

The author(s) shown below used Federal funds provided by the U.S. Department of Justice and prepared the following final report:

Document Title: A Multi-Method Evaluation of Police Use of Force Outcomes, Executive Summary

Author: Michael R. Smith, J.D., Ph.D., Robert J. Kaminski, Ph.D., Geoffrey P. Alpert, Ph.D., Lorie A. Fridell, Ph.D., John MacDonald, Ph.D., Bruce Kubu

Document No.: 231177

Date Received: July 2010

Award Number: 2005-IJ-CX-0056

This report has not been published by the U.S. Department of Justice. To provide better customer service, NCJRS has made this Federally-funded grant final report available electronically in addition to traditional paper copies.

<p>Opinions or points of view expressed are those of the author(s) and do not necessarily reflect the official position or policies of the U.S. Department of Justice.</p>

A MULTI-METHOD EVALUATION OF POLICE USE OF FORCE OUTCOMES

Michael R. Smith, J.D., Ph.D.
Robert J. Kaminski, Ph.D.
Geoffrey P. Alpert, Ph.D.
University of South Carolina

Lorie A. Fridell, Ph.D.
University of South Florida

John MacDonald, Ph.D.
University of Pennsylvania

Bruce Kubu
Police Executive Research Forum

The findings reported in this article are part of a larger study funded by the National Institute of Justice. The findings within this report are those of the authors and do not necessarily represent the official positions of the National Institute of Justice or the U.S. Justice Department. Please direct all correspondence regarding this report to Michael R. Smith, Chair, Department of Criminology and Criminal Justice, University of South Carolina, phone (803) 777-7065, email: mrsmith@mailbox.sc.edu.

A MULTI-METHOD EVALUATION OF POLICE USE OF FORCE OUTCOMES

This study is concerned with injuries that may occur to police officers and citizens during use of force events. Previous research has shown that a very small (1-2) percentage of police-citizen contacts involve the threat or application of physical force by the police, while 15-20 percent of arrests may result in the use of force by police to control a suspect. While most uses of force are low level, and involve officers' hands, arms, and bodies to gain control of a suspect, some applications of force are more serious, including less lethal devices such as pepper spray, batons, or Tasers, as well as the use of firearms. Various legal and policy restrictions govern the use of force by police, beginning with the 4th Amendment's prohibition against unreasonable searches and seizures and devolving downward to state statutes and departmental policies that govern how and under what conditions officers may use force. In most law enforcement agencies today, the use of force is tightly controlled by policy, and more serious applications of force are reviewed and/or investigated by supervisory personnel or internal affairs units.

Whenever force is used by the police or a suspect, there is a possibility of injury. Until recently, little was known about the frequency, causes, or correlates of force-related injuries. Over the past few decades, there have been advancements in training and technology with the goal of reducing the frequency and severity of injuries to the police and the public while maintaining the safe and effective control over resisting suspects. This article helps us understand how and why injuries occur to police and citizens during use of force events.

Technologies that Work

Oleoresin capsicum (OC or pepper) spray was among the first of the "new" less lethal weapons to achieve widespread adoption by police forces, while more recently conducted electrical devices (CEDs) such as the Taser have gained popularity. Conducted electrical devices generally, and Tasers in particular, have become very popular in recent years and

industry estimates now place the Taser in the hands of more than 11,500 police agencies nationwide. These two technologies were adopted, in part, with the hope of reducing injuries while maintaining control of combatant populations. Pepper spray and CED's have generated controversy and have been linked with in-custody deaths and allegations of overuse and even intentional abuse. Importantly, policy-makers and law enforcement officials question whether CED's are safe and effective and where (if at all) they should be placed on force continua that attempt to match appropriate police force options with levels of suspect resistance.

Overview of Methods

Several complementary research strategies were used to conduct the research. First, a nationally representative survey of U.S. law enforcement agencies was conducted to provide a snapshot of how less lethal force technologies, training, and policies are being used by state and local agencies. Second, agency-supplied use of force datasets from three agencies – Seattle, Washington, Miami-Dade, Florida, and Richland County, South Carolina – were analyzed separately in an effort to identify individual and situational predictors of injuries to officers and citizens during use of force events. Third, more than 24,000 use of force records from 12 police agencies were combined and analyzed using multilevel and fixed effects models to investigate the relationship between situational and policy-related factors and the likelihood of injury to police and citizens. Fourth, a longitudinal analysis was conducted that explored the effect on injury rates of the adoption of the Taser by the Austin, Texas and Orlando, Florida police departments. Finally, in effort to provide context to the quantitative analyses and gain insight into how use of force encounters unfold, in-depth interviews were conducted with more than 250 officers and 25 citizens who were involved in use of force events in two mid-size law enforcement agencies, one of which issued the Taser to its officers and one of which did not. We will present a brief review of what is known about the use of force and injuries, focusing on

recent technological advancements, and then present our findings, followed by policy suggestions.

A Comment on the Literature on Police Use of Force And Injuries

The use of force by police has been the subject of research for more than 40 years. Unfortunately, the majority of the research on injuries remains descriptive in nature or contains substantial data and analytic limitations that prevent the research from being used optimally to make policy or training decisions at the agency level. Furthermore, with the advent of conducted energy devices (CEDs), questions have arisen regarding the safety of such weapons and what their impact has been on injuries and in-custody deaths (Amnesty International, 2005, Amnesty International of Canada, 2007). The lack of independent research on CEDs and injuries has left law enforcement agencies without the information they need to make sound policy decisions or to respond to inquiries from citizens, special interest groups, and policy-makers, some of whom question whether CEDs are an appropriate less-lethal alternative for general police use.

In the 1990s, police found themselves in a similar position with respect to oleoresin capsicum (OC) or pepper spray. In those days, OC was spreading rapidly among American police forces and concerns were being raised concerning its misuse and safety (Amnesty International, 1997). The National Institute of Justice funded a variety of studies on the safety and effectiveness of OC (Edwards, Granfield, & Onnen, 1997; Granfield, Onnen, & Petty, 1994; Petty, 2004), and several other researchers examined its incapacitative effects and the relationship between OC use and officer and suspect injuries (Kaminski, Edwards, & Johnson, 1998, 1999; Morabito & Doerner, 1997; Smith & Alpert, 2000; Lumb & Friday, 1997).

Although there was research conducted on the issue, it was methodologically limited (see Smith & Petrocelli, 2002). Today, the few epidemiological studies conducted on CEDs

have been descriptive in nature and none examined the relationship between CEDs and injuries within the broader use-of-force context (see Charlotte-Mecklenburg Police Department, 2006; Jenkinson, Neeson, & Bleetman, 2006; Seattle Police Department, 2002). Because many use-of-force encounters involve multiple types of force, it is critical to assess the *independent* contribution of CEDs to injury outcomes so as to avoid erroneous conclusions about cause and effect. The lone exception (discussed later) appears to be the study by Smith, Kaminski, Rojek, Alpert and Mathis (2007), which analyzed the relationship between CEDs and officer and suspect injuries while simultaneously controlling for the effects of other types of force used by officers as well as suspect resistance and other factors. Although the Smith et al. (2007) study was an improvement over previous research, it analyzed data from only two law enforcement agencies. Thus, there continues to be a need for additional studies on the use of force by police and officer and suspect injuries, especially as they relate to CEDs.

Suspect injury

In general, injuries to suspects resulting from use-of-force incidents are infrequent relative to the overall number of police-citizen contacts. The 2002 National Survey of Contacts between the Police and the Public found that approximately 1.5 percent of citizens who had contact with the police reported that officers used or threatened to use force against them, with 14 percent of these respondents claiming they sustained an injury (Durose, Schmitt, & Langan, 2005). Similar low levels of suspect injuries sustained during use-of-force encounters have also been found (Kaminski, DiGiovanni, & Downs, 2004; Smith & Petrocelli, 2002; Alpert & Dunham, 2004; Henriquez, 1999). A few studies moved beyond the general reporting on the frequency of suspect injuries to examine this likelihood relative to specific use-of-force tactics and weapons. Meyer's (1992) analysis of Los Angeles Police Department use-of-force reports revealed that the use of a flashlight resulted in moderate or major suspect injuries in 80 percent of incidents in which it was employed. Punching suspects resulted in major or moderate injuries 64 percent of

the time, the use of a baton 61 percent, and other bodily force 46 percent. Interestingly, officer use of older generation CEDs and chemical irritants resulted in no major or moderate injuries to suspects or officers.

Officer injury

The analysis of injuries to officers in use-of-force encounters has provided mixed results with regard to frequency of occurrence. Several studies found that about officers were injured during use-of-force incidents ranging from 10 – 38% (Henriquez, 1999; Kaminski et al., 2004; Smith & Petrocelli, 2002; Alpert & Dunham, 2000; 2004; Kaminski, & Sorensen, 1995).

The Impact of Less-Lethal Weapons on Injuries

OC spray and CED's were developed with the intent of providing a quicker and more effective means for safely incapacitating suspects than traditional hands-on techniques used by law enforcement. While results of early research are encouraging, each study has had methodological concerns that raise more questions than they answer. However, preliminary results have been encouraging and just as with OC spray, CED's have been adopted and used throughout the country and world.

The Present Study

Multiple research strategies were used to address our questions. First, a nationally representative survey of U.S. law enforcement agencies was conducted to provide a snapshot of how less lethal force technologies, training, and policies are being used by state and local agencies. Second, agency-supplied use of force datasets from three agencies – Seattle, Washington, Miami-Dade, Florida, and Richland County, South Carolina – were analyzed separately in an effort to identify individual and situational predictors of injuries to officers and citizens during use of force events. Third, more than 24,000 use of force records from 12 police agencies were combined and analyzed using multilevel and fixed effects models to investigate the relationship between situational and policy-related factors and the likelihood of injury to

police and citizens. Fourth, a longitudinal analysis was conducted that explored the effect on injury rates of the adoption of the Taser by the Austin, Texas and Orlando, Florida police departments. Finally, in effort to provide context to the quantitative analyses and gain insight into how use of force encounters unfold, in-depth interviews were conducted with more than 250 officers and 25 citizens who were involved in use of force events in two mid-size law enforcement agencies, one of which issued the Taser to its officers and one of which did not.

National Survey

More than five hundred state and local agencies provided information on less lethal force generally and on their deployment and policies regarding CEDs in particular. In most agencies, line-level personnel carry batons (straight and/or expandable) and handheld chemical agents. Just under half of the agencies deploy CEDs to at least some personnel. At least three-fourths of the agencies that deploy the expandable baton, the CED, or personal issue chemical agents, deploy these weapons to at least half of their uniformed line-level patrol officers/deputies and supervisors.

A large majority of agencies report the use of a continuum/model in policy and/or training to convey to their personnel the appropriate circumstances for using the various types of force authorized. Over half of those agencies, had a model they described as “linear.” A full one-third of responding agencies had recently changed or were in the process of changing their continuum/model.

Scenarios were used to assess agency policy regarding the circumstances in which various types of force could be used. Most agencies allowed only soft empty-hand tactics/control against a subject who refuses, without physical force, to comply with commands; just under half of the agencies would allow officers to use chemical weapons in this circumstance. If this subject, however, tenses and pulls when the officer tries to cuff him, a majority of agencies would allow chemical agents, hard-empty hand tactics/strikes/punches,

and/or CED use. Forty percent of the agencies did *not allow* for the use of CED in probe mode in this tensing/pulling circumstance, but three-fourths did allow for CED use if the suspect fled and almost all allowed for CED use when the subject assumed a boxer's stance. The baton was reportedly not allowed by a majority of agencies in the scenarios until the subject threatened the officer by assuming a boxer's stance.

As conveyed above, most agencies do not allow the CED to be used against a subject who refuses, without physical force, to comply with commands. Six in ten, however, allow for the use of a CED against a subject who tenses and pulls when the officer tries to cuff him. CED deploying agencies generally place the CED at the same level as chemical agents in their force continuum/model. Agencies vary as to the placement of CEDs relative to strikes/punches; CEDs are generally lower than impact weapons on a continuum/model.

For only one circumstance—subject near flammable substances—do a majority of agencies prohibit CED use. For most of the special circumstances or vulnerable populations listed in the survey, the agencies either made no particular mention of it in policy or restricted the CED use to special circumstances. A majority of agencies has no restrictions on CED use on a subject threatening deadly force, fleeing on foot, who is emotionally disturbed, and/or seems to be experiencing excited delirium.

Single Agency Analyses

The University of South Carolina research team, utilizing its contacts with the Miami-Dade, FL Police Department, the Seattle, WA Police Department, and the Richland County, SC Sheriff's Department obtained use of force data from these agencies and subjected them to detailed analyses. The purpose for these agency-level analyses was to examine factors that predicted injuries to officers and citizens during use of force encounters.

The datasets from each of these agencies were analyzed separately in order to identify predictors of injuries associated with the use of force in general and intermediate weapons

specifically. Importantly, the three sites differed in that RCSD deputies and SPD officers had the ability to use OC spray while the MDPD officers did not have that option, though all three agencies had CEDs. The findings from Richland County indicated that the use of OC on suspects was one of the most important variables linked to a reduction in suspect injury, while CED use was unrelated to suspect injury. The data from the Miami-Dade Police Department, whose officers did not have access to OC as an intermediate weapon, showed that the use of CEDs was associated with reductions in injury to both officers and suspects. The results from the Seattle Police Department fell somewhere in between and showed CED-related injury reductions to suspects but not to officers. Moreover, unlike in Richland County, the use of OC spray in Seattle neither increased nor decreased the odds of injury to officers or suspects.

Why CED use was not associated with a significant reduction in injuries in the RCSD is unclear. However, since the majority of the RCSD deputies had a long history of using OC spray and the introduction of CEDs was relatively recent, the reliance on OC may have mitigated its injury reduction effects. Perhaps if both sites had a similar history with the same less-lethal weapon options, the findings would have been more comparable. Additional research in other settings may shed further light on this, but the results of this study suggest that not every agency's experience will be the same regarding CED use and injuries. The results from Seattle bear this out, as CED use reduced injuries to suspects but not to officers. Nonetheless, it is clear that the use of CEDs and OC *can* have a significant and positive effect on injury reduction.

Whereas CEDs and OC spray, which typically are deployed some distance from resistive or combative suspects, were associated with injury reduction, the use of hands-on tactics that require officers to be in close physical proximity to suspects to effect arrests was associated with an increased risk of injury to both officers and suspects, although some variations on this finding existed among the three agencies. Although we do not advocate the blind or wholesale substitution of intermediate weapons for hands-on tactics, the RCSD analysis

suggests that some deputies were more likely to be injured when using soft-hand controls to subdue actively aggressive suspects. To the degree that OC and/or CEDs would be authorized and appropriate for use in such encounters, their deployment in place of soft empty-hand controls may help prevent some injuries, albeit mostly minor ones.

Multiagency Analysis

We used data from 12 agencies which had appropriate use of force data and were able to export electronic files. We combined these data into a master dataset for the multiagency analysis.

Our analysis focuses on data that were extracted for a comparable set of measures from each agency and that enabled us to adjust for the demographic and situational differences between police use of force incidents. The outcome measure for this multiagency analysis focuses on whether the use of force event resulted in a recorded injury to the suspect or officer.

The multi-agency findings regarding CEDs and their effect on injuries were largely consistent with the single agency findings. Overall, CED use has been shown to reduce the probability of injuries to suspects across the 12 agencies in the combined analysis and in two out of the three agencies whose data were analyzed independently. Likewise, the relationship between OC spray and suspect injuries in the multi-agency analysis is consistent with the injury reduction finding in Richland County; in Seattle, OC spray had no effect on suspect injuries, while the Miami-Dade Police Department does not issue OC spray.

Longitudinal Analysis

After reviewing the data available for the multiagency analysis, two data sets – Austin, Texas and Orlando, Florida – were identified as potentially amenable to a longitudinal analysis for the purpose of examining how the introduction of CEDs into an agency subsequently affected injury outcomes in use of force encounters. The question to be addressed in this

analysis is whether equipping officers with CEDs reduced injuries to officers or citizens compared to injury levels before CEDs were put into use.

The Orlando data comprise 4,222 use-of-force incidents aggregated to 108 months - a nine-year period (1998 – 2006). The intervention (CED use) began February 1, 2003 (the 62nd month), with 21 CED deployments reported in the first month (there was a single prior CED use reported in August 2002). Thus, in Orlando, there were 61 pre-intervention observations and 47 post-intervention observations. The Austin data consist of 6,596 force incidents aggregated over 60 months (2002 – 2006), with the pre- and post-intervention observations consisting of 30 months each.

Using these data from Austin and Orlando, the analysis modeled pre-post Taser implementation changes in injury rates to officers and suspects involved in use of force events. In both cities, the adoption of the Taser was associated with a statistically significant reduction in average monthly injuries to suspects. After the Taser was adopted as a less lethal alternative for patrol officers in Orlando, the rate of injury to suspects dropped by more than 50 percent compared to the rate of injury before the Taser was put to use. In Austin, suspect injury rates were 30 percent lower after full-scale deployment of the Taser than they were in the pre-deployment period. Reductions in officer injury rates were even greater in Orlando than for suspects; the average monthly rate of injury to officers dropped by 60 percent after the Taser was adopted. In Austin, injuries to officers also dropped – by 25 percent – after the Taser was deployed agency-wide, a reduction that approached statistical significance at $p = .069$.

Implications for Policy and Training

In light of the findings from the present study on the relationship between various police use of force options, suspect resistance, and injuries to police and citizens, the placement of OC spray and CEDs on a linear force continuum (used by more than half of the agencies surveyed) should be carefully considered. Research on the use of force by police, including the results

from the current study, consistently shows that most use of force encounters involve no more than defensive efforts by suspects to resist physical control. A typical resistance scenario involves an initial refusal by a suspect to comply with police commands followed by the suspect pushing or pulling against an officer's attempt to physical gain control and apply handcuffs. According to our interviews with officers, many of these "wrestling matches" end up with the suspect and officer on the ground and the officer trying to use the ground for leverage. The single and multiagency injury models, though, clearly show the increased risk for injury that such physical struggles carry with them. Furthermore, although suspects are injured more frequently than officers in use of force encounters, the increased risk for injury associated with soft empty hand control attempts is borne disproportionately by the police.

In juxtaposition to these observations, our findings consistently show a significant reduction in the risk of injury to suspects when CEDs or OC spray is used. This should not be surprising, as these weapons allow officers to control suspects from a distance without engaging in the hand-to-hand struggles that typically cause injuries. However, these weapons are not painless or risk-free. Tasers barbs often cause small punctures or superficial burns, and OC spray causes intense burning and irritation of the skin and mucous membranes. In very rare cases, people have died after being pepper sprayed or shocked with a Taser, although no clear evidence exists that the weapons themselves caused the deaths (National Institute of Justice, 2008; Petty, 2004). Also included in the risk/benefit calculus is the observation from our data that most injuries, either to officers or suspects, are minor and involve muscle strains, bruises, small cuts, or scrapes.

According to the survey results, 45 percent of agencies allow for the use of OC spray to overcome passive resistance (suspect sits down and refuses to comply with police commands), while another 20-30 percent of agencies authorize the use of a CED under these circumstances. When resistance increases to the typical defensive level (suspect tenses and

pulls against officer's attempt at handcuffing), 82 percent of agencies authorize OC spray and about 60 percent allow for the use of a CED. Once the suspect's resistance level becomes threatening or assaultive, CED authorization increases to about 70 percent, while OC spray remains at about 85 percent.

If injury reduction is the primary goal, then agencies that authorize OC spray and/or CEDs to overcome defensive resistance are clearly at an advantage based upon the results from the current study. Both of these less lethal weapons help prevent or minimize physical struggles that cause injury (albeit relatively minor ones) to officers and citizens. Although both cause pain, they reduce injuries, and based on the present state of the medical research, death or serious harm associated with their use is extremely rare. In that sense, CEDs and OC spray are safe, and both are similarly effective at reducing the probability for injury. Both should be authorized as possible response alternatives to defensive (muscle tensing, struggling to escape physical control, fleeing on foot) or higher levels of suspect resistance. This recommendation not only is supported by our findings and observations about injuries but is presently followed by the majority of agencies that responded to the national survey.

The proliferation of CEDs in law enforcement agencies nationwide suggests that agencies see value in investing in this less lethal technology. At the incident level in our data, CEDs were used far more often (4-5 times more often) than OC spray among agencies that equipped their officers with CEDs and were sometimes used at rates that exceeded soft empty hand control. Unlike OC spray, CEDs do not require post-use decontamination and do not carry the risk of accidental overspray or "blow back" that often occurs when pepper spray is used. However, they do require the removal of prongs and the potential for an unintended shock of a police officer. Even with these concerns, they are rapidly overtaking other force alternatives when resistance is encountered. Although the injury findings suggest that the substitution of CEDs for physical control tactics may be beneficial in many cases, their ease of use and

popularity among officers (recall that every CPD officer interviewed longed for a Taser) raise the specter of overuse.

The possible overuse of CEDs has several dimensions. First, CEDs can be used too often, that is, at inappropriately low levels of suspect resistance. This problem can be managed with policies, training, monitoring and accountability systems that provide clear guidance (and consequences) to officers regarding when and under what conditions CEDS should be used and when they should not be used. In addition to setting the resistance threshold appropriately – our recommendation is to use defensive resistance – good CED policies and training should require that officers evaluate the totality of the circumstances before using a CED, which would include the age, size, gender, apparent physical capabilities, and health concerns (i.e. obviously pregnant women) of suspects. In addition, CED policies and training should prohibit the use of CEDs in the presence of flammable liquids or in circumstances where falling would pose unreasonable risks to the suspect (elevated areas, adjacent to traffic, etc.). Finally, policies and training should address the use of CEDs against persons who are restrained (e.g. handcuffed or otherwise controlled) and should either prohibit such uses outright or limit them to clearly defined, aggravated circumstances.

In addition to being used too often, CEDs can be used too much. Reported deaths in association with CEDs often involve multiple activations of a Taser (more than one Taser at a time) or multiple 5 second cycles from a single Taser. In addition to having a very low rate of serious injury in epidemiological studies, controlled medical trials have shown the Taser to be safe on healthy adult volunteers for exposures of up to 15 seconds. Thus, CED policies should require officers to assess continued resistance after each standard cycle and should limit the CED to no more than 3 standard cycles (15 seconds) of total activation time against the same person. Following the deployment of a CED, the suspect should be carefully observed by officers for signs of distress and should be medically evaluated at the earliest opportunity.

REFERENCES

- Alpert, G.P. & Dunham, R.G. (2000). *Analysis of police use of force data*. Washington, D.C.: National Institute of Justice.
- Alpert, G.P. & Dunham, R.G. (2004). *Understanding police use of force: Officers, suspects, and reciprocity*. Cambridge, NY: Cambridge University Press.
- American Civil Liberties Union of Southern California. (1995, June). *Pepper spray update: more fatalities, more questions*. Retrieved October 15, 2008 from http://www.aclu-sc.org/attach/p/Pepper_Spray_New_Questions.pdf.
- Amnesty International of Canada. 2007. Inappropriate and excessive use of tasers. Downloaded Feb. 2, 2009.
<http://www.amnesty.org/en/library/asset/AMR20/002/2007/en/doAMR200022007en.pdf>
- Charlotte-Mecklenburg Police Department. (2006). *Taser project: First year—full deployment study*. Charlotte, N.C.: Author. Retrieved December 26, 2006 from <http://www.charmeck.org/NR/rdonlyres/e2alrn6jzttfx35m2gwabbqjzhlahc567iwaeusye62e5iz6amtldfmv4mel3ojqzq3qtzd375dhuui4ozio7y3estb/1+year+taser+study.pdf>.
- Durose, M.R., Schmitt, E.L. & Langan, P.A. (2005). *Contacts between police and the public*. Washington, D.C.: Bureau of Justice Statistics.
- Edwards, S.M., Granfield, J., & Onnen, J. (1997). *Evaluation of pepper spray*. Washington, D.C.: National Institute of Justice.
- Granfield, J., Onnen, J., & Petty, C.S. (1994). *Pepper spray and in-custody deaths*. Alexandria, VA: International Association of Chiefs of Police.

- Henriquez, M. (1999). IACP national database project on police use of force. In *Use of force by police: Overview of national and local data* (pp. 19-24). Washington, DC: National Institute of Justice and Bureau of Justice Statistics.
- Jenkinson, E., Neeson, C., & Bleetman, A. (2006). The relative risk of police use-of-force options: Evaluating the potential for deployment of electronic weaponry. *Journal of Clinical Forensic Medicine, 13*, 229-241.
- Kaminski, R.J. & Sorensen, D.W.M. (1995). A multivariate analysis of individual, situational, and environmental factors associated with police assault injuries. *American Journal of Police, 14*(3/4), 3-48.
- Kaminski, R., DiGiovanni, C., & Downs, R. (2004). The use of force between the police and persons with impaired judgment. *Police Quarterly, 7*, 311-338.
- Kaminski, R. J., Edwards, S. M., & J. W. Johnson. (1999). Assessing the incapacitative effects of pepper spray during resistive encounters with the police. *Policing: An International Journal of Police Strategies and Management, 22*, 7-29.
- Kaminski, R. J., Edwards, S. M., & J. W. Johnson. (1998). The deterrent effects of oleoresin capsicum on assaults against police: Testing the velcro-effect hypothesis. *Police Quarterly, 1*, 1-20.
- Lumb, R.C. & Friday, P.C. (1997). Impact of pepper spray availability on police officer use-of-force decisions. *Policing: An International Journal of Police Strategy and Management, 20*, 136-148.
- Meyer, G. (1992). Nonlethal weapons vs. conventional police tactics: Assessing injuries and liabilities. *The Police Chief, 59*, 10-17.
- Morabito, E.V. & Doerner, W.G. (1997). Police use of less-than-lethal force: Oleoresin capsicum (OC) spray. *Policing: An International Journal of Police Strategies & Management, 20*, 680-697.

- National Institute of Justice. (2008). *Study of deaths following electro muscular disruption: An interim report*. Washington, DC: National Institute of Justice.
- National Institute of Justice. (2003). The effectiveness and safety of pepper spray. *Research for Practice*. Washington, D.C.: National Institute of Justice.
- Petty, C.S. (2004). *Deaths in police confrontations when oleoresin capsicum is used: Final report*. Washington, D.C.: National Institute of Justice.
- Seattle Police Department. (2002). *The M26 taser year one implementation*. Seattle, WA: Author.
- Smith, M.R. & Alpert, G.P. (2000). Pepper spray: A safe and reasonable response to suspect verbal resistance. *Policing: An International Journal of Police Strategy and Management*, 23, 233-245.
- Smith, M.R., Kaminski, R.J., Rojek, J., Alpert, G.P., & Mathis, J. (2007) The impact of conducted energy devices and other types of force and resistance on police and suspect injuries. *Policing: An International Journal of Police Strategies and Management*, 30, 443-426.
- Smith, M.R. & Petrocelli, M. (2002). The effectiveness of force used by police in making arrests. *Police Practice and Research*, 3, 201-215.