use of force practices and ecological factors.

Research gap in neighborhood violent crime levels and police use of force

A paucity of research supports the contention that higher levels of police force are applied in higher crime areas (Garner, Maxwell, & Heraux, 2002; Terrill & Reisig, 2003). When the focus is limited to overall violent crimes, however, their impact on police use of force remains insignificant while positive (Lawton, 2007; Lee et al., 2010). Unfortunately, the generalizability of these previous findings is limited due to: (1) varying measures of neighborhood violent crime levels, and (2) different levels of aggregation for spatial analyses.

With respect to the measures of neighborhood violent crime levels, Garner et al. (2002) examined police-citizen encounter locations that were known for criminal activity or known to be hazardous to police officers in six police jurisdictions. The information on the encounter locations was derived from self-surveys; however, it lacked details on what constituted criminal activity. Moreover, self-report data obtained from officers following their encounters with citizens might suffer critical biases because officers may justify their behavior by characterizing the citizens in a more hazardous way (Lawton, 2007). Instead of using officers' perceptions, Terrill and Reisig (2003) adopted police-recorded homicide rates per 1,000 residents as a measure of neighborhood context in Indianapolis, Indiana, and St. Petersburg, Florida. Although they argued that homicide is the least underreported crime, the exclusion of other types of crimes has a limitation given that homicide rates do not solely constitute high crime areas. In their study, there were 93 homicides in 50 Indianapolis neighborhoods and 23 homicides in 48 St. Petersburg neighborhoods. Compared to the number of neighborhoods in each city, the total number of homicides ($n = 116$) was small. Moreover, the authors noted that the distribution of homicides across neighborhoods was skewed. In contrast, there are a few studies that examined the effect of the overall violent crimes (murder, rape, robbery, and aggravated assault) per 100,000 residents on police use of force. In Lawton's (2007) study, violent crime rates did not show a significant effect on the outcome measure in the Philadelphia setting. Lee et al. (2010), however, found a significant effect of neighborhood violent crime rates on choosing higher levels of police force in eight different cities in the U.S.

Regarding the levels of aggregation for analyses, prior research also shows considerable variation. Garner et al.'s (2002) study did not determine the level of geographical aggregation when measuring criminal activity: It was unclear whether officers perceived criminal activity or potential hazard at the micro level or at the meso level, limiting the generalizability of its findings. The other three studies used neighborhood crime either at the police district level (Lawton, 2007; Terrill & Reisig, 2003) or at the city level (Lee et al., 2010). Terrill and Reisig (2003) used a total of 80 districts in the two cities as their unit of multilevel analysis. The average neighborhood size was 1.39 square miles, ranging from .14 to 4.62 square miles (Terrill & Reisig, 2003).[3] Lawton (2007) used 45 neighborhoods in Philadelphia, Pennsylvania. According to his earlier version of the study (Lawton, 2006), the average neighborhood size was 3.17 square miles, with 2.41 square miles of standard deviation. Finally, Lee et al.'s (2010) study compared police use of force practices at the city level, using eight police departments. The meso approaches at the district or higher level combined with low between-unit variations may distort contextual coefficients (Kaminski, Jefferis, & Gu, 2003; Lawton, 2007)

In sum, the dearth of research on the predictors of the police use of force at the micro level is evident. Therefore, research at the street level is needed to uncover the contextual effects at lower levels of aggregation. Moreover, no attempt has been made to simultaneously examine the impact of neighborhood violent crimes on police use of force at the micro and meso levels in a single study, which may help measuring any possible differences between the two approaches. Accordingly, the current study developed the following research hypotheses:

Research Hypothesis 1. There is a significant relationship between the levels of police force and the number of neighborhood violent crime incidents at the micro level of aggregation.

Research Hypothesis 2. There is a significant relationship between the levels of police force and neighborhood violent crime rates at the meso level of aggregation (i.e., police district).

Methods

Data

The current study used self-report police use of force incidents between January 1, 2006, and December 31, 2007, that were obtained from the Austin, Texas, Police Department (APD). All APD officers are mandated to report and document all uses of force. The following details were collected in addition to the types of force used: date information, reason for contact, demographic information of officer (rank, race, and gender), demographic information of citizen (race, gender, and age), citizen actions, and injury to officer and citizen. Second, each use of

force report was matched to incident reports that detail every police-citizen encounter, from which the type of offense and geographical information of each incident were retrieved. Third, age and education levels of officers who completed use of force reports were obtained from the Texas Commission on Law Enforcement Officer Standards and Education. Fourth, all reported violent crimes between January 1, 2005, and December 31, 2007, were obtained from the department. A total of 1,763 use of force reports were originally completed by APD officers during the study period. During the study period, there occurred only two deadly force incidents in the APD. As the total number of deadly force incidents was too small to constitute a separate category, those two incidents were excluded from the current analysis. After deleting missing values, cases involving deadly force, and incidents that occurred outside of the APD jurisdiction, 1,459 use of force incidents were finally analyzed.

Variables

Dependent variable

The outcome variable in the current study is the highest level of force applied by the officer during the encounter with citizens. Because of the low frequencies of using impact munitions, chemical munitions, diversion devices, firearms, canines, and other force, the current analyses excluded any incidents involving those rarely used force options. Despite some disagreement on the proper placement of oleoresin capsicum spray (OC spray) and Tasers, recent research proposed a hierarchical order that is similar to the use of force continuum used by the APD (International Association of Chiefs of Police, 2001; Lawton, 2007; Lee et al., 2010).[4] Following the hierarchical order that the IACP uses, the current study adopted a multinomial measure of police force in which "soft empty hand control" is the reference category (impact weapon = 0, electronic shocking device = 1, OC spray = 2, hard empty hand control = 3, and soft empty hand control = 4).[5]

Neighborhood violent crime levels at the micro level

Among various GIS mapping techniques, radial buffers have been widely used when calculating the number of criminal events of interest within these buffer areas (Zandbergen, Levenson, & Hart, 2010). To capture the spatial impact of neighborhood violence at the micro level on levels of police force, the current study generated four radial buffer zones (500 feet, 1,000 feet, 2,000 feet, and 3,000 feet) around every location where police force was used. Compared to previous studies (Lawton, 2007; Lee et al., 2010; Terrill & Reisig, 2003), these neighborhood crime buffer zones allow for the investigation of the contextual effects at much lower levels of aggregation: 500 feet buffer zone = .027 square miles, 1,000 feet buffer zone = .113 square miles, 2,000 feet buffer zone = .451 square miles, and 3,000 feet buffer zone = 1.014 square miles. The current study evaluated violent crimes (murder, rape, robbery, and aggravated assault) that occurred within each of the four buffer zones for the 12 months prior to each police use of force incident.

Neighborhood violent crime levels at the meso level

For comparison purposes, the current study also used neighborhood violent crime rates at the meso level. The APD crime data in 2005 were spatially merged with the APD's nine command area shape files. Then, the calculated violent crime rates per 1,000 residents within each of the APD's nine command areas were included in the analyses.

Statistical analyses

The current study adopted two analytic strategies: multinomial logistic regression and hierarchical generalized linear modeling (HGLM). Multinomial logistic regression was employed to test the impact of neighborhood crime at the micro level on levels of police force. HGLM was used to examine their relationship at the meso level. Treating "soft empty hand control" as the reference category, the present study created four independent logit submodels at the micro level and at the meso level, respectively.[6]

Results

Descriptive analyses

Descriptive statistics of each variable in this study are presented in Table 1. Results show that APD officers used weaponless tactics in almost half of the encounters with citizens (soft empty hand control, 31.8%; hard empty hand control, 19.5%). When weapons became involved, APD officers were more likely to rely on nonimpact weapons, such as Tasers (18.8%) and OC spray (26.6%), than impact weapons (3.3%).

The average citizen in a use of force incident was approximately 29-years-old, male (88.1%), and non-White (64.8%). With respect to officer characteristics, the average officer in the current sample was about 34-years-old, male (94.7%), and White (70.4%). Slightly more than one-third of officers (37.6%) possessed a bachelor's degree or higher. In 46.6% of cases, White police officers encountered non-White citizens. The vast majority of citizens (94.0%) in this study resisted officers during an encounter to a certain degree. Only 6.0% of citizens in the sample were either cooperative or resisted passively. The rest of the citizens showed different levels of resistance: firearm/edge (3.3%), empty hand active aggression (51.7%), empty hand defensive aggression (31.5%), and verbal resistance/aggression (7.5%).

APD officers encountered an average of 1.75 citizens in a use of force situation. An average of 1.63 officers responded to a use of force incident. With respect to the nature of police-citizen encounters, the current sample includes 107 violent crimes (7.3%) and 196 drug-related crimes (13.4%). Regarding the reason for contact, approximately

Table 1
Measurements and Descriptive Statistics for Variables in the Analysis (n = 1,459)

Variable	*n*	%	*M*
Dependent variable			
0 = Impact weapon	48	3.3	
1 = Electronic shocking device	275	18.8	
2 = OC spray	388	26.6	
3 = Hard empty hand control	284	19.5	
4 = Soft empty hand control (reference)	464	31.8	
Citizen characteristics			
Citizen age	–	–	28.96
Citizen gender (1 = male)	1,286	88.1	0.88
Citizen race (1 = non-White)	945	64.8	–
Officer characteristics			
Officer age	–	–	33.56
Officer gender (1 = male)	1,382	94.7	0.95
Office race (1 = White)	1,027	70.4	0.70
Officer education (1 = bachelor or higher)	548	37.6	0.38
Situational characteristics			
Race interaction (1 = WO/NWC)	680	46.6	0.47
Citizen resistance			2.38
0 = cooperative/passive	48	3.3	
1 = verbal resistance/aggression	755	51.7	
2 = empty hand defensive resistance	459	31.5	
3 = empty hand active aggression	109	7.5	
4 = firearm/edged weapon	88	6.0	
Number of citizens present	–	–	1.75
Number of officers present	–	–	1.63
Violent crime (1 = yes)	107	7.3	0.07
Drug crime (1 = yes)	196	13.4	0.13
Officer initiated (1 = yes)	500	34.3	0.34
Arrest (1 = yes)	1,175	80.5	0.81
Neighborhood violent crime at the micro level			
Within the 500 feet buffer zone			10.61
Within the 1,000 feet buffer zone			30.03
Within the 2,000 feet buffer zone			67.68
Within the 3,000 feet buffer zone			101.26
Neighborhood violent crime rates at the meso level			
Violent crime rates per 1,000 population			5.62

Table 2
Multinomial Logistic Regression Analyses Using Neighborhood Violent Crimes at the Micro Level

Variable	Model 1 (500 feet zone)		Model 2 (1,000 feet zone)		Model 3 (2,000 feet zone)		Model 4 (3,000 feet zone)	
	OR	95% CI	*OR*	95% CI	*OR*	95% CI	*OR*	95% CI
Contrast 1 (Impact weapon vs. Soft empty hand control)								
Citizen age	0.959	[0.917, 1.002]	0.959	[0.916, 1.003]	0.960	[0.917, 1.005]	0.957	[0.915, 1.002]
Citizen gender	9.933*	[1.291, 76.042]	10.511*	[1.359, 81.312]	9.453*	[1.224, 73.003]	9.432*	[1.224, 72.668]
Citizen race	0.581	[0.189, 1.781]	0.590	[0.191, 1.816]	0.621	[0.202, 1.908]	0.614	[0.200, 1.883]
Officer age	1.017	[0.960, 1.077]	1.018	[0.961, 1.078]	1.021	[0.964, 1.082]	1.020	[0.963, 1.080]
Officer gender	2.035	[0.253, 16.352]	1.956	[0.242, 15.836]	1.910	[0.236, 15.470]	1.894	[0.234, 15.309]
Officer race	0.764	[0.284, 2.058]	0.746	[0.275, 2.021]	0.736	[0.271, 1.998]	0.750	[0.277, 2.027]
Officer education	0.355*	[0.153, 0.822]	0.361*	[0.156, 0.837]	0.365*	[0.157, 0.849]	0.351*	[0.151, 0.815]
Race interaction	0.986	[0.267, 3.633]	0.960	[0.259, 3.556]	0.976	[0.264, 3.607]	0.957	[0.259, 3.530]
Citizen resistance	3.739***	[2.148, 6.509]	3.662***	[2.096, 6.397]	3.773***	[2.167, 6.570]	3.917***	[2.249, 6.821]
Number of citizens present	0.758	[0.162, 3.552]	0.719	[0.153, 3.379]	0.731	[0.156, 3.437]	0.736	[0.157, 3.457]
Number of officers present	1.469	[0.290, 7.434]	1.542	[0.304, 7.830]	1.468	[0.290, 7.444]	1.471	[0.290, 7.456]
Violent crime	4.267**	[1.456, 12.499]	4.264**	[1.443, 12.598]	3.677*	[1.257, 10.753]	3.289*	[1.131, 9.564]
Drug crime	1.284	[0.406, 4.059]	1.358	[0.428, 4.303]	1.195	[0.380, 3.763]	1.086	[0.346, 3.404]
Officer initiated	3.281**	[1.477, 7.287]	2.342*	[1.026, 5.347]	2.488*	[1.111, 5.569]	3.157**	[1.457, 6.841]
Arrest	1.357	[0.492, 3.741]	1.314	[0.473, 3.647]	1.301	[0.469, 3.612]	1.378	[0.499, 3.806]
Neighborhood violent crime at the micro level	1.059**	[1.024, 1.095]	1.031***	[1.017, 1.045]	1.016***	[1.009, 1.024]	1.010***	[1.005, 1.016]
Contrast 2 (Electronic shocking device vs. Soft empty hand control)								
Citizen age	1.001	[0.985, 1.017]	1.001	[0.985, 1.018]	1.001	[0.985, 1.018]	1.000	[0.984, 1.017]
Citizen gender	4.876***	[2.587, 9.189]	4.904***	[2.600, 9.248]	4.871***	[2.580, 9.197]	4.824***	[2.556, 9.104]
Citizen race	1.248	[0.688, 2.266]	1.238	[0.681, 2.248]	1.239	[0.681, 2.252]	1.233	[0.679, 2.240]
Officer age	1.049***	[1.021, 1.078]	1.049***	[1.021, 1.077]	1.050***	[1.022, 1.078]	1.049***	[1.021, 1.078]
Officer gender	0.640	[0.316, 1.293]	0.637	[0.314, 1.295]	0.601	[0.296, 1.219]	0.586	[0.289, 1.189]
Officer race	0.726	[0.417, 1.262]	0.710	[0.408, 1.237]	0.705	[0.405, 1.226]	0.710	[0.408, 1.234]
Officer education	0.866	[0.612, 1.226]	0.866	[0.612, 1.225]	0.869	[0.614, 1.231]	0.862	[0.609, 1.220]
Race interaction	1.452	[0.739, 2.854]	1.471	[0.747, 2.896]	1.479	[0.751, 2.910]	1.463	[0.744, 2.875]
Citizen resistance	2.797***	[2.264, 3.457]	2.779***	[2.249, 3.435]	2.806***	[2.270, 3.468]	2.810***	[2.274, 3.472]
Number of citizens present	0.785	[0.328, 1.880]	0.752	[0.314, 1.803]	0.781	[0.325, 1.875]	0.802	[0.334, 1.925]
Number of officers present	0.789	[0.312, 1.995]	0.824	[0.325, 2.087]	0.781	[0.307, 1.984]	0.761	[0.300, 1.930]
Violent crime	2.618**	[1.447, 4.738]	2.592**	[1.426, 4.711]	2.531**	[1.394, 4.597]	2.411**	[1.331, 4.370]
Drug crime	0.943	[0.576, 1.543]	0.941	[0.576, 1.538]	0.920	[0.563, 1.505]	0.905	[0.554, 1.478]
Officer initiated	0.866	[0.555, 1.352]	0.763	[0.483, 1.203]	0.770	[0.491, 1.209]	0.829	[0.536, 1.282]
Arrest	0.720	[0.478, 1.086]	0.712	[0.472, 1.076]	0.699	[0.463, 1.057]	0.714	[0.473, 1.077]
Neighborhood violent crime at the micro level	1.020*	[1.000, 1.040]	1.011**	[1.004, 1.019]	1.006**	[1.002, 1.010]	1.004**	[1.001, 1.006]
Contrast 3 (OC spray vs. Soft empty hand control)								
Citizen age	0.984	[0.967, 1.001]	0.984	[0.967, 1.002]	0.984	[0.967, 1.002]	0.982*	[0.965, 1.000]
Citizen gender	1.979**	[1.217, 3.216]	2.050**	[1.252, 3.358]	1.951**	[1.191, 3.195]	1.941**	[1.191, 3.164]
Citizen race	0.792	[0.432, 1.453]	0.788	[0.427, 1.456]	0.790	[0.427, 1.460]	0.786	[0.427, 1.447]
Officer age	0.986	[0.958, 1.015]	0.990	[0.962, 1.019]	0.988	[0.960, 1.018]	0.987	[0.959, 1.016]
Officer gender	0.629	[0.316, 1.253]	0.594	[0.297, 1.187]	0.563	[0.279, 1.135]	0.549	[0.272, 1.106]
Officer race	0.947	[0.558, 1.609]	0.919	[0.538, 1.571]	0.900	[0.526, 1.539]	0.929	[0.545, 1.583]
Officer education	0.876	[0.627, 1.224]	0.906	[0.647, 1.268]	0.893	[0.636, 1.253]	0.858	[0.613, 1.201]
Race interaction	1.334	[0.678, 2.625]	1.373	[0.692, 2.723]	1.409	[0.710, 2.796]	1.377	[0.697, 2.720]
Citizen resistance	1.703***	[1.423, 2.039]	1.676***	[1.398, 2.009]	1.693***	[1.412, 2.031]	1.721***	[1.436, 2.061]
Number of citizens present	5.279***	[2.965, 9.400]	5.079***	[2.831, 9.114]	4.983***	[2.767, 8.972]	5.136***	[2.863, 9.214]
Number of officers present	0.105***	[0.055, 0.201]	0.109***	[0.056, 0.210]	0.109***	[0.056, 0.211]	0.107***	[0.055, 0.206]
Violent crime	1.518	[0.792, 2.909]	1.484	[0.770, 2.860]	1.373	[0.711, 2.652]	1.225	[0.637, 2.720]
Drug crime	0.519*	[0.296, 0.908]	0.533*	[0.304, 0.934]	0.489*	[0.278, 0.860]	0.449**	[0.256, 0.786]
Officer initiated	2.395***	[1.625, 3.530]	1.826**	[1.217, 2.739]	1.845**	[1.237, 2.750]	2.304***	[1.572, 3.376]
Arrest	0.651*	[0.437, 0.970]	0.606*	[0.406, 0.905]	0.606*	[0.404, 0.909]	0.651*	[0.435, 0.973]
Neighborhood violent crime at the micro level	1.059***	[1.041, 1.078]	1.029***	[1.022, 1.036]	1.015***	[0.012, 1.019]	1.010***	[1.007, 1.013]
Contrast 4 (Hard empty hand control vs. Soft empty hand control)								
Citizen age	0.995	[0.979, 1.012]	0.996	[0.980, 1.012]	0.996	[0.980, 1.012]	0.995	[0.979, 1.011]
Citizen gender	3.016***	[1.732, 5.252]	3.069***	[1.760, 5.349]	3.007***	[1.725, 5.243]	2.987***	[1.713, 5.207]
Citizen race	1.138	[0.603, 2.148]	1.138	[0.602, 2.150]	1.140	[0.603, 2.154]	1.133	[0.600, 2.141]
Officer age	0.986	[0.958, 1.014]	0.987	[0.960, 1.015]	0.986	[0.958, 1.014]	0.986	[0.958, 1.014]
Officer gender	1.261	[0.575, 2.766]	1.243	[0.567, 2.727]	1.190	[0.542, 2.615]	1.158	[0.526, 2.547]
Officer race	1.297	[0.730, 2.306]	1.281	[0.720, 2.278]	1.262	[0.710, 2.246]	1.269	[0.714, 2.257]
Officer education	0.731	[0.526, 1.018]	0.730	[0.525, 1.015]	0.734	[0.527, 1.022]	0.728	[0.523, 1.012]
Race interaction	1.066	[0.529, 2.150]	1.087	[0.538, 2.194]	1.084	[0.537, 2.189]	1.071	[0.531, 2.162]
Citizen resistance	1.924***	[1.597, 2.318]	1.922***	[1.594, 2.317]	1.939***	[1.609, 2.337]	1.947***	[1.616, 2.347]
Number of citizens present	0.737	[0.341, 1.591]	0.702	[0.324, 1.521]	0.722	[0.332, 1.568]	0.738	[0.340, 1.603]
Number of officers present	1.202	[0.529, 2.732]	1.283	[0.562, 2.927]	1.206	[0.527, 2.760]	1.179	[0.516, 2.697]
Violent crime	1.615	[0.853, 3.056]	1.577	[0.832, 2.989]	1.533	[0.807, 2.909]	1.451	[0.765, 2.751]
Drug crime	1.883**	[1.249, 2.839]	1.839**	[1.222, 2.768]	1.798**	[1.194, 2.708]	1.752**	[1.164, 2.637]
Officer initiated	1.144	[0.761, 1.722]	1.036	[0.682, 1.572]	1.043	[0.692, 1.574]	1.122	[0.754, 1.669]
Arrest	0.800	[0.532, 1.202]	0.789	[0.525, 1.187]	0.777	[0.516, 1.169]	0.793	[0.527, 1.192]
Neighborhood violent crime at the micro level	1.031**	[1.012, 1.050]	1.014***	[1.007, 1.021]	1.007***	[1.004, 1.011]	1.005***	[1.002, 1.008]
-2 Log Likelihood	3.525		3.500		3.491		3.510	
Model $\chi^2(df)$	661.683***(64)		694.761***(64)		697.016***(64)		677.596***(64)	
Nagelkerke R^2	.391		.405		.407		.398	

Note. The reference category is "soft empty hand control."
*$p < .05$, **$p < .01$, ***$p < .001$.

one-third of the encounters (34.3%) were prompted when officers observed ongoing criminal activities. A total of 1,175 citizens (80.5%) were eventually arrested after their encounter with the police.

Within the 500 feet radial buffer zone, there occurred an average of 10.61 violent crimes. The number of violent crimes that occurred within the buffer zones increased as the size of concentric rings also increased: 30.03 violent crimes within the 1,000 feet buffer zone, 67.68 violent crimes within the 2,000 feet buffer zone, and 101.26 violent crimes within the 3,000 feet buffer zone. The average violent crime rates per 1,000 population of the nine command areas in 2005 were 5.62.

Multinomial logistic regression analyses

Table 2 represents the results of multinomial logistic regression analyses for the impact of neighborhood crimes at the micro level on police use of force. In Contrast 1 of Model 1, the log-odds of choosing an "impact weapon" relative to a "soft empty hand control" became significantly higher when citizens were male, they resisted the police with higher levels of force, police-citizen interactions were caused by violent crimes, and encounters were initiated by officers. On the contrary, the log-odds became significantly lower when police officers had higher education. The total number of violent crimes within the 500 feet buffer zone, the main independent variable in the current study, showed a statistically significant and positive effect of increasing the log-odds of using an "impact weapon." In the second contrast of Model 1, the log-odds of choosing an "electronic shocking device" relative to a "soft empty hand control" were significantly related to citizen gender (*Odds-Ratio* [*OR*] = 4.876), officer age (*OR* = 1.049), citizen resistance (*OR* = 2.797), and violent crime (*OR* = 2.618). The number of violent crimes in the 500 feet buffer zone also showed a positive and significant effect on increasing the log-odds of using an "electronic shocking device" relative to the reference category.

In Contrast 3 of Model 1, statistically significant variables that affected the log-odds of choosing "OC spray" relative to the reference category included: citizen gender (*OR* = 1.979), citizen resistance (*OR* = 1.703), number of citizens present (*OR* = 5.279), number of officers present (*OR* = 0.105), drug crime (*OR* = 0.519), officer initiated (*OR* = 2.395), and arrest (*OR* = 0.651). The number of violent crimes in the 500 feet buffer zone was also statistically significant, increasing the probabilities of using "OC spray." In the final contrast of Model 1, citizen gender, citizen resistance, and drug crime increased the log-odds of choosing "hard empty hand control" tactics with statistical significance. The total number of violent crimes in the 500 feet buffer zone was still statistically significant in increasing the log-odds of choosing "hard empty hand control" tactics. Regardless of the levels of police force, the violent crime level in the 500 feet buffer zone had a statistically significant and positive effect on police use of force.

As explained, Model 2 used the total number of violent crimes within the 1,000 feet buffer zone. In Model 2, the significance levels of all variables showed no discrepancy with those in Model 1. The total number of violent crimes within the 1,000 feet buffer zone also produced a statistically significant and positive impact on police force in all contrasts. The total number of violent crimes within the 2,000 feet buffer zone was added in Model 3. As in the previous model, the significance levels remained constant in the current model. The total number of violent crimes within the 2,000 feet buffer zone increased the log-odds in all contrasts. Finally, Model 4 used the total number of violent crimes within the 3,000 feet buffer zone. With the exception of citizen age becoming significant (*OR* = 0.982) in Contrast 3, the significance levels of all variables in this model remained unchanged. The number of violent crimes in the 3,000 feet buffer zone was statistically significant in all contrasts, increasing the log-odds of using higher levels of force.

In sum, the impact of neighborhood violent crime at the micro level on police use of force was strong. Regardless of the levels of aggregation, the probabilities of using more severe force than the reference category were statistically significant. Nevertheless, the effect of the violent crime at the micro level on the outcome variable became weaker as the size of radial buffers increased. In the case of Contrast 1, the *Odds-Ratio* in the 500 feet buffer zone model (Model 1) was 1.059; however, the values in the other models were 1.031 in the 1,000 feet buffer zone model (Model 2), 1.016 in the 2,000 feet buffer zone model (Model 3), and 1.010 in the 3,000 feet buffer zone model (Model 4). In the case of Contrast 2, the *Odds-Ratio* decreased from 1.020 in the 500 feet buffer zone model (Model 1) to 1.004 in the 3,000 feet buffer zone model (Model 4). Similar patterns were observed in the other two contrasts. Therefore, violent crime in the 500 feet buffer zone showed the most powerful influence on police use of force.[7]

Multinomial hierarchical generalized linear modeling analyses

Table 3 presents the results of HGLM analyses.[8] In Contrast 1, the log-odds of using an "impact weapon" relative to a "soft empty hand control" became significantly higher when citizens were male, they resisted the police, and they committed violent crimes. The log-odds became significantly lower when officers had a bachelor's or higher degree. Violent crime rates at the meso level did not significantly affect the log-odds of choosing an "impact weapon" compared to a "soft empty hand control." In Contrast 2, the log-odds of choosing an "electronic shocking device" relative to a "soft empty hand control" were significantly related with citizen gender (*OR* = 4.638), officer age (*OR* = 1.053), citizen resistance (*OR* = 2.821), and violent crime (*OR* = 2.505). Neighborhood violent crime rates at the meso level were not statistically significant in the second contrast, either.

In Contrast 3, the log-odds of using "OC spray" relative to a "soft empty hand control" were significantly related with citizen age (*OR* = 0.981), citizen gender (*OR* = 1.715), citizen resistance (*OR* = 1.684), number of citizens present (*OR* = 5.437), and number of officers present (*OR* = 0.102). Neighborhood violent crime rates at the meso level also failed to reach significance. In Contrast 4, the log-odds of using a "hard empty hand control" relative to a "soft empty hand control" was significantly affected by citizen gender (*OR* = 2.832), officer education (*OR* = 0.690), citizen resistance (*OR* = 1.935), and drug crime (*OR* = 1.788). Unlike in the other three contrasts, neighborhood violent crime rates at the meso level significantly increased the log-odds of using a "hard empty hand control" relative to a "soft empty hand control."

In sum, the overall impact of neighborhood violent crime rates at the meso level across the APD's nine command areas on police use of force was diminished compared to the neighborhood violent crimes at the micro level. Neighborhood violent crime rates did not significantly increase the log-odds of using an "impact weapon," an "electronic shocking device," and "OC spray" relative to the reference category.

Discussion and conclusion

The current study explored the relationship between neighborhood violence and police use of force at two levels of aggregation based on the work of Black (1976), Smith (1986), and Klinger (1997). The impact of neighborhood violence on police force has been often tested; however, no study has simultaneously examined the role of neighborhood violent crimes at the micro level and at the meso level.

Regarding the individual and situational factors, the results of the current study showed no discrepancy with prior research. Blalock's (1967) power-threat theory and Black's (1976) sociological theory of law have often been used to test if minority individuals are disproportionately subject to police use of force. Modern research, however, has shown that citizen race or officer race does not significantly affect levels of police force when citizen resistance to the police is statistically controlled (Garner et al., 2002; Lawton, 2007; Lee et al., 2010; Terrill & Reisig, 2003). The current study also found that citizen race and officer

Table 3
Multinomial HGLM Analyses Using Neighborhood Violent Crimes at the Meso Level

Variable	Contrast1		Contrast 2		Contrast 3		Contrast 4	
	OR	95% CI	*OR*	95% CI	*OR*	95% CI	*OR*	95% CI
Level 1								
Citizen age	0.955	[0.912, 1.001]	1.001	[0.985, 1.017]	0.981*	[0.964, 0.999]	0.995	[0.979, 1.011]
Citizen gender	8.273*	[1.063, 64.359]	4.638***	[2.450, 8.780]	1.715*	[1.033, 2.848]	2.832**	[1.617, 4.960]
Citizen race	0.683	[0.219, 2.129]	1.176	[0.636, 2.174]	0.816	[0.429, 1.549]	1.056	[0.552, 2.019]
Officer age	1.031	[0.971, 1.095]	1.053***	[1.025, 1.082]	0.993	[0.963, 1.023]	0.991	[0.963, 1.020]
Officer gender	1.894	[0.232, 15.478]	0.636	[0.310, 1.306]	0.566	[0.279, 1.150]	1.284	[0.581, 2.838]
Officer race	0.678	[0.246, 1.866]	0.683	[0.391, 1.193]	0.789	[0.452, 1.377]	1.205	[0.674, 2.157]
Officer education	0.338*	[0.145, 0.791]	0.842	[0.594, 1.193]	0.834	[0.590, 1.179]	0.690*	[0.495, 0.963]
Race interaction	1.005	[0.269, 3.757]	1.559	[0.788, 3.083]	1.546	[0.764, 3.131]	1.145	[0.564, 2.325]
Citizen resistance	3.740***	[2.116, 6.612]	2.821***	[2.280, 3.491]	1.684***	[1.397, 2.029]	1.935***	[1.603, 2.337]
Number of citizens present	0.845	[0.177, 4.028]	0.764	[0.316, 1.844]	5.437***	[2.948, 10.030]	0.752	[0.344, 1.647]
Number of officers present	1.274	[0.248, 6.533]	0.822	[0.321, 2.103]	0.102***	[0.051, 0.203]	1.187	[0.515, 2.741]
Violent crime	4.316*	[1.432, 13.003]	2.505**	[1.373, 4.573]	1.597	[0.815, 3.128]	1.611	[0.846, 3.070]
Drug crime	1.375	[0.429, 4.411]	0.909	[0.555, 1.491]	0.573	[0.321, 1.020]	1.788**	[1.181, 2.708]
Officer initiated	1.810	[0.846, 3.874]	0.724	[0.474, 1.104]	1.409	[0.932, 2.130]	0.955	[0.643, 1.419]
Arrest	1.353	[0.487, 3.761]	0.770	[0.508, 1.166]	0.661	[0.436, 1.000]	0.839	[0.555, 1.268]
Intercept	0.020***	[0.007, 0.058]	0.454***	[0.336, 0.614]	0.345*	[0.176, 0.676]	0.518**	[0.372, 0.720]
Level 2								
Neighborhood violent crime at the meso level	1.324	[0.928, 1.890]	1.108†	[0.997, 1.232]	1.277†	[1.004, 1.623]	1.150*	[1.021, 1.296]
Random effect								
χ^2	65.317***		13.507†		132.562***		23.084**	
Variance	0.798		0.067		0.683		0.109	
Reliability estimate	.498		.491		.839		.609	

Note. The reference category is "soft empty hand control."
$^{\dagger} < .10$ (only for level 2), $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

race do not significantly alter the amount of police force used; instead, citizen resistance during their encounter with the police was found to be the single most important factor in explaining elevated levels of police force.[9] In addition, citizen age, citizen gender, officer age, officer education level, number of citizens involved, number of officers involved, and the nature of the offense were statistically significant, which is consistent with previous research (Alpert, Dunham, & Stroshine, 2006; Garner et al., 2002; Lawton, 2007; Lee et al., 2010).

For Research Research Hypothesis 1, about neighborhood violence at the micro level, the current study found that the total number of violent crimes that occurred within the four radial buffer zones for the last one year had a significant and positive effect of increasing the chances of using higher levels of police force compared to a "soft empty hand control." This finding was consistent across the four buffer zones; however, the strength of the neighborhood violent crime effect decreased as the buffer zones expanded. Stated differently, officers were more likely to use higher levels of force in a neighborhood with higher levels of violent crimes at lower levels of aggregation. The increasing size of radial buffers attenuated the neighborhood violence effect because higher levels of aggregation could blur its genuine effect by including more distant, non-attributable violent criminal events within large-sized radial buffers.

For comparison purposes, the current study developed a second research hypothesis: if neighborhood crime at the meso level can affect police use of force? For Research Research Hypothesis 2, about neighborhood violence at the meso level, unlike at the micro level, did not show a significant and positive effect in increasing the log-odds of choosing an "impact weapon," an "electronic shocking device," or "OC spray" relative to a "soft empty hand control." The neighborhood violent crime rates at the meso level were only significant in increasing the log-odds of using a "hard empty hand control" relative to a "soft empty hand control." As in the studies of Lawton (2007) and Lee et al. (2010), the other three higher force options only produced a positive sign with no statistical significance.

With the findings at the micro level, the current study supports the work of Black (1976) and Smith (1986) that there is an interaction between neighborhood criminal context and levels of police force. The adoption of the four radial buffer zones empirically supports the literature that police officers are more likely to use higher levels of force when they respond to places known for violent crimes. It is noteworthy that the effect of neighborhood violent crimes on police force depends on the level of aggregation in measuring neighborhood violence. Despite the statistically significant effect of neighborhood violent crime levels at the street level, the current study failed to produce a significant effect on choosing higher levels of police force at the district level. As aforementioned, not every street corner in a police district is similarly violent (Sherman, Gartin, & Buerger, 1989). Using multilevel analyses of police use of force incidents especially nested in large-sized districts may not fully consider low within-unit variation in a district, which, in turn, curtails the true effect of neighborhood crime levels on police use of force. Indeed, Lawton's (2007) multilevel study using relatively large-sized districts also produced only marginally significant effects of neighborhood violent crime rates on higher levels of police force. Put simply, location matters. Moreover, levels of aggregation matter most.

Ideally, factors other than legal factors should not affect police decision-making processes about when to use force or how much force to use (Eitle, 2005). It appears that extralegal factors have played a role in police use of force as witnessed in various high-profile police brutality incidents,[10] endangering police legitimacy. It is also true that police officers are exposed to potential danger, especially when they respond to a high-crime area. Nevertheless, entering a dangerous neighborhood does not justify police use of excessive force because the neighborhood context is a form of extralegal factors. As the current study found, however, police officers have a tendency to use higher levels of force in areas with higher violent crimes. Of course, none of the relatively higher levels of force in the current study sample was found illegal or excessive as the officers exercised discretion to choose a force option within acceptable legal boundaries. Although the tendency to use higher levels of force that is influenced by the neighborhood context does not necessarily entail an issue of excessive force, proper police management acknowledges that lesser force is ideal in resolving encounters with citizens in an effort to curtail unnecessary claims of police excessive force.

In this regard, police administrators, supervisors, and officers must make an extra effort to reduce the role of extralegal factors in police use of force. Most large police departments in the United States are now equipped with crime analysis tools, including GIS programs. As shown

in this study, these techniques also can be used to analyze the patterns of police use of force. By pinpointing high-crime areas, as well as locations inviting frequent and severe use of force, police organizations can provide more training and supervision to officers who work in violent crime areas.

Despite its contribution to the literature on the impact of neighborhood violent crime levels on police use of force, the current study leaves an important task for future research. As aforementioned, research in this field has seldom attempted to examine the patterns of police use of force at the national level. The lack of nation-wide data on police use of force exposes research findings to the issues of threats to external validity. Although it is very difficult, future studies are expected to utilize a larger number of police departments in their analyses. Due to the data limitation, the current study could not explore the interaction effects between citizen characteristics and their demeanor toward the police (i.e., the effect of sobriety on demeanor) of which importance an earlier study emphasized (Engel et al., 2000). Another limitation in the current study is its failure to incorporate other neighborhood contextual factors. Future studies are expected to use more detailed information, including neighborhood racial composition, socioeconomic status, residential stability, and levels of social disadvantage. These efforts will address possible correlations between police use of force and other neighborhood contexts.

Notes

[1] In the current study, the micro level analysis refers to a street level analysis using radial buffer zones (500 feet to 3,000 feet) to measure neighborhood violent crime levels. For the meso level analysis, the study used violent crime rates in each police district.

[2] Van Maanen (1974) envisioned three types of citizens that police officers may encounter: (1) "suspicious persons"—police officers believe these individuals may have committed a serious crime, (2) "assholes"—those people fail to accept the police definition of the situation, and (3) "know nothings"—normal and respectable citizens who do not belong in the first two categories. Among those three types of citizens, police officers believe the "assholes," who challenge, question, and criticize police authority, are in need of an attitude adjustment (Van Maanen, 1978). Accordingly, police officers are more likely to invoke the law or to use force against the "assholes." Moreover, the "assholes" may receive street justice or "justice without trial," that is, "a response to a community mandate that something be done about situations where formal institutions cannot or will not respond to for a variety of reasons" (Sykes, 1986, p. 498). Not granted individual rights as human beings, the "assholes" are easily exposed to physical attacks and punishment by the police (Klockars, 1986; Van Maanen, 1978; Wilson, 1968; Worden, Shepard, & Mastrofski, 1996).

[3] The U.S. Census Bureau (2010) reports the size of each city: Indianapolis = 361.5 square miles and St. Petersburg = 59.6 square miles.

[4] The placement of OC spray and/or Tasers does not affect the overall findings as the present study adopts multinomial logistic regression models, comparing each of the four types of police force to "soft empty hand control," respectively. It is evident that OC spray and Tasers are more, at least slightly, severe than use of soft empty hand control, which helps avoiding any debate over the placement of OC spray and Tasers.

[5] A "soft empty hand control" includes joint locks, pressure points, or escort holds whereas a "hard empty hand control" refers to hand or leg strikes. The dependent variable was reverse coded for the multinomial logistic regression analysis in SPSS.

[6] Each model created four independent logit submodels with a "soft empty hand control" as the reference category: Contrast 1 = an "impact weapon" versus a "soft empty hand control," Contrast 2 = an "electronic shocking device" versus a "soft empty hand control," Contrast 3 = "OC spray" versus a "soft empty hand control," and Contrast 4 = a "hard empty hand control" versus a "soft empty hand control."

[7] Places with a great number of violent crimes are known to the police (Garner et al., 2002).

[8] The preliminary analysis of a simple unconditional (ANOVA) model showed that the command area-level variance was significantly different from zero. Therefore, further HGLM analyses were warranted.

[9] There has been a long debate regarding the issues of racial discrimination in criminal justice system, supported by various theoretical underpinnings. More often than not, empirical data have shown that racial minority individuals are disproportionately stopped, arrested, criminally charged, and even more subject to severe police force compared to their White counterparts (Dunn & Reed, 2011; Reiss, 1968). Relatively recently, however, a growing body of research has set forth a counterargument by pointing out that (1) African American individuals possess more disrespectful demeanor toward the police (Engel, 2003), (2) police officers initiate contact with citizens mostly based on their actions not because of racial stereotypes, meaning that African Americans are more likely to be involved in a cycle of traffic violations and license suspensions (Regoeczi & Kent, 2014; Tillyer & Engel, 2012), and (3) African Americans self-report more violent behavior than Whites (Beaver et al., 2013). As DeLisi (2011) indicated, more research to further the race effects in criminal justice systems is urgent.

[10] Included are the police beating to death of McDuffie in 1979 and Malice Green in 1992, the beating of motorist Rodney King in 1991, the brutal sodomizing of Abner Louima with a bathroom plunger in 1997, and the shooting deaths of Amadou Diallo (41 bullets) in 1999 and Sean Bell (50 bullets) in 2006 (Alpert et al., 2006; Gabbidon & Higgins, 2009; McCluskey, Terrill, & Paoline, 2005; Nelson, 2000; Scrivner, 1994; Weitzer & Tuch, 2005). More recently, police killed two African-Americans after Hurricane Katrina, and shot unarmed Oscar Grant in Oakland; these events captured their fair share of attention regarding police excessive force (Berger, 2009; LaGanga & Sewell, 2010).

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