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The Impact of the Taser on Suspect Resistance

Identifying Predictors of Effectiveness

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Despite the Taser's increasing popularity among police agencies, questions have been raised concerning the weapon's use and effectiveness as well as its potential to cause serious injury or death. This article examines all Taser deployments by the New York City Police Department from 2002 to 2005 (N = 375) and uses two multivariate approaches—logistic regression and chi-square automatic interaction detection—to identify predictors of Taser effectiveness, measured as continued suspect resistance and officer satisfaction. Findings indicate that several factors are associated with reduced effectiveness, including suspect body weight (more than 200 pounds), drug and alcohol use, physical violence, and close distance (3 feet or less) between the officer and the suspect. Although this study represents a preliminary effort at identifying predictors of Taser effectiveness, there are clear training and policy implications for police departments.

Keywords: *police use of force; Taser; less-than-lethal weapons; conducted energy device (CED)*

Conducted energy devices (CEDs)—most notably, the Taser—are being adopted and deployed by police agencies on a broad scale across the United States. Taser International, the leading developer of stun device technology, has sold more than 200,000 weapons to more than 9,000 police agencies in the United States (Davis, 2007). The economic trends are perhaps a better indicator of the enormous growth of the Taser; Taser International's revenue grew from approximately $2.5 million for fiscal year 1999 to an estimated $67 million in 2004 (McBride & Tedder, 2005).[1] Despite its increasing popularity among police departments and private consumers, questions have been raised concerning the weapon's use and

effectiveness as well as its potential to cause serious injury or death. The following examples illustrate why this topic has become contentious:

- Use: In fall 2005, police officers in Miami used a Taser on a 6-year-old boy who was cutting himself with a piece of glass and on a 12-year-old truant fleeing police.
- Effectiveness: In December 2005, Nashville, Tennessee, police officers used the Taser 19 times on a combative suspect before they were able to take him into custody (Bottoroff, 2005).
- Physiological impact: Amnesty International issued a report in 2004 describing 74 cases in the United States and Canada where a suspect died after being stunned by a Taser. The organization cites these deaths, recent biomedical research, and news reports of incidents involving the questionable use of Tasers to support a moratorium on their use.

Although a growing body of research has examined the physiological effects of the Taser (Ho, Miner, Lakireddy, Bultman, & Heegaard, 2006; Joint Non-Lethal Weapons Human Effects Center of Excellence, 2005; McDonald, Stratbucker, Nerheim, & Brewer, 2005), sparse empirical research has been conducted on the use and effectiveness of the instrument in a field setting. Consequently, our knowledge is largely limited to reports from the CED industry (e.g., Taser International) and police agencies on one side and documents from human rights groups (e.g., Amnesty International and the American Civil Liberties Union) on the other.[2]

This article seeks to add to the scientific knowledge base in this area through an examination of all Taser incidents involving officers in the New York Police Department (NYPD) from 2002 to 2005 ($N = 375$), with an emphasis on identifying predictors of weapon effectiveness. Specifically, the authors use both logistic regression and chi-square automatic interaction detection (CHAID), a form of segmentation modeling, to identify predictors of Taser effectiveness, measured as both the termination of suspect resistance and officer satisfaction with the weapon. The article concludes with a discussion of implications for the ongoing public discourse regarding the Taser as well as for police policy and practice.

Prior Research

Police and the Use of Force

Police officers have legal authority to use force in a wide range of situations, and the nature of this force can entail using empty-hand force and

less lethal weapons (e.g., baton, pepper spray, or CED), depriving an individual of liberty through arrest, and as a last resort, using a firearm to take an individual's life (Walker & Katz, 2002). Bittner (1970) asserts that the capacity to threaten or use physical force is the core function of the police that defines their role and shapes each contact with a citizen or suspect:

> There can be no doubt that this feature of police work is uppermost in the minds of people who solicit police aid or direct the attention of the police to problems, that persons against whom the police proceed have this feature in mind and conduct themselves accordingly, and that every conceivable police intervention projects the message that force may be, and may have to be, used to achieve a desired objective. (p. 40)

Despite its central role in police work, research indicates that police use of force is statistically rare, occurring in only about 1% of all police–citizen encounters (U.S. Bureau of Justice Statistics, 1999).[3] However, because of the sheer volume of police–citizen encounters in a given year (approximately 43 million), an estimated 421,000 use-of-force incidents occur annually, which translates into about 1,100 incidents per day. Rubinstein (1973) clearly illustrates the intrusive, dehumanizing effect that force can have on a citizen:

> [The patrol officer] may not only circumscribe a person's liberty by stopping him on the street, he may also completely violate the suspect's privacy and autonomy by running his hands over the man's entire body. The policeman knows that a frisk is a humiliation people usually accept from him because he can sustain his authority by almost any action he feels necessary. While he does not frisk people often to just humble them, he can do so; when he feels obliged to check someone for a concealed weapon, he is not usually in a position to request their permission, even if this were desirable. (p. 271; see also Skolnick & Fyfe, 1993, p. 94)

The consequences of police use of force can be severe and long lasting, far exceeding the immediate impact on the individual officer and citizen involved. Fyfe (1988) notes that use-of-force incidents have led to civil disorder and riots, the firing of police executives, millions of dollars in litigation, criminal prosecutions, and strained police–community relations. Recent examples include outbreaks of civil disorder in Cincinnati, Ohio, and St. Petersburg, Florida, in the late 1990s as well as the riots after the acquittal of the Los Angeles Police Department officers involved in the Rodney King incident.

Because of the magnitude of this responsibility delegated to the police and its potential consequences, police officers are mandated to use the minimum force necessary to accomplish their objective; force exceeding this minimum standard is considered excessive (Commission on Accreditation for Law Enforcement Agencies, 1999). Police departments closely monitor use of force and provide policy guidelines to officers typically through a "force continuum," which describes verbal and physical actions an officer can take in response to different levels of suspect resistance and behavior. The use-of-force continuum will usually highlight the minimum and maximum recommended force options available to the individual officer. As the subject's resistance or aggression increases, the officer may use greater degrees of force and is allowed to remain one level above the suspect as the interaction progresses (i.e., an officer may be permitted to use a less lethal weapon, such as pepper spray or a CED, in response to physical resistance by a suspect).

The Development of Less Lethal Alternatives

The role of the police in igniting the riots that marked the 1960s led scholars and police practitioners to reevaluate the force options available to patrol officers in responding to varying levels of suspect resistance. Although discussions regarding less lethal alternatives to the firearm date back to the 1920s, the President's Commission on Law Enforcement and the Administration of Justice (1967) brought the issue to the forefront of the policing agenda when it recommended the development and adoption of less lethal alternatives. During the past several decades, advances in technology have led to the development of a range of new alternatives, such as oleoresin capsicum (OC) spray, impact weapons, foams, ballistic rounds, nets, and most recently, CEDs (Wrobeleski & Hess, 2003). These weapons are intended to provide officers with more alternatives when a situation requires the application of force but has not escalated to the point where lethal force is necessary—thereby adding response options to the use-of-force continuum.

During the 1990s, the adoption of OC or pepper spray became commonplace among police agencies, and this trend was accompanied by a sizeable literature on its use, impact, and effectiveness (Smith & Alpert, 2000). The research on OC spray serves as an important backdrop for the current work on CEDs, because many of the same issues and concerns have been raised. Specifically, controversies surrounding the use of OC spray included its use

against passive resisters, disproportionate use against minorities, and potential health risks (Kaminski, Edwards, & Johnson, 1999). A number of studies have examined the effectiveness of OC spray, indicating relatively high rates of suspect incapacitation, reduced officer injuries, and less reliance on other types of force (Gauvin, 1994; Lumb & Friday, 1997; Nowicki, 1993). Using interrupted time-series analysis, Kaminksi, Edwards, and Johnson (1998) concluded that the adoption of OC spray in Baltimore County reduced the number of assaults on police by 15%. Furthermore, Kaminski et al. (1999) found that the effectiveness of OC spray was mitigated by suspect age, weight, distance, and drug use (but not alcohol).

New Technology Emerges: CEDs

For many police agencies, CEDs are more than just the latest novelty in less lethal alternatives; rather, they are becoming what mace was for police departments in the 1960s—an integral tool used in daily police practice. Advantages of CEDs over other less lethal alternatives—such as pepper spray, bean bag guns, and other soft-impact rounds—include the relatively short duration of their recovery time, their reliability at greater distances, their size and utility, and their perceived effectiveness.[4]

Nonetheless, some police departments have been cautious in adopting this technology on a broad scale, and anecdotal evidence suggests that line officers may be reluctant to use the device routinely because of its dubious public image. The Taser, an acronym for Thomas A. Swift Electric Rifle, "is a conducted energy weapon that fires a cartridge with two small probes that stay connected to the weapon by high-voltage, insulated wire" (Wrobeleski & Hess, 2003, p. 87). The M26 and X26 advanced Taser models introduced by Taser International in 1999 and 2003, respectively, are the two common "new generation" CEDs used by police agencies. These weapons discharge two darts to a distance of 21 feet, delivering a 50,000-volt shock in a 5-second cycle. The electrical charge overrides the central nervous system, resulting in the loss of neuromuscular control, which gives the officer time to gain control of the suspect and apply handcuffs, if necessary.

Questions Surrounding the Taser

The controversy regarding the Taser has occurred in the public domain and has been widely publicized. News reports describing incidents in which police officers used the weapon against the elderly, children, and the mentally ill have made national headlines. Favorable and unfavorable

media images of police practices have been competing for public attention and serve as the backdrop against which the Taser is being assessed by the public and government officials (Lovell, 2003). Currently, empirical research is not driving the debate. This is unsettling, considering that mainstream media depictions of the police are often inaccurate or unrealistic (Ian Ross, 2000; Manning, 1977, 1997). The controversy regarding the Taser came to a head in 2004 when Amnesty International issued its report:

> In its recommendations . . . *Amnesty International* is reiterating its call on federal, state and local authorities and law enforcement agencies to suspend all transfers and use of electro-shock weapons, pending an urgent rigorous, independent and impartial inquiry into their use and effects. (Amnesty International, 2004, p. 3).

The conclusions of the Amnesty International report underscored the controversy and ongoing debate between CED manufacturers and human rights organizations about the expanded use of CEDs among police agencies in the United States. The organizations' concerns focused on fatalities occurring after Taser deployment as well as the potential for abuse by police and its use as a routine force option. CED manufacturers argue, however, that the device is a safe alternative to other less lethal weapons that reduces injuries to officers and suspects. More generally, concerns about CEDs have emerged in three critical areas. Each is discussed below.

When is it appropriate to use the device? No consensus exists among police agencies regarding where the Taser should be placed on the force continuum (U.S. Government Accountability Office, 2005). Should CEDs be placed at the same level as pepper spray, or are they more appropriate farther down the use-of-force continuum as a last alternative to the firearm? Should they be used against suspects who are passively resisting an officer (e.g., ignoring verbal commands) or only against individuals who are actively resisting arrest? Is there any justification for using the Taser against a minor, a senior citizen, or a pregnant woman? Police departments have varied considerably in their responses to these questions, and both the International Association of Chiefs of Police (IACP; 2005) and the Police Executive Research Forum (PERF; 2005) have taken action recently by developing training guidelines and model policies to offer guidance to agencies in their deployment of CEDs. For example, both the IACP and PERF suggest that CEDs only be used against those who are actively resisting, that they not be used against children or the elderly except

in emergency situations, and that each deployment is closely supervised and documented.

Does it work effectively? Since January 2000, *The New York Times* has printed nearly 200 news stories describing incidents in which officers across the United States have used the Taser to control or subdue a suspect. A review of these articles reveals an abundance of cases in which the Taser appears not to have the intended physiological effect on a suspect. In some cases, one or both of the prongs missed the target, or the prongs hit the target but failed to penetrate the suspect's clothing. To date, much of the academic research on the effectiveness of CEDs has relied on field reports completed by officers after deploying the weapon, which measure whether the CED functioned properly, enabling the officer to incapacitate or arrest the subject. Field data analyzed by Taser International (2006) and internal evaluations conducted by police agencies (see, e.g., Seattle Police Department, 2004) place the effectiveness rate of the Taser somewhere between 80% and 94%, but there is sparse independent empirical research studying the effectiveness of the device. White and Ready (2007) calculated an effectiveness rating by examining the impact of the Taser on suspect resistance. They found that use of the weapon caused suspects to stop resisting in 86% of all Taser deployments by the study department.

Several police agencies that have implemented CEDs on a broad scale have later reported reductions in injuries sustained during police–citizen contacts. Police departments in Austin, Texas; Putnam County, Florida; and Cincinnati, Ohio, experienced reductions in injuries to both suspects and officers after adopting the Taser (see Putnam County Sheriff's Office, 2005; Taser International, 2006). Although these trends are noteworthy, questions remain concerning the extent to which the Taser contributed to these reductions. Retrospective analysis of injury trends may not account for other variables (e.g., more training, crime trends, new leadership, etc.) that influence yearly injuries sustained during police–citizen encounters. At present, there are no national-level baseline data concerning the number of police agencies that have reported reductions in injuries after adopting the Taser as compared to the number of agencies that have not reported reductions. The degree to which the device is used effectively depends less on the physiological effects of the technology than on the policy guidelines and field training that departments apply to reinforce accepted standards of use.

Proponents in the law enforcement community claim that the Taser can serve as a substitute for lethal force and other forms of less lethal force (e.g., baton) that may result in serious injury or death (Heck, 2003;

McBride & Tedder, 2005; U.S. Bureau of Justice Statistics, 1999). This is an empirical question that has not been tested, and any practical benefits must be balanced against the potentially harmful physiological effects of the device.

What is its impact on the likelihood of serious injury or death to a suspect? As noted earlier, Amnesty International called for a moratorium on police use of the Taser in late 2004, citing 74 deaths that occurred in North America following deployment of the weapon. Although there is no evidence of a direct causal link between use of the Taser and elevated risk of serious injury or death, a review of the Amnesty International report suggests that the risk of death may be greater for those with preexisting medical conditions (particularly heart conditions) as well as those under the influence of drugs or alcohol. Recent studies supported by the federal government have tested the physiological effects of CEDs on healthy adult volunteers (a sample that may be very different than suspects targeted by police officers) and have concluded that no decisive evidence of ventricular fibrillation or other serious medical side effects exists (Ho et al., 2006; Joint Non-Lethal Weapons Human Effects Center of Excellence, 2005; McDonald et al., 2005). The Canadian Police Research Centre (2005) conducted an exhaustive review of existing research and concluded that "definitive research or evidence does not exist that implicates a causal relationship between the use of CEDs and death" (p. ii).

In sum, despite the growing popularity of CEDs in American policing, researchers have failed to keep pace with the diffusion of this rapidly spreading technology. A developing body of scientific research has begun to address the research question relating to the potential for the Taser to cause serious injury or death, but the questions concerning when it is appropriate to deploy the weapon (and against whom) and its degree of effectiveness remain largely unanswered. Guidelines outlined by PERF and IACP have played a critical role in clarifying some of the important issues for police administrators. This article seeks to inform the use and effectiveness dialogue by shifting the emphasis toward prediction; that is, under what circumstances and against what types of suspect behavior is the Taser most likely to be effective? In other words, what are the characteristics of police officers and suspects and incident-related circumstances that increase or reduce the odds that police use of the CED will result in a successful resolution?

Method

NYPD and the Taser

This article examines all Taser incidents involving police officers from the NYPD from January 2002 through December 2005 (N = 375). The NYPD is cautious in its approach to the deployment of Tasers, and its use is closely monitored. The Taser is issued only to officers in the Emergency Service Unit (ESU). The ESU is responsible for situations that require advanced equipment and expertise, such as crisis situations involving the mentally ill, hostages, and suicidal suspects. The unit consists of several hundred officers, which is a relatively small proportion of the 35,000 sworn NYPD officers. Also, supervisors at the rank of sergeant and above are trained to use the Taser, and each precinct is equipped with one or more devices that can be signed out, though they are not required to carry it. The patrol guide details fairly specific circumstances in which it is appropriate to use the device:

> Patrol supervisors or uniformed members of the service assigned to the Emergency Services Unit may utilize a Taser/electronic stun device to assist in restraining emotionally disturbed persons if necessary. The Taser/electronic stun device may be used:
>
> a. To restrain an EDP [emotionally disturbed person] who is evincing behavior that might result in physical injury to himself or others, OR
> b. To restrain person(s) who, through the use of drugs, alcohol, or other mind-altering substances, are evincing behavior that might result in physical injury to himself or others.
>
> Emergency Service Unit personnel will obtain the permission of the Emergency Service Unit Supervisor prior to utilizing a Taser/electronic stun device, except in emergencies. (NYPD, 2000)

As a result, deployment of the Taser is allowed only in situations involving an EDP or person under the influence of drugs or alcohol who is posing a threat of physical injury where either ESU officers are dispatched or a supervisor is present and has a Taser in his or her possession.[5]

The data analyzed for the current study are derived from a "Taser/stun device report," which is completed every time an officer deploys the weapon.[6] The report contains a series of questions that use check boxes to elicit a range of information about demographic characteristics of the suspect, his or her emotional and physical state, behavior and level of resistance,

weapons present, the rank and assignment of the officer, and characteristics of Taser deployment (e.g., distance, effect, etc.). Most items on the report are formatted as multiple-choice questions, with an additional narrative section where the officer is required to describe the incident in detail. From these reports, the authors created a data set in SPSS that captures 40 variables relating to each Taser incident. These independent variables serve as predictors of Taser effectiveness for the multivariate analysis. Though the research was admittedly limited by the information collected on the Taser/stun device report, the authors note the earlier work conducted by Kaminski et al. (1999), which employed a similar design and analysis, with similar variables, for an evaluation of the effectiveness of OC spray.

The Dependent Variable: Measuring Effectiveness

The dependent variables used in the study include three separate but related measures of effectiveness. The first two measures of effectiveness are based on the extent of suspect resistance. Specifically, the field report contains several items that measure whether suspect resistance ended after the Taser was deployed and notes how much time transpired (in seconds) before the suspect was incapacitated. A follow-up item requires the responding officer to indicate whether the suspect was incapacitated at all. The average time to incapacitation was 8.10 seconds, but this measure should be viewed with caution. It is likely that officers at the scene were far more concerned about bringing the suspect under physical control than counting the number of seconds needed to terminate the struggle and apply handcuffs. For this reason, we will focus on the dichotomous measures of resistance for the analysis.

In one third of the cases (33.0%), the suspect continued resisting against the officer after the Taser was deployed. The cases involving continued resistance can be divided into two categories based on the nature and duration of the resistance. In 32 cases, the resistance continued immediately following the Taser deployment because the suspect was not restrained by the weapon; that is, at no point was the subject subdued, and he or she continued to resist (*continual resistance*). The Taser was clearly ineffective during these incidents, perhaps because of loose or heavy clothing blocking the darts from making full contact, mechanical failure, or resilience on the part of the suspect. In the other 65 cases involving continued resistance, the subject was initially incapacitated by the Taser and the officer(s) gained control temporarily; however, the suspect began resisting again at a subsequent

point in time (*any resistance*). The distinction between these two different outcomes draws attention to the temporary impact of the Taser (i.e., the involuntary loss of muscle control is not long term) and shows the importance of carefully observing the suspect's actions immediately after the Taser is deployed. Because of the practical importance of this distinction in resistance, both measures are used as dependent variables in the analysis. The base rates for any subsequent resistance and continual resistance are 33.0% and 10.9%, respectively.[7]

At the end of the Taser/stun device report, the officer is instructed to indicate whether the device performed satisfactorily (yes or no). Police officers' responses to this question serve as the third measure of Taser effectiveness. Officers reported that the Taser performed satisfactorily during 78.7% of the cases. Officer satisfaction is likely related to a host of factors, including the physiological effect on the suspect and the outcome of the deployment taken as a whole. Did the Taser discharge as intended? Did both prongs strike the target, and if so, did they penetrate the suspects' clothing? Did the suspect stop resisting the officer and was he or she subsequently taken into custody? Finally, was anyone seriously injured during the altercation?

Data Analysis

The authors employed two analytic approaches, logistic regression and CHAID (a form of segmentation modeling), to identify predictors of Taser effectiveness. Descriptive analyses were conducted to identify significant relationships at the bivariate level. The bivariate findings, theory, and practical expectations directed the identification of predictors for the multivariate analysis, though all variables were included in the multivariate analysis. Logistic regression is employed because all three measures of effectiveness are dichotomous outcomes with yes-or-no responses. Similar to logistic regression, CHAID predicts the probability of an event's occurring, but the method relies on different assumptions and properties and uses segmentation modeling to accomplish the task. CHAID divides a population into "increasingly homogenous" segments that differ on the basis of the dependent variable; in this case, suspect resistance and officer satisfaction (Jones, Harris, Fader, & Grubstein, 2001, p. 490). The resulting segments are mutually exclusive and exhaustive, and as the analysis proceeds, the best predictor is selected among a particular subgroup of cases based on chi-square analysis.

CHAID analysis is employed in this study because it offers a number of advantages. First, "one significant advantage of this approach is that the model can find different combinations of predictors for different subsets of the population" (Jones et al., 2001, p. 490). This is especially useful if there is reason to suspect that predictors may differ in their impact among subgroups. For example, predictors of suspect resistance may be different for intoxicated and sober suspects, and CHAID facilitates the identification and exploration of these interactions. Second, Jones et al. (2001) point out that numerous studies have examined statistical issues in risk prediction (Gottfredson, 1987; Simon, 1971; Tarling & Perry, 1985), including the use of CHAID and more traditional methods such as logistic regression, and the general consensus is that "no method is consistently better than any other" (Tarling & Perry, 1985, p. 212). With this conclusion in mind, multiple methods allow researchers to either "triangulate" their findings or identify inconsistencies across techniques. Last, an additional benefit of CHAID is the user-friendly visual representation of variables that interact to produce an outcome; in this case, the technique highlights the important situational dynamics of Taser incidents—and how those dynamics relate to outcomes—in a more interpretable manner for practitioners and policy makers.

Limitations and Considerations

Several limitations of this study should be considered. First, the article examines official reports from one police department that has deployed the Taser in a controlled, limited manner. This impairs the generalizability of the findings to other police departments, particularly, those agencies that have issued the Taser to all patrol officers.[8] Second, this study examines only Taser incidents that generated an official police report. There is no indication that officers are not completing the Taser field report on a systematic basis, especially considering that the device tracks each deployment electronically; however, it is possible that some incidents did not result in a report. Third, anecdotal evidence provides some support for a deterrent effect when the Taser is exposed to a potential subject but not used; that is, much like the firearm, suspects may become compliant when confronted with the imminent possibility of being stunned with the Taser. Researchers and police practitioners would consider this type of incident as a successful de-escalation, but these situations are not captured in the data because the NYPD requires a field report after discharge only.

Results

Descriptive Analysis of Taser Incidents

Suspect characteristics. Suspects targeted in the Taser incidents were primarily male (88.8%) with a mean age of 34.9; more than half were African American (52.1%), 18.7% were White, and 27.3% were Hispanic (see Table 1). Most of the suspects did not appear under the influence of drugs or alcohol (87.2%), but the majority exhibited signs of mental illness (92.5%) and were therefore identified by the responding officers as EDPs.[9] About 40% of the subjects were armed with a weapon (39.6%), most commonly, a kitchen knife or cutting instrument (84% of armed suspects, 32% of all cases).[10] The vast majority of suspects (95%) engaged in physical violence. The violent behavior was directed at an officer during more than half of the incidents (53.3%), one fifth involved a threat of suicide or self-harm (18.6%), and the remaining violent individuals (18.9%) directed their aggression toward multiple individuals at the scene.

Officer characteristics. The Taser/stun device report captures limited information regarding the officer who deploys the weapon. More than half of the officers who used the device were detectives (55.5%), and 41.2% were patrol officers. Just 3.2% were supervisors. More than 90% of the officers were assigned to the ESU. In the majority of cases, the officer deploying the Taser was not alone. One or more back-up officers were present during nearly all of the incidents (93.5%), and a supervisor was present in 88.1% of the cases.[11]

At the bivariate level, there are notable differences in officer rank with regard to the outcomes of interest: satisfaction and suspect resistance. During the study period, 12 cases involved supervisors who were not assigned to the ESU (i.e., patrol sergeants). The effectiveness ratings from these supervisors are significantly lower than the ratings from the ESU officers: Any suspect resistance was reported by 54.5% of the supervisors, compared to 26.7% of police officers and 36.3% of detectives; 20.0% of the supervisors reported resistance immediately after the Taser was used, compared to 7.6% of police officers and 12.0% of detectives; and 41.7% of the supervisors reported being satisfied with the Taser, compared to 81.7% of police officers and 79.4% of detectives.[12] These findings may have implications for the NYPD, because supervisors outside of the ESU receive less training in use of the Taser and may also be using an older model of the device.

Table 1
Characteristics of Suspects and Officers Involved in Taser Deployments

	Percentage	*n*
Suspect characteristics		
Gender		
Male	88.8	332
Female	11.2	42
Total	100.0	374
Racial background		
African American	52.1	189
White	18.7	68
Hispanic	27.3	99
Asian or Other	1.9	7
Total	100.0	363
Mean age = 34.9 years		332
Emotionally disturbed		
No	7.5	28
Yes	92.5	347
Total	100.0	375
Intoxicated		
No	87.2	321
Drugs	7.1	26
Alcohol	4.3	16
Both drugs and alcohol	1.4	5
Total	100.0	368
Armed with a weapon		
No	60.4	217
Yes	39.6	142
Total	100.0	359
Violent behavior		
No	5.2	19
Toward self	18.6	68
Toward officer	53.3	195
Toward other citizens	4.1	15
Toward multiple	18.9	69
Total	100.0	366
Officer characteristics		
Rank		
Patrol officer	41.2	153
Detective	55.5	206
Supervisor	3.2	12
Total	100.0	371
Command		
Emergency Service Unit	91.2	321
Other	8.8	31
Total	100.0	352
Back-up present		
No	6.5	22
Yes	93.5	318
Total	100.0	340
Supervisor Present		
No	11.9	42
Yes	88.1	310
Total	100.0	352

Note: Total numbers are different because of missing data. In some of the study cases, information for one or more variables was missing, and the tables reflect known information only.

Incident characteristics. More than three quarters of the incidents occurred indoors (see Table 2). Per department policy, the majority of suspects (95.6%) were transported to a hospital for a physical examination following the incident. Interestingly, three quarters of the subjects (75.9%) were not arrested after the incident, although many of them were held at the hospital for psychological examination and/or civil commitment. The average distance between the officer and the suspect at the time of deployment is approximately 5.5 feet. In 80.7% of the incidents, the Taser was deployed only once by the officer, and in nearly 80% of the cases, both darts made contact with the suspect as intended. Officers used the device in stun mode in 48 incidents (direct contact to skin, no darts).[13] In 22% of the cases, officers also used another nonlethal device, most typically another type of stun device (14%) or pepper spray (5%). In 86% of the cases, a supervisor indicated that use of the Taser was consistent with departmental policy.[14] Findings with regard to officer satisfaction and suspect resistance—the dependent variables for the multivariate analysis—have been summarized above.

Multivariate Analysis

Logistic regression analysis. Table 3 displays the results of the logistic regression models predicting the three measures of Taser effectiveness. The table provides the logistic regression coefficients, standard errors, and odds ratios for the independent variables in each of the models. The likelihood ratio test for each of the models was statistically significant, and Nagelkerke R^2 estimates suggest that the models predicting any subsequent suspect resistance, resistance immediately after use of the Taser, and officer satisfaction accounted for 23%, 13%, and 21% of the explained variation, respectively.[15] In the first model, statistically significant predictors of any suspect resistance include the following:

- The suspect's body weight is greater than 200 pounds.
- Distance between the officer and the suspect is 3 feet or less.
- The suspect is under the influence of drugs or alcohol.
- The suspect directs violence toward an officer or citizen (as opposed to oneself).
- One or both Taser darts missed the intended target.
- The officer used another nonlethal device before or after using the Taser.[16]

Specifically, when one or both Taser darts miss the suspect, the likelihood of any suspect resistance increases by about 300%. Three predictors—violence directed at an officer or citizen, drug or alcohol intoxication, and

Table 2
Characteristics of Incidents Resulting in Taser Deployments

Incident Characteristic	Percentage	*n*
Location		
Indoors	77.5	286
Outdoors	22.5	83
Total	100.0	369
Suspect arrested		
No	75.9	274
Yes	24.1	87
Total	100.0	361
Suspect transported to hospital		
No	4.4	16
Yes	95.6	346
Total	100.0	362
Number of Taser deployments		
One	80.7	284
More than one	19.3	68
Total	100.0	352
Mean distance between officer and suspect = 5.41 feet		
Darts on target		
Both darts on target	77.7	240
One dart missed	4.5	14
Both darts missed	1.6	5
Darts made contact but fell from clothing	0.6	2
Device used in stun mode	15.5	48
Total	100.0	309
Was suspect incapacitated?		
No	13.2	42
Yes	86.8	277
Total	100.0	319
Mean time to incapacitation = 8.10 seconds		
Did suspect continue to resist?		
No	67.0	235
Yes	33.0	116
Total	100.0	351
Officer satisfied with Taser?		
No	21.3	74
Yes	78.7	273
Total	100.0	347

Note: Total numbers are different because of missing data. In some of the study cases, information for one or more variables was missing, and the tables reflect known information only.

police use of another less lethal weapon—more than double the odds of the occurrence of any suspect resistance during Taser incidents. In addition, suspects who weigh more than 200 pounds are about 84% more likely to resist the officer after the Taser is deployed.

Significant predictors of resistance occurring immediately after deployment of the Taser include the following:

- The suspect's body weight is greater than 200 pounds.
- The suspect is under the influence of drugs or alcohol.
- One or both Taser darts missed the intended target.

Findings for the second model are similar to the model predicting any suspect resistance. Continual resistance immediately after the Taser is deployed is most likely to occur in circumstances where the Taser darts miss a large suspect who is intoxicated.

Results from the model predicting officer satisfaction indicate that the following independent variables are statistically significant:

- The suspect's body weight is 200 pounds or less.
- Distance between the officer and the suspect is greater than 3 feet.
- The suspect is armed with a knife or gun.
- Both Taser darts struck the intended target.[17]

Interestingly, the strongest predictor of officer satisfaction with the Taser is the suspect's being armed with a knife or gun. When the suspect is armed with a weapon, the likelihood of police's reporting that they are satisfied with the Taser is about 200% greater. A possible explanation may be that the likelihood that harmful consequences will occur when the Taser does not work properly is greater when the suspect is armed with a knife or gun; therefore, the sense of relief experienced when the device does perform properly in these volatile situations affects the officer's reporting of satisfaction. The distance between the officer and the suspect during the Taser deployment is also positively associated with officer satisfaction with the device.

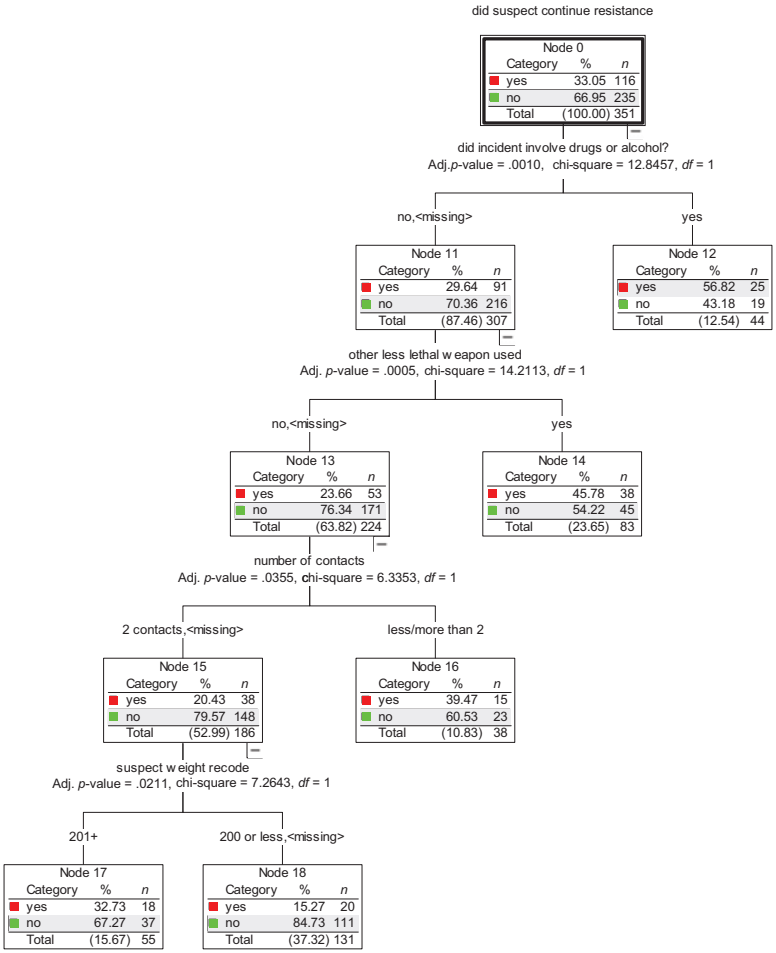
CHAID analysis. Figures 1 to 3 show the results of the CHAID analysis, which uses the same set of variables to predict Taser effectiveness. In Figure 1, the top cell (or root node) in the CHAID tree reflects 33.05% of the cases where any suspect resistance occurred. The initial split was made on the basis of whether the suspect was under the influence of drugs or alcohol, thus separating the 375 Taser cases into two cells: those where the

Table 3
Logistic Regression Predicting Three Measures of Taser Effectiveness

Predictor Variables	*B*	*SE*	Wald	Odds Ratio	*p* Value
Any suspect resistance					
Suspect weight	0.612	.302	4.114	1.844	.043
Distance	–0.667	.306	4.735	0.513	.030
Suspect intoxicated	0.954	.410	5.418	2.596	.020
Suspect violent toward others	0.884	.373	5.617	2.421	.018
One or both prongs miss target	1.393	.531	6.887	4.028	.009
Other less lethal weapon used	1.057	.312	11.445	2.877	.001
Log likelihood	285.065				
R^2 (Nagelkerke)	.227				
Chi-square	46.051				
df	6				
Significance	.000				
n	255				
Resistance immediately after deployment					
Suspect weight	0.882	.416	4.484	2.415	.034
Suspect intoxicated	1.285	.486	6.982	3.614	.008
One or both prongs miss target	1.744	.569	9.379	5.717	.002
Log likelihood	164.691				
R^2 (Nagelkerke)	.130				
Chi-square	17.634				
df	3				
Significance	.001				
n	262				
Officer satisfaction					
Suspect weight	–0.904	.338	7.133	0.405	.008
Distance	0.928	.337	7.586	2.528	.006
Suspect armed with gun or knife	1.111	.422	6.945	3.037	.008
One or both prongs miss target	–2.193	.578	14.408	0.112	.000
Log likelihood	229.067				
R^2 (Nagelkerke)	.213				
Chi-square	37.268				
df	4				
Significance	.000				
n	246				

suspect was not intoxicated (n = 307; 87.46% of the total) and those where the suspect was intoxicated (n = 44; 12.54% of the total). The splits in CHAID are made according to differences in the dependent variable (i.e., any suspect resistance): Of suspects who were intoxicated, 56.8% continued to resist, compared to 29.6% of suspects who were not intoxicated. An additional split was made from the *not intoxicated* cell and is based on

Figure 1
CHAID Analysis Predicting Any Suspect Resistance



Note: CHAID = chi-square automatic interaction detection.

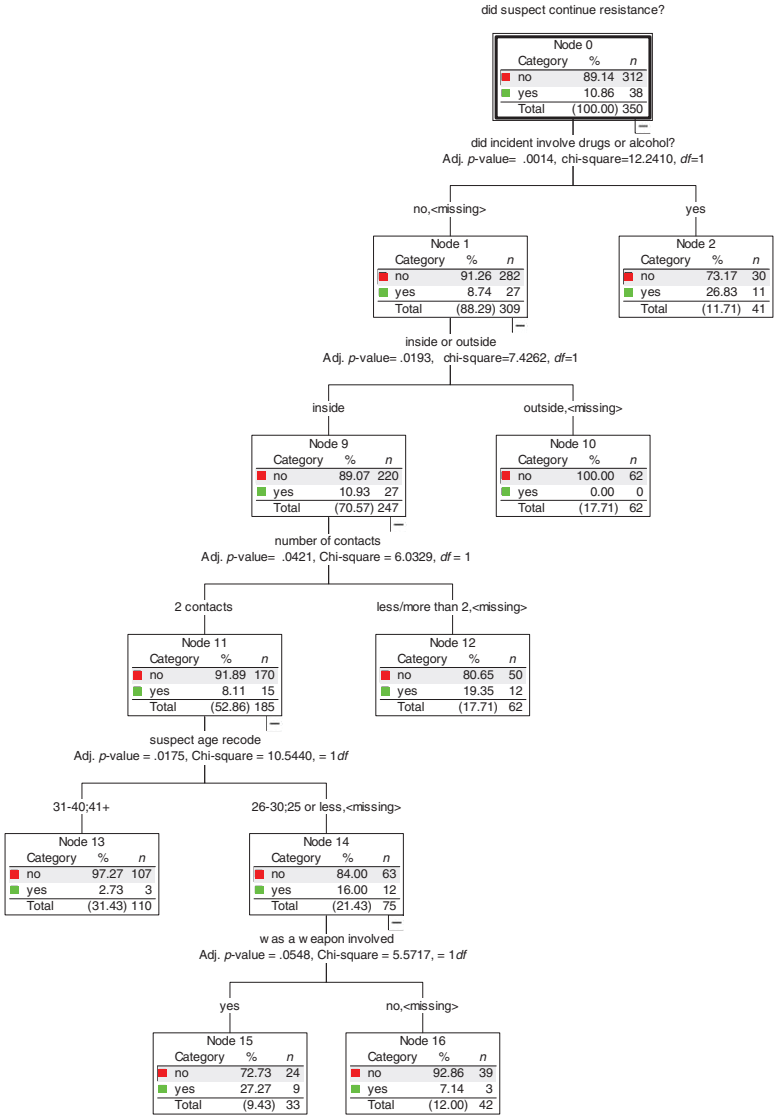
whether police used another less lethal weapon: Suspect resistance occurred in 45.8% of cases where another less lethal weapon was used in addition to the Taser, compared to 23.7% of cases where only the Taser was used. The next split was made from the cell indicating that no other less lethal weapon

was used except the Taser. This split is based on the number of darts that made contact with the suspect: Subjects who were not intoxicated during the encounter, where no other less lethal weapon was used except the Taser, continued to resist during 20.4% of the cases where two darts made contact, compared to 39.5% of the cases where fewer or more than two contacts were made.[18] The final split is made from the cell indicating that two darts made contact and is based on suspect body weight: Suspects in cases where both darts made contact, where no other less lethal weapon was used except the Taser, and where the suspect was not intoxicated were more likely to continue to resist if they weighed more than 200 pounds (32.7% compared to 15.3% for those who weighed 200 pounds or less). Table 4 summarizes the termination cells for the CHAID tree predicting any suspect resistance, which includes the predictors, cell size, percentage of the total cases, and percentage of the dependent variable: any suspect resistance.

Figure 2 displays the CHAID tree predicting continual resistance, and the top cell represents 10.9% of the cases where suspect resistance occurred immediately after the deployment. The initial split is based on the use of drugs or alcohol, as it was for the first CHAID tree: Intoxicated suspects continued to resist immediately after the Taser was deployed in 26.8% of the cases, compared to 8.7% of the cases in which the suspect was not intoxicated. Several additional splits flow from the cell indicating that the suspect was not intoxicated. The next split is based on whether the Taser incident occurred indoors or outside (10.9% suspect resistance inside compared to 0.0% resistance outside). From the cell indicating that the incident occurred indoors, the next split is based on whether the two darts made contact or not (8.1% resistance compared to 19.4%). From the "two contacts" cell, the split is based on whether the suspect was 30 years old or younger (16.0% resistance) as opposed to 31 years old or older (2.7% resistance). The final split flows from the *30 years old or younger* cell and is based on whether the suspect was armed with a weapon (27.3% resistance) or not (7.1% resistance). Termination cell summaries are again shown in Table 4.

Figure 3 shows the CHAID tree for the last measure of effectiveness: officer satisfaction. An initial split is based on the number of darts that made contact—two darts, or fewer or more—with greater officer satisfaction when two darts made contact (83.7% vs. 66.3%). The next split, made from the *two contacts* cell, is based on the distance between the police officer and the suspect. Officer satisfaction is greater when the officers are 4 feet or more away from the target: In this category, 86.7% of the officers reported being satisfied, compared to 72.0% for the officers who were 3 feet away or closer (see Table 4 for summary).

Figure 2
CHAID Analysis Predicting Resistance Immediately After Deployment



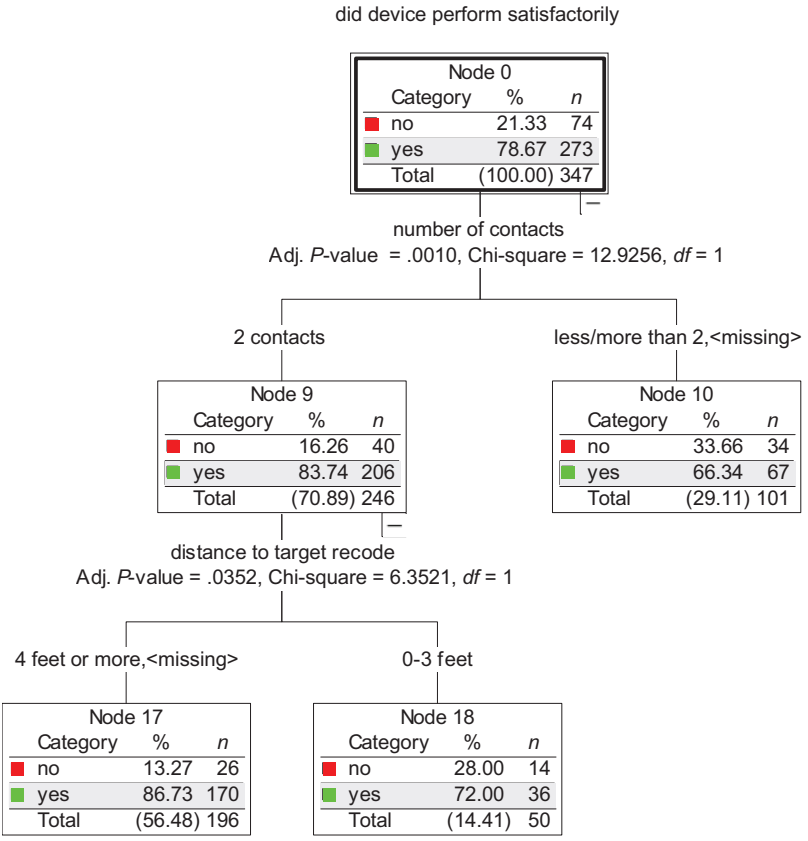
Note: CHAID = chi-square automatic interaction detection.

Table 4
Summary of CHAID End Groups

	n	% of Total	% of Suspect Resistance
Any suspect resistance			
Suspect intoxicated	44	12.54	56.82
Suspect not intoxicated (or missing); other less lethal weapon used	83	23.65	45.78
Suspect not intoxicated (or missing); no other less lethal weapon used (or missing); not two contacts	38	10.83	39.47
Suspect not intoxicated (or missing); no other less lethal weapon used (or missing); two contacts (or missing); suspect weighs 201+ pounds	55	15.67	32.73
Suspect not intoxicated (or missing); no other less lethal weapon used (or missing); two contacts (or missing); suspect weighs 200 pounds or less (or missing)	131	37.32	15.27
Total	351	100.00	
Resistance immediately after deployment			
Suspect not intoxicated (or missing); occurred inside; two contacts; suspect 30 or younger (or missing); suspect has weapon	33	9.43	27.27
Suspect intoxicated	41	11.71	26.83
Suspect not intoxicated (or missing); occurred inside; not two contacts (or missing)	62	17.71	19.35
Suspect not intoxicated (or missing); occurred inside; two contacts; suspect 30 or younger (or missing); suspect has no weapon (or missing)	42	12.00	7.14
Suspect not intoxicated (or missing); occurred inside; two contacts; suspect 31 or older	110	31.43	2.73
Suspect not intoxicated (or missing); occurred outside (or missing)	62	17.71	0.00
Total	350	100.00	
Officer satisfaction			
Two contacts; distance 4 feet or more (or missing)	196	56.48	86.73
Two contacts; distance 3 feet or less	50	14.41	72.00
Not two contacts (or missing)	101	29.11	66.34
Total	347	100.00	

Note: CHAID = chi-square automatic interaction detection analysis.

Figure 3
CHAID Analysis Predicting Officer Satisfaction



Note: CHAID = chi-square automatic interaction detection.

Discussion

Empirical research on the Taser has lagged behind its circulation throughout American law enforcement, leaving questions about its use and effectiveness unanswered. Considering the recent groundswell of media attention to controversial uses of the device and concerns about the potential link to serious injury or death, it is critical to examine how police agencies are deploying and monitoring these less lethal weapons. This line of inquiry has

profound implications for police administrators who are responsible for upholding use-of-force standards. This article seeks to contribute to the dialogue on CEDs by identifying predictors of Taser effectiveness.

Findings from the descriptive analysis suggest consistency across the types of incidents (and suspects) in which officers in the NYPD deploy the Taser.

- Most suspects were male, African American or Hispanic, and in their 30s.
- Few suspects were under the influence of alcohol or drugs, but nearly all were identified as exhibiting signs of mental illness.[19]
- Nearly all suspects engaged in violent behavior.
- Just fewer than half of suspects were armed, and among armed suspects, the majority possessed a knife or cutting instrument.
- Nearly all the officers using the Taser in the NYPD were assigned to the ESU.
- Back-up officers and supervisors were present in almost all cases.
- A large majority of suspects were incapacitated by the Taser after the first deployment, and most were incapacitated within 5 seconds.
- Most of the subjects were not arrested on criminal charges, although nearly all were transported to a hospital for physical and/or psychological evaluation.

Findings from the multivariate analyses, both logistic regression and CHAID, are remarkably consistent in predicting the three effectiveness measures:

Any suspect resistance (a measure of ineffectiveness)

- Suspect body weight was over 200 pounds (logistic and CHAID).
- Suspect was intoxicated (logistic and CHAID).
- One or both Taser darts missed the intended target (logistic and CHAID).
- Officer used another less lethal weapon (logistic and CHAID).
- Distance between the officer and the suspect was 3 feet or less (logistic).
- Suspect directed violence toward an officer or citizen (logistic).

Resistance occurring immediately after Taser use (a measure of ineffectiveness)

- Suspect was intoxicated (logistic and CHAID).
- One or both Taser darts missed the intended target (logistic and CHAID).
- Suspect body weight was more than 200 pounds (logistic).
- For a subset of cases, incident occurred indoors, suspect was 30 years old or younger, and suspect was armed (CHAID).

Officer satisfaction (a measure of effectiveness)

- Suspect and officer were more than 3 feet apart (logistic and CHAID).
- Both Taser darts struck the intended target (logistic and CHAID).
- Suspect body weight was 200 pounds or less (logistic).
- Suspect was armed with a gun or knife (logistic).

Three important findings emerge from the analysis. First, the analysis suggests that Taser effectiveness can be modeled using multivariate techniques, as several suspect- and incident-related variables are associated with a greater or lesser likelihood of effectiveness. Considering the paucity of research examining use and effectiveness of the Taser, this finding alone is important. Second, a number of variables were noticeably absent from the statistically significant predictors of Taser effectiveness identified in the multivariate analysis. For example, the race and gender of the suspects were unrelated to any of the three measures of effectiveness. Importantly, whether the suspect was classified as "emotionally disturbed" was also unrelated to Taser effectiveness. Note that only 28 cases did not involve a suspect classified as an EDP, so caution should be used in generalizing to this subgroup. The findings relating to EDPs are particularly important, however, because anecdotal evidence made available by the news media and interest groups suggests that the mentally ill may be more likely to continue to resist the police and to experience serious injury or death when stunned by the Taser. The results of this study indicate that the suspects' mental health at the time of the incident did not affect the effectiveness of the Taser. Additionally, the authors reviewed all news reports ($N = 192$) of Taser incidents printed in *The New York Times* during the study period to become more familiar with the qualitative aspects of the incidents and found evidence of only one case where NYPD deployment of the Taser resulted in the death of an emotionally disturbed suspect.[20]

The third important research finding relates to the variables that were identified as significant predictors in the multivariate analyses, including suspect intoxication, body weight, violence directed at an officer or citizen, and distance between the officer and the suspect. A relatively small proportion of the Taser cases involved an intoxicated suspect—13%, or 46 incidents—but effectiveness dropped significantly for those cases: Intoxicated suspects were twice as likely to exhibit any resistance during the encounter (57% compared to 30%, respectively), they were about 3 times as likely to resist immediately after police deployed the Taser (27% compared to 9%, respectively), and intoxication was associated with lower officer-reported satisfaction with the Taser (67% compared to 80%, respectively).[21] Although the reason for this finding is not clear, one possible explanation relates to

the effect of drugs and alcohol on the suspect's ability to reason and process information. The intoxicated suspects may be less capable of thinking rationally during the police–citizen encounter and therefore less inclined to comply with the officer's instructions after the effects of the Taser wear off. This finding clearly warrants attention from police researchers and practitioners. If it is replicated in other police jurisdictions, with other suspect samples, there are clear policy and training implications. Police field training can highlight the increased likelihood of continued resistance among intoxicated suspects and provide officers with a clear set of guidelines to anticipate and curtail resistance to prevent violence escalation and serious injuries.

The emergence of suspect body weight as a predictor of Taser effectiveness is both interesting and puzzling. Evidence that the weapon is less effective against heavier individuals is not apparent from the CED industry reports or the growing clinical research. This study finds suspect weight—with a cutoff at 200 pounds—a significant predictor of both resistance measures and officer satisfaction. Depending on the degree to which body weight moderates the effects of the Taser, there are implications for Taser use and for police policy and training. Police officers may need to prepare for the greater likelihood of resistance immediately after using the weapon on particularly tall or heavy suspects. Policy should offer guidance on subsequent responses, which may include additional Taser deployments or alternative less lethal weapons. Given the potential relationship between multiple Taser deployments and elevated risk of serious injury or death, police departments may need to craft their policies carefully. Moreover, researchers should consider investigating the potential for an interaction effect between body weight and intoxication. For example, 18 cases in the study data involve an intoxicated suspect who weighs more than 200 pounds, of whom 13 (72%) continued to resist the officer after being stunned with a Taser. This is clearly an important issue that requires further investigation.

Two other suspect-related variables were significant in the multivariate analysis: violent behavior directed at an officer or another person and whether the subject was armed with a weapon. Suspects who were suicidal, engaged in self-harm, or threatened self-harm were less likely to continue resisting after being stunned with the Taser, compared to those who were acting violently toward an officer or citizen. The implications for police are straightforward: Suspects who direct their violence toward others—most notably, the police officer—represent the greatest risk of a physical struggle after being stunned with the Taser, and therefore, officers should remain especially vigilant when using the Taser on subjects that fit this description.

The association between armed suspects and measures of effectiveness indicates that police use of the Taser is most effective in those situations where the potential for serious injury or death is highest. Further research is needed to substantiate this finding, but there are a number of potential explanations:

- High-risk situations could be fundamentally different in ways that affect officer satisfaction.
- The actual physiological effects of the Taser may be different (e.g., more effective) in these types of encounters.
- Police officer performance during and after Taser use may be different in high-risk encounters (e.g., quicker reaction times, better handcuffing, etc.).

Several incident-related characteristics are also associated with the effectiveness measures, notably, distance from the intended target, police use of another less lethal device in addition to the Taser, and the number of darts that make contact with the suspect. The importance of the number of darts that strike the subject and police use of other less lethal weapons is clear. For the Taser to deliver the current, both darts must strike the suspect, penetrate the clothing, and attach to the skin. If this does not occur, the device will not work as intended, and consequently, resistance will be more likely to continue. Although the field report does not specify the order in which multiple weapons are used, the fact that more than one weapon is used implies that one or more instruments were ineffective in curtailing resistance.

The significance of the distance from the suspect as a predictor of effectiveness has both training and policy implications. Taser International offers cartridges with maximum ranges of 15 feet, 21 feet, 25 feet, and even 35 feet. The study findings suggest that the Taser is less effective when used at close range—within 3 feet or less of the target. (Note that distance remained significant when controlling for use of the device in stun mode, i.e., direct contact to the suspect's skin.) The reasons for this are unclear, although use at close range may increase the likelihood that suspect movement could affect the accuracy of the weapon, the suspect could grasp or bump into the weapon at time of discharge, or the darts may not spread out sufficiently to deliver the optimal current. Police agencies may want to consult with each other or the CED manufacturer to determine if this short-range problem has emerged elsewhere. Regardless, maintaining a safe distance whenever possible is of central importance; in fact, the NYPD (2000) patrol guide states that officers should maintain a "zone of safety" of 20 feet and call ESU when

responding to EDPs. Findings from this study suggest that the "safe-distance" principle should be reinforced for ESU as well, particularly when there is reasonable suspicion that a Taser may be deployed.

Conclusion

This article sought to address questions about the use and effectiveness of CEDs by examining all Taser deployments by the NYPD from 2002 to 2005 ($N = 375$). The authors employ both logistic regression and CHAID analysis to identify predictors of Taser effectiveness, measured as the extent of suspect resistance and officer satisfaction. A number of statistically significant predictors surfaced with policy and training implications, including suspect body weight, drug and alcohol use, violent behavior, and the distance between the responding officer and the suspect. Considering the lack of empirical research predicting Taser effectiveness, this article takes an important step in thinking about the circumstances in which favorable deployment outcomes are likely to occur.

As we suggested earlier, there is an ongoing discourse between civil rights organizations and the CED industry regarding the widespread adoption of these devices. Although this research offers an objective, empirical analysis of Taser deployments, for a number of reasons, it is difficult for the authors to weigh in on this debate. First, much of the debate has focused on the physiological effects of CEDs, which is not a focus of this research. Second, we have examined one police department with a restrictive and closely monitored deployment pattern, which limits the conclusions we can draw. Alternatively, this research shows that the study police department experienced positive outcomes while avoiding the current controversies associated with use and effectiveness. Both PERF and IACP offer detailed guidance on model policy and procedures for the Taser, most of which mirror the NYPD approach. Thus, we can conclude that with regard to the use and effectiveness questions only, this research suggests that departments can successfully deploy the Taser—avoiding problems with misuse and abuse—by implementing and closely monitoring the guidelines developed by PERF and IACP.

Nonetheless, additional research on this topic is necessary not only because the technology is relatively new but also because different agencies are adopting the weapon to varying degrees and developing different standards and expectations concerning its proper use. A multisite analysis of police agencies that have incorporated the Taser into routine practice based on

different approaches would yield valuable comparative data. This type of cross-site approach—coupled with the release of research supported by the National Institute of Justice, particularly, the national-level study being conducted by Alpert and colleagues—will enable researchers to begin asking more complex questions about police use of the Taser, such as to what extent it is used by officers as an alternative to other less lethal weapons (and physical force) and what types of information would be required for a rigorous cost-benefit analysis of the Taser.

Notes

1. There are competitors to Taser, including Stinger Systems and Law Enforcement Associates, but Taser dominates the market with approximately 95% of conducted energy device (CED) sales in the United States. Stinger Systems has sold just 12,000 weapons since 2000. Law Enforcement Associates introduced their CED only recently, in March 2005.

2. Important considerations and limitations associated with these reports include small sampling frames and potentially competing interests among those who carried out the studies. The National Institute of Justice is currently funding several national-level research projects on the Taser, but these studies have just begun.

3. This estimate becomes much greater if handcuffing and verbal commands are included as use of force.

4. For example, the effects of mace and pepper spray are often felt for several hours, and their range of effectiveness is much shorter (which increases the likelihood of other officers' being hit). Beanbag guns and similar impact munitions are often fired from a specialized shotgun that is larger and bulkier than CED.

5. The New York Police Department's (NYPD; 2000) patrol guide also offers a definition of an emotionally disturbed person (EDP):

> A person who appears to be mentally ill or temporarily deranged and is conducting himself in a manner which a police officer reasonably believes is likely to result in serious injury to himself or others. (p. 1)

In situations involving an EDP, officers are instructed to create and maintain a "zone of safety" of approximately 20 feet and to call for the Emergency Service Unit (ESU) and a patrol supervisor as well as an ambulance (NYPD, 2000). Officers are not to attempt to take an EDP into custody unless

- The EDP is unarmed, not violent and is willing to leave voluntarily; OR
- The EDP's actions constitute an immediate threat of serious physical injury or death to himself or others. (NYPD, 2000, p. 1)

6. These reports were provided to the authors by the supervisor of the department's training division. Although the form is used primarily for the Taser, there were 33 forms involving use of another type of nonlethal weapon: either a stun device or other similar alternative. Because the focus of this article is the Taser, these cases were excluded from the analysis.

7. Given that the intent of the Taser is temporary incapacitation only, the latter suspect resistance measure—10.9%—is probably a fairer measure of the Taser's effectiveness. Also, the *any suspect resistance* measure includes both types of resistance (i.e., continual resistance is a subset of the more general resistance measure). Both measures are examined in the multivariate analysis.

8. At the same time, it is worth noting that the limited manner in which the NYPD has implemented the Taser is a practical advantage to police administrators in New York, who have avoided being criticized in the news media for excessive reliance on the Taser.

9. This variable is based on the police officer's assessment of the suspect at the time of the incident. It is not based on more definitive tests, such as a urinalysis or blood or hair analysis. Although this would appear to suggest that police officers in the study department use the Taser disproportionately against the mentally ill in crisis, this finding must be interpreted in the context of how the department has deployed the Taser. Per department policy, the ESU is called when the patrol officers or supervisors on scene determine that the situation involves an EDP who is behaving in a manner that could result in physical injury or death to the EDP or others (NYPD, 2000). Thus, these data are a reflection of the types of suspects typically handled by the ESU—a highly specialized group of officers—not the suspects typically handled by line officers.

10. There were also two cases where the suspect was armed with a gun: In one case, the suspect was threatening to commit suicide, and in the other case, the suspect had taken a hostage and was threatening multiple people (including the hostage and himself). Of the remaining cases involving an armed suspect, the most common weapon was a blunt object, such as a metal pipe, baseball bat, chair, or large stick.

11. The nearly universal presence of back-up officers and supervisors is again dictated by the fact that most of these cases involve the ESU. This unit is typically called to the scene by the first responding officer, and often a supervisor will also respond.

12. Both police officers and detectives are assigned ranks in the ESU. Chi-square values indicate that the satisfaction and any-resistance differences are statistically significant (p = .005 and p = .050, respectively). It may be useful in future research to examine length of time on the job and officer training as factors related to effectiveness. These variables may more accurately capture the relationship between officer's use of the Taser—especially among non-ESU personnel—and effectiveness measures.

13. Information on the number of dart contacts was not reported in 66 cases. Rather than make assumptions about the number of contacts, the authors have proceeded conservatively and coded these cases as missing. This decision, however, reduces the number of cases available for multivariate analysis.

14. In the remaining 14% of the cases (n = 53), the form was not signed and there was no information about whether the use met departmental policy. However, a review of the narrative of those 53 cases suggests that they too conformed with department policy on use of the Taser.

15. Nagelkerke R^2 provides an approximation of the explained variation in a logistic regression model. This measure of model strength is considered slightly more conservative than the R^2 statistic in ordinary least squares regression but less conservative than the Cox and Snell R^2 estimate, which does not have a maximum value of 1.0.

16. Although the "Taser/stun device report" indicates whether another nonlethal device was also used, it does not specify which is used first, the Taser or the alternative.

17. Suspect resistance was also a predictor of officer satisfaction, but it has been excluded from the analyses because it serves as the other effectiveness measure. The authors question the value of a model that uses one outcome measure to predict another.

18. Fewer than two contacts would indicate that one or both prongs missed; more than two indicate multiple discharges of the Taser.

19. These are not clinical judgments. Rather, they are conclusions drawn by the officers on scene based on available evidence.

20. The medical examiner's report indicated that the suspect had swallowed a large amount of drugs prior to being shocked with the TASER, and the cause of death was ruled as a drug overdose.

21. Importantly, ESU officers are specially trained to identify indicators of mental illness and drug and alcohol use (as well as to solicit information from others at the scene, such as family members and friends), so although these judgments are not clinical, they are in all likelihood fairly reliable.

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