

# TASER and Less Lethal Weapons: An Exploratory Analysis of Deployments and Effectiveness

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## Introduction

Contact between citizens and law enforcement officers is the heart of policing. Numerous reasons exist for a citizen and an officer to come into contact, and in some of those cases, it may become necessary at some point for the law enforcement officer to detail, take into custody, or affect an arrest of the citizen. When that occurs, officers are sometimes required to use the training and equipment provided to them by their agencies.

In this time of community-oriented policing, the use of less-lethal technologies is clearly the most socially acceptable and humane means to maintain peace, law, and order. In the event that less lethal technology is used and an injury results, the most socially acceptable and humane type of injury would be the one that is the least severe. While being concerned with suspect and officer injuries, however, another major concern is the effectiveness of the less lethal weapons system from the perspective of the beat officer. To date, the majority of literature has offered little analysis of the various types of less lethal weapons available to law enforcement.

The overriding problem with the selection of appropriate less lethal weapons is a general lack of research examining their effectiveness. Studies examining the effectiveness of a particular less lethal weapons system are most often generated by the product's manufacturer. Thus, law enforcement agencies are required to rely on factory data, specification sheets, and company marketing in order to make the critical decision as to which system to adopt. The manufacturers can easily manipulate this information for their own direct benefit. This article seeks to examine the extant literature on use of force as a framing reference for the sections that follow examining a number of less lethal weapons.

## Literature Review

The academic community to date has not examined the effectiveness of less lethal weapons systems at the officer level where use-of-force encounters generally occur; however, the scholarly literature on police use of force is extensive. A search of the extant literature found that most researchers focus on discriminatory abuses of force, excessive force, and wrongly applied deadly force. In addition, a number of articles examined police officer misconduct and officer deviance. Of interest in this article

are distinctions between deadly and non-deadly force, or less lethal force that can exert control over but not kill or significantly injure a person.

Generally, police force can be classified into several modal categories. In the past, the general categories used to describe force have been deadly vs. non-deadly, physical vs. non-physical, reasonable vs. excessive, and extralegal vs. unnecessary. Generally, deadly force is defined as force that is likely to cause death or serious bodily harm. Conversely, non-deadly force is not likely to result in death or serious bodily harm (Pate & Fridell, 1993).

Bittner (1970) and others claim that the capacity to use non-negotiable coercive force is at the core of the police role in society (Reiss, 1971; Scharf & Binder, 1983; Sherman, 1980; Walker & Fridell, 1993). So basic is the element of force to the police, that Langworthy and Travis (1994) claim that the reason we call the police is based on the belief that force may be necessary.

More recently, Terrill (2005) has utilized a transactional approach to examine officer's uses of force and suspect resistance during the law enforcement citizen encounter. In this study, Terrill examines the law enforcement officer encounter at the event level and attempts to decompose officer and suspect actions within the context of the use-of-force continuum. As identified by Adams et al. (1999), little is known about the effectiveness of the various types of non-lethal weapons, and in their recommendations for future research add that an evaluation of all types of police force used in street encounters is needed.

The following section briefly addresses the issue of less lethal force in the context of what is considered socially acceptable. Additional discussion of possible unintentional consequences of abuses of force is included.

### Less Lethal Force

Police use of force has tremendous implications on the law enforcement agency and its administration. Thus, uses of force may frequently impact the development of public policy and how it is administered in practice. Current public policy permits officers to use the minimum amount of force necessary to affect the arrest or quell the disturbance, and to do so, they utilize the tools available to the profession (e.g., chemical agents, impact weapons, TASERs, and defensive tactics).

Unfortunately, there is no one less lethal weapon that fits every circumstance. While some options, like the TASER, appear to offer the maximum in suspect compliance benefits and a reduction in both suspect and officer injuries (Hopkins & Beary, 2003), they are limited by their range. Accordingly, in order to use the TASER, it is necessary for officers to place themselves within a 21-foot range of the suspect, creating additional risks and tactical concerns.

Kinetic weapons (i.e., less lethal munitions like bean bag projectiles), on the other hand, respond quite well at distances over 21 feet but suffer the limitation of transferring excessive energy at close range. A number of deaths and serious injuries have been documented from these weapons at various close ranges (Hubbs & Klinger, 2004). As a result, the greatest weakness in the existing less lethal arsenal is the distance at which each tool can be safely deployed.

### Less Lethal Weapons and Injuries

The injuries sustained by suspects from many less lethal devices have been examined in the literature. Chemical weapons (Chan et al., 2002; Rappert, 2001), impact weapons (Rappert, 2001), and kinetic energy projectiles (Hubbs & Klinger, 2004) have been studied. Although less lethal weapons are designed to reduce the likelihood of death or serious injury, they have been responsible for a number of documented deaths and an undetermined number of injuries.

Public perception of these weapons often influences the degree to which an agency is capable of their use. One study of the perceptions of college students toward less lethal weapons deployments given a scenario with a suspect actively attempting to injure officers found that TASER and chemical agents were more appropriate, while an empty handed strike and police dog bite were least appropriate (Hougland, Mesloh, & Henych, 2005).

### TASER

The TASER weapon (Thomas A. Swift's Electric Rifle) administers an electric charge causing muscular dysfunction and temporary incapacitation, which is substantially different from other less lethal weapons that rely solely upon pain compliance. Two darts are fired from the pistol-like weapon, and an electric current of 50,000 volts is passed into the subject's body (British Columbia Office of the Police Complaint Commissioner, 2004). The darts fired from the TASER can reach from 15 feet (civilian model) to 21 feet (law enforcement model). While the amount of this voltage seems excessive, it is comparable to the static electricity charge one might produce by the shuffling of feet on carpet (Orange County Medical TASER Taskforce, 2005). Additionally, the amperage of the TASER weapon is remarkably small (about  $\frac{1}{1000}$  of one amp) in comparison to household appliances that draw between 1 and 15 amps of current (Orange County Medical TASER Taskforce, 2005). Early studies indicated that this weapon's effectiveness ranged from 50% to 85% (Donnelly, 2001). Significant improvements in design, however, appear to have substantially increased the effectiveness (Taser International, 2004).

Currently, several models of the TASER with varying power levels exist in the law enforcement marketplace; however, most Florida agencies have chosen the M-26 air TASER as its electrical weapon of choice. Since its deployment by the Orange County Sheriff's Department in 2000, the use of deadly force by officers and the number of officers injured during arrest confrontations has been dramatically reduced (Hopkins & Beary, 2003). In a single year within the OCSO, eighteen TASER deployments and apprehensions took place where deadly force was justified (Hougland et al., 2005).

### Impact Weapons (Baton/ASP)

The two primary baton manufacturers for law enforcement are ASP and Monadnock, and each company has a wide product offering for different types of batons ranging in size and features. The first generation expandable batons used friction to keep the baton extended, and an officer was forced to slam the tip against a hard surface in order to close it. Newer designs include the positive lock function, which allows the baton to be closed with a push of a button while still maintaining rigidity during

strikes. The tips of the baton vary from a rounded metal surface to a hard plastic "safety tip" that puts more weight at the tip of the baton and allows an officer to generate more kinetic energy in a strike.

A number of specific types and models are available, ostensibly attempting to serve a particular need or solve a problem. High-visibility nightsticks and side-handled batons seem to have gone out of style and have been replaced with smaller, collapsible straight batons, which have a more positive public perception and are easier to carry (Johnston, 1996).

With the transition to a collapsible nightstick, many of the advanced control techniques (which were possible with the PR-24 and other side-handled batons) are difficult if not impossible. Consequently, the impact weapon chosen by the Orange County Sheriff's Office (the ASP) is little more than a metal club to be used for striking or blocking. Metal flashlights are being used as an improvised impact weapon since their dynamics are similar. Training officers for proper use of impact weapons is necessary, as they have the potential to create serious injuries, specifically to the head (Cox, Buchholz, & Wolf, 1987).

### **Chemical Weapons (Oleoresin Capsicum/Tear Gas/Pepper Spray)**

Most agencies have transitioned from the use of CS/CN gas to pepper spray, an irritant spray that can disable a suspect. Most of these products are made with oleoresin capsicum oil from selected hot peppers; hence the term OC spray (Lumb & Friday, 1997). Prior literature suggests that many law enforcement agencies believe pepper spray to be the "magic bullet" to reduce officer and suspect injury; however, issues regarding cross-contamination of back-up officers and a growing number of reports that suspects were able to fight through the burning pain of the spray illustrate the weaknesses of chemical agents.

In 1973, The Federal Bureau of Investigation became the first agency to carry this tool, and since then, it has been adopted by agencies nationwide (Chan et al., 2001). The military embraced OC due to the reduction of civilian casualties in war game simulations (Magnolia, 1997), and in 1998, the U.S. Marine Corps devised a 120-hour instructor course on "Non-Lethal Individual Weapons" and included OC at a low level on the use of continuum.

OC was the cutting edge less lethal weapon of its time, as it incapacitated suspects by "causing the eyes to tear and swell shut, mucus to drain profusely from the nasal passages, bronchial passages to constrict, and breathing [to] become more labored" (Morabito & Doerner, 1997, p. 681). Studies from the early 1990s found OC spray to be effective over 90% of the time (Kingshott, 1992; Nowicki, 1993), and as a result, many agencies issue this tool.

Furthermore, Lumb and Friday (1997) found that issuing OC spray reduced officer threats of deadly force against a suspect with a weapon from 100% prior to OC issuance to 62.5% after it was issued. Major deployment issues with this weapon are the cross-contamination between the suspect sprayed and the other officers and many reports indicating that a number of suspects were able to fight through the burning pain of the spray.

As with any less lethal weapon, fatalities eventually occurred in the course of OC spray usage. In 1993, the American Civil Liberties Union (ACLU) claimed they found 30 deaths that were the direct result of OC deployment. Reviews of the ACLU's claim revealed that OC was not a direct cause of death in 22 of the cases, but the result of cocaine intoxication, cocaine delirium, or positional asphyxiation (Granfield, Owen, & Petty, 1994).

### **Defensive Tactics**

Defensive tactics are techniques employed by law enforcement officers to respond to situations and control suspects. Whereas in the past, officers were given a billy club and relied on their learned brawling skills to win a fight, officers are now trained in defensive techniques in the academy and through inservice training. The techniques often rely on pain compliance through joint manipulation and pressure points.

There is some dissent among officers as to the effectiveness of this training because it is typically taught in a formal environment against sober, compliant subjects. The techniques are often ineffective when applied to intoxicated suspects who are intent on resisting. In a study by Kaminski and Martin (2000), 30% of respondents felt that the defensive tactics techniques taught by their agency were ineffective against aggressive suspects, compared with only 37% who felt that the techniques were effective. Additionally, 51% of officers surveyed studied some form of martial arts on their own, including traditional martial arts (e.g., Tae Kwon Do, Karate), boxing, and grappling. The officers who studied grappling had the highest percentage of application of their outside study to their police work with 90% using the techniques against suspects.

### **Research Design**

The Orange County Sheriff's Office (OCSO) secondary data collected consisted of all use-of-force reports collected from 2001 to 2003 by OCSO. From a total of 1,200 incidents, a random sample of 400 cases were selected that contained information on suspect resistance, officer less lethal weapon deployment, and the outcomes of the encounter.

These reports, a regular tool used by agencies to account for uses of force, capture much data and allow a research endeavor to begin at the event level. The data includes specific information regarding the type of force used in an encounter, be it less lethal or deadly, and also the type of resultant injuries.

Agency policy requires officers to complete the form whenever force is used or a suspect injury occurs. These documents were stored separate from the offense report by the training division and utilized to monitor use-of-force trends within the agency.

While these reports are created as a stand-alone document, there were inherent risks in their analysis. The narrative section of the use-of-force report is relatively small and relies primarily upon a series of matrices to capture information regarding the confrontation. Under normal circumstances, there would not be sufficient data regarding officer and suspect demographics for quantitative analysis; however, our analysis focused upon the tools and their effectiveness, which was properly documented within these reports.

Three researchers coded the data from the report into Statistical Software for the Social Sciences (SPSS), using a team approach to review the information. Whenever an incident's outcome was unclear to a single coder, all three coders would then assess the information to ensure reliability. Each incident was broken down into a series of actions and reactions, each with potential successes or failures. The goal was to determine under what circumstances each less lethal weapon was used and the extent to which it was effective at bringing the confrontation to resolution.

While many of the tools are available in the law enforcement market, the agency under study only deployed a relative few. Consequently, these are the only ones addressed in this study. Additionally, canine deployments were eliminated as their documentation was limited in the use-of-force report, and it was impossible to collect reliable data in this area.

## Findings

Table 1 shows the distribution of suspect offense types and average force levels of both officer and suspect. Narcotics investigations were the most frequent initial offense accounting for 21% of the agency's use-of-force incidents; traffic stops comprised 16%; and slightly less than 11% involved domestic violence cases. Violent and nonviolent crimes make up 36% and 16% respectively. As shown, average officer force levels are consistently almost a full level below the suspect's level of resistance. The highest suspect resistance levels are found in domestic violence and violent crime investigations.

**Table 1**  
**Offense Type and Average Force Levels**

Recorded Offense	Resistance Level	Officer Force Level
Traffic	3.9123	3.0175
Narcotics	4.0000	3.0137
Domestic Violence	4.1622	3.0000
Nonviolent Crime	4.0787	3.0472
Violent Crime	4.1071	3.0179
Total (n = 350)	4.0486	3.0257

Table 2 shows the distribution of suspect offense types and the type of less lethal weapon deployed. TASER was the most frequently used less lethal weapon (73%), followed by chemical agent (18%), defensive tactics (6%), and impact weapons (3%). Less lethal munitions were used in a single confrontation involving the SWAT team. Additionally, none of the impact weapon applications involved the use of a traditional baton. In each case, a flashlight was utilized in this function as an improvised impact weapon. Finally, in all cases in which deadly force would have been sanctioned and a less lethal weapon was used, TASER was the only weapon selected by officers. It is unclear whether officers made a conscious decision to take a more humane approach or the TASER was already in the officer's hand and the time required to transition weapon platforms was too great. Regardless of the

intention, it is clear that a substantial number of suspects' lives were spared as a result of the TASER deployments.

**Table 2**  
**Offenses and Types of Less Lethal Weapons**

	Type of Less Lethal Weapon					Total
	TASER	Chemical	Impact	Defensive Tactics	Bean Bag	
Offense						
Traffic	42	10	1	4	0	57
Narcotics	62	9	0	2	0	73
Domestic	25	7	2	3	0	37
Nonviolent	90	21	4	11	1	127
Violent	35	17	2	2	0	56
Total	254	64	9	22	1	350

While the TASER was deployed more frequently than other weapons, its use was not disproportionate to the other less lethal weapon usages across most categories. In narcotics-related confrontations, TASER was deployed considerably more often. Interviews with officers related that these subjects were more likely to flee, and the TASER was the only tool available that has the ability to prevent escape. Analysis of the data validated this statement, as 63% of the narcotics suspects originally resisted by taking flight. Suspect flight was the most common type of resistance and was encountered in 33% of all cases. TASER was used to stop fleeing suspects (across the offenses) 84% of the time.

**Table 3**  
**Resistance Type and Type of Less Lethal Weapon Used**

	Type of Less Lethal Weapon Used					Total
	TASER	Chemical Agent	Impact Weapon	Defensive Tactics	Bean Bag Round	
Resistance Type						
Flight	109 (27.3%)	15 (3.8%)	1 (.3%)	5 (1.3%)	0 (.0%)	130 (32.6%)
Concealment	3 (.8%)	0 (.0%)	0 (.0%)	1 (.3%)	0 (.0%)	4 (1.0%)
Verbal Threat or Posture	62 (15.5%)	19 (4.8%)	2 (.5%)	3 (.8%)	0 (.0%)	86 (21.6%)
Wrestle	75 (18.8%)	23 (5.8%)	3 (.8%)	8 (2.0%)	0 (.0%)	109 (27.3%)
Strikes	27 (6.8%)	17 (4.3%)	2 (.5%)	8 (2.0%)	0 (.0%)	54 (13.5%)
Use or Threaten with Impact Weapon	1 (.3%)	2 (.5%)	0 (.0%)	0 (.0%)	1 (.3%)	4 (1.0%)
Use or Threaten with Edged Weapon	3 (.8%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	3 (.8%)
Used or Threatened with Firearm	4 (1.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	4 (1.0%)
Other	3 (.8%)	1 (.3%)	1 (.3%)	0 (.0%)	0 (.0%)	5 (1.3%)
Total	287 (71.9%)	77 (19.3%)	9 (2.3%)	25 (6.3%)	1 (.3%)	399 (100.0%)

Table 3 shows the resistance type and the less lethal weapon deployed. Over 50% of the less lethal weapon deployments were utilized against offenders who had not taken aggressive action against the officer. In these cases, less lethal weapons were used preemptively in an attempt to de-escalate the encounter. Resistance types of wrestling (27.3%) and striking (13.5%) made up the majority of aggressive actions against officers, while armed suspects threatening or using weapons against officers made up less than 5%. TASER was the most frequently used when confronted with a weapon and in 18 incidents in which deadly force was justified (Houglund et al., 2005).

**Table 4**  
**Type of Less Lethal Weapon and Level of Success**

	Less Lethal Weapon			Total
	Immediately Effective	Delayed Effectiveness	Not Effective	
<b>Type of Less Lethal Weapon Used</b>				
TASER	191 (67.7%)	27 (9.6%)	64 (22.7%)	282 (100%)
Chemical Agent	64 (83.1%)	4 (5.2%)	9 (11.7%)	77 (100%)
Impact Weapon	8 (88.9%)	0 (0%)	1 (11.1%)	9 (100%)
Defensive Tactics	13 (54.2%)	4 (16.7%)	7 (29.1%)	24 (100%)
Bean Bag	1 (100%)	0 (0%)	0 (0%)	1 (100%)
<b>Total</b>	<b>277 (70.5%)</b>	<b>35 (8.9%)</b>	<b>81 (20.6%)</b>	<b>393 (100%)</b>

Table 4 shows the distribution of less lethal weapons deployed and the level of the weapon's success. As a whole, less lethal weapons were ineffective in 21% of the initial applications of force. Chemical agents were ineffective in 12% of the confrontations, in comparison with impact weapons (11%) and defensive tactics (29%). Surprisingly, TASER was ineffective (in a single application) 23% of the time; however, TASER training stresses the use of multiple applications in order to bring a suspect under control. When deployed a second time, its ineffectiveness dropped to less than 3%. In these cases, either TASER was deployed a third time, the officer switched to a different less lethal option, or the suspect escaped as officers were unprepared to engage in foot pursuit. Suspect escape occurred more frequently with TASER, as officers were accustomed to immediate compliance on the part of the suspect and it is extremely difficult to run with a weapon and drag 21 feet of wire and probes.

**Table 5**  
**Reason for TASER Ineffectiveness**

	Frequency	Percent
<b>Valid</b>		
Missed	19	38
Baggy clothes	16	32
Probe came loose	11	22
Suspect grabbed TASER	1	2
Malfunction	2	4
Cartridge fell off	1	2
<b>Total</b>	<b>50</b>	<b>100</b>

Table 5 shows the type and frequency of the causes of TASER ineffectiveness in 50 cases. Misses (38%) and baggy clothing worn by the suspect (32%) make up the majority of these failures. Factory literature explains some of these issues. TASER probes are reported to have a spread rate of approximately 12 inches for every 7 feet of distance between the weapons and suspect (TASER International, 2004). Additionally, thick or baggy clothing has been shown to disrupt the current and leave the suspect relatively unaffected (TASER International, 2004). These incidents of ineffectiveness on the part of TASER necessitated the need to create an experiment to examine this issue further.

### TASER Probe Study

In a sample of 50 cases in which the TASER was found to be ineffective, both probes missing the target explained 38% of the cases (see Table 4). A drawback to the TASER is that while the cartridges have an advertised range on 21 feet, it is not feasible to properly deploy the weapon at that distance and expect a successful outcome.

In order to better understand why so many misses occurred with the TASER, a field experiment was created to measure the spread of the probes as the distance between the weapon and the target increased. In order to test the spread, cartridges were fired five times at each of six distances at a stationary target. An electronic rangefinder was placed parallel to the tip of the cartridge and aimed at the target in order to find the exact distance between the cartridge and the target.

TASER cartridges (cost \$20 per unit) were donated by TASER International, while the actual weapon (model X26) was purchased under a Bureau of Justice Assistance grant. The field experiments were filmed as part of an ongoing media project and monitored by members of the media that had an obvious interest in the outcome of the study.

The distances tested were 1 to 6 yards, and the probes had a minimum spread of 6 inches at 1 yard and a maximum of 34 inches at 6 yards. With a total of 30 observations, the mean spread for each distance was graphed along the x-axis and the number of yards from the target along the y-axis. A linear regression of these observations produced an  $R^2$  of .983 ( $F=787.6$ ,  $df=24$ ) indicating an almost perfect relationship between distance and probe spread. For every foot of distance between suspect and officer, probe spread is approximately 2 inches. At 6 yards, a mean spread of 30 inches was observed, which is too great to assume that both probes will hit their target as required for the TASER to be effective. Consequently, ineffective TASER deployments are more related to distance factors than the suspect's ability to fight through the electricity.

### Conclusion

The data suggests that the TASER is the most frequently used less lethal weapon. This is even the case when a higher level of force may be warranted. Based on officer interviews and the data, it appears that the TASER offers police officers a "magic bullet" solution when dealing with many confrontations.

Interestingly, despite the TASER being deployed so frequently, it has relatively mixed effectiveness in its initial deployment. In 282 TASER uses, the TASER was

immediately effective in 191 (48.6%) deployments, while some deployments had delayed effectiveness 27(6.9%). In a number of cases, the TASER/officer missed its target. In other cases, the TASER probes fell out, and in some cases in which the suspect had baggy clothes, the early generation TASER cartridges were ineffective in penetrating the clothing and incapacitating the suspect. Since the collection of this data, however, substantial improvements have been made to both the TASER cartridge and weapon to resolve some of these issues.

When looking at less lethal weapons, it is interesting to note that they appear to be utilized across a wide range of confrontations, not exclusively to violent incidents. This supports the findings of MacDonald, Manz, Alpert, and Dunham (2003), who found that nonviolent property calls for service were more likely to illicit a higher level of use of force than violent calls for service. Additionally, this finding suggests that less lethal weapon deployments are based less on the threat perceived by the officer; it is more likely that officers use specific tools to facilitate the confrontation's quick and effective resolution.

It is important to add that in routine, reactive patrol, which accounts for the majority of law enforcement activity, the officer is often forced to respond to the subject's actions. This inherently gives suspects a timing advantage as they may have committed to an action to which the officer is unaware. In many conflicts, this places officers at a disadvantage as they are forced to react to suspect behavior oftentimes in milliseconds. Training and experience may reduce reaction times; however, due to the "act and react" nature of the law enforcement officer/suspect confrontation, experience will inherently cue officers to furtive movements and pre-assault indicators. In the OSCO, these actions are labeled as Level 3 resistance allowing officers to deploy the TASER earlier in the confrontation, thereby deescalating the encounter before it matures.

While some less lethal weapons require the suspect to be in close proximity to the officer, others, namely TASER, are effective (or can be deployed) at greater ranges allowing its use to solve a broader range of issues. Other less lethal weapons, such as chemical agents and impact weapons, are generally ineffective at stopping a fleeing suspect due to the distance between the officer and the suspect. Naturally, a trained officer will use the most appropriate less lethal weapon based on law, agency policy, and the limitations of the weapon. As improvements are made to both the TASER and its cartridges, it is likely that TASER will continue to dominate in less lethal weapon deployments; however, future less lethal weapons development will need to expand the reactionary gap between officer and suspect, consequently allowing more time for the officer to formulate the proper force option response.

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