The Police Killing of Persons Brandishing Knives in the United States

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October 5, 2020

Abstract

This paper examined the use of lethal force by law enforcement against people brandishing knives in the United States. The purpose of the research was to better understand the correlates of lethal force encounters and inform the development and implementation of systems and procedures designed to monitor, predict, and reduce the frequency of fatal police/civilian violence. There are two parts to this mixed-methods study: a quantitative analysis of the distribution of fatal event factors and descriptive epidemiology of fatal police encounters among persons brandishing knives. A non-probability sample ($n = 174$) was assembled from publicly reported use-of-force fatalities. The analysis revealed the typical decedent was a mentally ill 37-year-old White male brandishing a kitchen knife. Most encounters involved 2–4 officers firing 2–4 bullets at a person no more than 10-feet away. Police injuries, while uncommon, tended to be moderate, but none were fatal. Contrary to previous studies, Thursday was the most lethal day of the week. California accounted for 29% of all fatal encounters. Future research is needed to examine Black decedents' over-representation, explore the unexpectedly high number of deaths in California, and evaluate trends over time.

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1 Introduction

Department of Justice (DOJ) statistics indicate that approximately 630,000 law enforcement officers sworn to serve and protect more than 321 million people in the United States in 2015 (Federal Bureau of Investigation [FBI], 2016a). Those same statistics show assailants killed more than 15,500 people and murdered 41 law enforcement officers in the line of duty during the same period (FBI, 2016a; FBI, 2016b). While the law enforcement murder rate (6.5 murders per 100,000 officers) exceeds that of the general population (4.9 murders per 100,000 people), the actual number of law enforcement officers murdered is relatively low (FBI, 2016a). More people die falling out of their beds than are killed in the line of duty (Centers for Disease Control and Prevention [CDC], 2016). Nevertheless, law enforcement officers were responsible for one out of every 16 persons killed (about 1,000 people) in 2015 (Guardian, 2016; Somashekhar & Rich, 2016).

Reading statistics fraught with emotional undertones can be disturbing. The state-sanctioned killing of a private citizen, however justified, is incongruent with the law enforcement mission to serve and protect. Too frequently, it seems, police respond to calls for help with lethal force. These deaths are routinely classified as homicides, as all deaths resulting from external causes are either accidents, suicides, or homicides (National Center for Health Statistics, 2003). As these killings are neither accidents nor suicides, they must be homicides. Homicide, often conflated with murder, is not murder. Homicide refers to the "killing of one person by another" (Garner, 2009, p. 802), while murder refers to the "killing of a human being with malice aforethought" (Garner, 2009, p. 1114). The distinction is malice aforethought. Killings committed by on-duty law enforcement officers are permitted by law and therefore committed without malice aforethought.

Maintaining law and order is an unpredictable and hazardous endeavor. In 2015, assailants assaulted more than 50,000 law enforcement officers in the line of duty, including more than 900 assaulted with a knife or other cutting instrument (FBI, 2016b). The public can reasonably expect an officer to face an edged weapon attack every eight hours and be injured during such an attack every third day. The public can also reasonably expect law enforcement officers to use lethal force to repel such attacks. The use of lethal force is generally permitted when an officer has a reasonable belief that such force is necessary to prevent "imminent danger of death or serious physical injury to the officer or another person" (Department of Justice [DOJ], 1995).

The law enforcement community is widely aware of the notion that a person armed with a knife can launch a life-threatening attack from as far away as 21 feet before the officer can effectively repel the attack (Hontz, 1999). This principle, however, has not been universally accepted or adopted. The Police Executive Research Forum (PERF), in a report recommending the discontinuation of outdated policing concepts, expressed serious reservations with police using this so-called 21-foot rule as the justification for the use of lethal force (Police Executive Research Forum [PERF], 2015).

When and under what circumstances, the decision of when to use lethal force is as variable as the number of potential police/citizen encounters. What may seem unreasonable on its face becomes more reasonable as more information becomes known. For example, a police officer killed an overweight woman with a limping gait (due to foot deformity) as she approached with a steak knife (Serrano v. Trieu, 2016). It seems that an officer of average ability should be able to evade an overweight suspect with a foot deformity. The analysis becomes less confident, knowing that the decedent had already chased the officer more than 160 feet and was advancing at a rate of 13 feet

per second before being shot. At the other end of the scale, a report that a police officer killed a suspect that attempted to stab another police officer seems reasonable on its face. The analysis becomes less confident knowing that the suspect was a double-amputee (missing one arm and one leg), used a wheelchair, and the weapon brandished was a plastic ballpoint pen (DePrang, 2013). Authorities, ruling the shootings were justified, cleared the officers in both cases.

The increasing public awareness of the amount of force, particularly lethal force used by law enforcement, demands attention. The number of law enforcement homicides appears to be disproportionately high compared to the number of officers feloniously killed in the line of duty. Contrary to the prevalent perception that policing is an inherently dangerous profession (President's Task Force on 21st Century Policing, 2015), the suspect is 25 times more likely to be killed than the officer during a fatal law enforcement encounter. Regardless of the need to intervene, officers are acutely aware that their decisions, made in circumstances that were "tense, uncertain, and rapidly evolving" (*Graham v. Connor*, 1989, p. 397), will be analyzed in painstaking detail for years after (Geller & Scott, 1992).

This paper will examine the use of lethal force by law enforcement against people brandishing knives in the United States through the 21-foot rule's prism. It will consider whether it is reasonable to use lethal force to repel an edged weapon attack and assess the viability of less-lethal alternatives to lethal force. It will close with a discussion of how the police can protect society while minimizing lethal force. While not everyone brandishing an edged weapon is dangerous, the 21-foot rule is essential to officer safety because it is more effective and reliable than its alternatives, is easily understood and commonly used, and minimizes the risk of fatal officer injuries.

2 Review of Literature

2.1 What is the 21-root rule?

The basic premise of the 21-foot rule is that an assailant armed with a knife can cover 21 feet in less time than it takes for the average police officer to draw and fire two rounds into the assailant's chest (center of mass). Dennis Tueller, a firearms instructor, devised the rule following a series of informal drills where he observed the average adult male could run 7 yards in approximately 1.5 seconds (Tueller, 2004). Tueller, who was attempting to answer how close was too close when confronting a suspect armed with a knife, also observed that it took the average police officer 1.5 seconds to draw and fire two rounds into a target's center of mass. Comparing the two times, Tueller noted little margin for error and advocated officers take several safety precautions. Officers should develop situational awareness, create distance between themselves and the suspect, move behind obstacles or barriers to impede the assailant's attack, and draw and present their sidearm quickly (Tueller, 2004). His last point was twofold: first, the assailant may reconsider attacking after the officer indicates the willingness to use lethal force to prevent an attack, and getting the pistol out of the holster and onto the target (out and up) affords the officer more time to react if the assailant attacks. While informative, Tueller's tests were far from scientific. The article makes no mention of the number of study participants, the number of trials, the preamble given to each participant, or any demographic information (officer gender, age, years of police experience). Despite the lack of empirical evidence supporting the 21-foot rule (Hontz, 1999), police officers routinely shoot suspects armed with a knife within this so-called 21-foot danger zone because society permits it (Johnson,

2017). Perceived societal license perpetuates the 21-foot rule in the absence of a more explicit scientific or legal foundation.

Thomas Hontz (1999) attempted to fill this empirical void through a series of tests conducted in 1996. Hontz tested 76 officers from the Scottsdale Police Department to determine how quickly they could fire one accurate shot following a visual cue. Hontz also timed volunteers as they performed a series of hostile movements (drawing a concealed firearm from various places and firing one-shot) and ran a series of distances (15–30 feet). Hontz reported that a person could cover 15 feet before the officer could fire an aimed shot to the center of mass from the low ready (pistol drawn but pointed down) position and that the distance increased to 20 feet when the officer attempted to hit a smaller target (e.g., a headshot). Contrary to what Tueller observed, Hontz found that a suspect could cover 30 feet before the officer could fire an aimed shot at the center of mass if the officer started with a holstered pistol. Hontz took steps to ensure his test sample matched both the gender breakdown of the participating police department and the average age/years of service of officers killed in the line of duty in 1994. Nevertheless, Hontz acknowledged that his study was not without limitations and cautioned that the results probably indicated the best-case scenario since researchers primed each participant with the knowledge they would be shooting.

Blair et al. (2011) built upon Hontz's work with their police reaction time study. In a lethal force encounter, the police officer must perceive and interpret the suspect's actions before choosing and delivering a legally justifiable, situationally appropriate response. In an action/reaction exercise, Blair found that most police officers could not prevent the suspect from shooting first even when the officer's pistol was already drawn and pointed. Of note is that the 24 participants in this study were all regional SWAT team members attending a nearby conference and therefore skewed the results towards proficient marksmanship. Researchers also primed participants with the knowledge they would encounter an armed suspect and thus mentally prepared for action. The researchers acknowledged these limitations and suggested that their results were more aligned with the best-case scenario than a typical lethal force encounter. Most officers are not SWAT qualified and generally less proficient with their pistol manipulations and shot placement.

Morrison and Vila (1998) reviewed police marksmanship and reported that it was better than previous generations but remained quite limited. Despite professional training, they often achieved little better results than chance during real-world lethal force encounters. White (2006) reported that the hit rate during police shootings was consistently below 50%. His study of 271 police shootings in Philadelphia reported that the police hit their target just 49% of the time. Accuracy was at its best within 10 feet then dropped off considerably at 20 feet. A review of 796 officer homicides conducted by Swedler, Kercher, Simmons, and Pollack (2014) indicated that assailants murdered 10% of officers with their own (or another officer's) sidearm.

This research reveals that officers are behind the action/reaction curve during lethal force encounters and may explain why some officers act decisively to stop the situation before it escalates beyond their control. While not necessarily inspiring confidence, it may also explain why some police officers fire multiple rounds despite the suspect's relative proximity—many of their shots miss their intended target. An officer might also fire multiple rounds when struggling with an assailant over control of their sidearm. Finally, the research supports the contention that the risk of fatal outcomes increases as the officer and the suspect's distance decreases.

2.2 Flawed reporting of justifiable homicides in official sources

The federal government lacks a central repository for the mandatory reporting of deaths due to legal intervention. Researchers seeking a convenient and comprehensive database of names and vital statistics of those killed by the police will be deeply disappointed for no such database exists. Researchers must instead rely on querying multiple data sources to gain a complete sense of the research question, including the National Vital Statistics System (NVSS) maintained by the CDC; the Supplementary Homicide Report (SHR) published by the FBI's Uniform Crime Reporting (UCR) Program and the Bureau of Justice Statistics (BJS) Arrest-Related Deaths (ARD) program.

Unfortunately, all three government programs under-reported lethal force encounters. A study by Loftin, Wiersema, McDowall, and Dobrin (2003) of justifiable homicides committed over 22 years found that both the NVSS and the SHR underreported homicides but for different reasons. The NVSS often misclassified justifiable homicides as homicides, while the SHR relied on law enforcement agencies' voluntary program data participation. The researchers advised caution when relying on homicide data compiled under either system. Miller et al. (2017) reinforced these results when they reported the SHR and the ARD consistently missed about half of those killed by the police while the 16-state National Violent Death Reporting System (NVDRS) captured no more than 58% of deaths. The researchers acknowledge their estimates may be inaccurate due to lack of reporting in some jurisdictions and underreporting in others. Researchers have created various open-source databases to fill in the gaps in these unreliable official government datasets. The Washington Post and Guardian newspapers, working independently on their projects, captured about twice as many fatalities as any government source. Hirschfield (2015) discussed these efforts in his review of the rate of police killings in America and found that these informal databases were valuable tools when conducting lethal force research. Hughey (2016) countered that official sources (e.g., NVSS), despite their limitations, remain better suited to scholarly analysis. While acknowledging the "serious methodological issues" with the SHR (p. 225), Hughey failed to acknowledge the underreporting associated with the NVSS. Nevertheless, Hughey's commentary suggested using secondary data sources during lethal force research was not free from debate.

2.3 The effect of police training, tactics, and culture

Morrison and Garner (2011) noted that police agencies enjoy wide latitude in delivering deadly force training that was both well-intentioned yet unsupported by empirical research. The researchers argued that this latitude accommodates "all but the most vapid approaches" (p. 346) to training, impedes systematic evaluation and precludes meaningful comparisons between modalities. Adopting a more rigorous approach to law enforcement training may enhance both public and police safety. The implication is that ad-hoc standards, such as the 21-foot rule, become ingrained into police culture before instructors thoroughly vet their effectiveness.

Quinet, Bordua, and Lassiter (1997) studied the trend in police murders from 1960 to 1992 and noted a steady decline since 1971. The researchers offered three possible explanations for the decline: training, tactics, and target hardening. The development and widespread adoption of soft body armor (target-hardening) in the 1980s accounted for some of the declines in police murders; this factor alone does not fully account for the drop since the 1970s. Instead, the researchers point to police tactics' evolution as the primary driver in reducing police fatalities. Police officers began to exert more forceful control over potentially dangerous situations before they escalated. The

researchers point to the decline in both officer and suspect fatalities to support their assertion that improved training and tactics positively altered the police-citizen dynamic and reduced the likelihood of violence. Batton (2006) reinforced this research by expanding the period under observation from 1947 to 1998 and attributed the decline in police murders since the 1970s to better training and technology. Batton found that heightened focus on training increased officer skills and reduced the prevalence of potentially fatal tactical errors.

The move towards more forceful policing tactics is not without risks. Ganpat, van der Leun, and Nieuwbeerta (2013) compared the influence of event characteristics on fatal and non-fatal assaults and proposed an integrated theoretical framework to account for the differences. The researchers discovered that those who died were more likely to have threatened the suspect than those who lived. The implication is that aggressive police tactics may unnecessarily escalate encounters by provoking suspects into lashing out at the police. Nevertheless, the cultural shift toward officer safety continues today. The Supreme Court unanimously held that officer safety trumps personal privacy when a police officer reasonably suspects a person is armed and dangerous (Ross & Myers, 2009). The Court held that an immediate show of authority to neutralize potential danger was reasonable. The 21-foot rule implies that it is not objectively unreasonable for a police officer to confront a suspect armed with a knife from behind a drawn pistol.

Gross (2016) argued that this renewed emphasis on officer safety is due, in part, to the pervasive misperception that policing is extremely dangerous. The inherent dangerousness narrative has resulted in the public, and the Supreme Court, becoming too deferential to the risks faced by police officers. Using statistics from 2011, Gross computed the chance of an assailant killing a police officer during an arrest was 0.00077% (23 deaths out of 3 million arrests). Marenin (2016) agreed that reports exaggerated the dangers of police work. Using statistics from 2014, Marenin computed the chance that a perpetrator murdered a police officer during an arrest at 0.00001% (126 deaths out of 12.5 million arrests). Gross provided the basis for his statistics (US DOJ/FBI), but Marenin did not. Without the basis for the statistics, it is unclear how Marenin counted almost 10 million more arrests than Gross. It also appears that Marenin may have miscalculated the risk faced by police officers—126 deaths out of 12.5 million arrests is 0.001008%, not 0.00001% as reported. Either way, the risk of on-duty police officer murder was exceedingly low. Despite 2015 being one of the safest years for law enforcement, both Gross and Marenin recognized the prevailing attitude amongst police officers was officer safety was paramount and trumped all other considerations.

Mol, Baas, Grillon, van Ooijen, & Kenemans (2007) also found that predictability affected fear when they reported that unpredictable threats increased the amount of cognitive effort required to differentiate between rapidly changing inputs. The authors noted that anxiety and fear produced different results and suggested that threat cues activated different biological processes. As police officers use predictability patterns to stereotype situations and reduce the fear of the unknown, officers may become biased towards acting (and reacting) within these preconceived schemas even if the encounter failed to follow the predicted pattern. The implication is that officers may react with deadly force when encountering a suspect armed with a knife because they expect the suspect to attack (even if the suspect has no such intent). In effect, police officer expectations become a self-fulfilling prophecy.

Manning (2008) explored the ritualistic response to the unpredictable nature of policing. Manning noted that officers sought to bring order to chaos by establishing patterns and routines then

assessed the risk of citizen encounters based on how the events corresponded with their expectations. Encounters that deviated from the norm were considered riskier than routine interactions. Deviating from the norm is dangerous in a subculture that values the repetition of rituals and conformity to dogma. Devotion to doctrine reinforces stereotypical police officer perspectives. In this culture, "street smarts" are more valued than "book smarts," and only those who have worked the streets can understand the danger police face. The general reluctance to second-guess police judgment is based partly on the Supreme Court dicta that courts must not judge the reasonableness of force with 20/20 hindsight (*Graham v. Connor*, 1989). Johnson (2017) expanded on Manning's exploration of police rituals to examine how officers act upon their perceived license to use force. The informal codification of police culture into police rituals encourages police officers to enforce their expectations during citizen encounters. Building upon the theme that deviation equates to danger, Johnson explained how the sense of hidden danger imbues police culture, leads to the development of a siege mentality, and the misperception of danger in situations where none exists. While back-up is often considered a reasonable response against the threat of violence, a review of all force used by the Orlando police from 2006–2008 found that officer assaults were significantly more likely in situations where more than one officer was present (Covington, Huff-Corzine, and Corzine, 2014). The presence of multiple officers may compel some suspects to try to escape from a seemingly inescapable situation. The 21-foot rule implies that a cornered suspect may choose to fight (rather than surrender) when the avenue for flight is blocked. While back-up should enhance officer safety, it also has the potential to escalate, rather than de-escalate, already tense situations.

Peelo (2006) and Hirschfield and Simon (2010) note that lethal police encounters' exceptional nature results in extensive media coverage. These media narratives generally confirm and reinforce existing stereotypes and stereotypical responses to crime. As consumers of the media, police officers feed and perpetuate the very feedback loop they subconsciously use to justify their policing approach. The 21-foot rule implies that the positive media reporting following a lethal police encounter with a suspect armed with a knife reinforces the righteousness of immediate action's response and necessity. In contrast, adverse reporting reinforces police siege mentality and the notion that the public does not fully realize the dangers faced by police officers.

Mays and Keys (2011) studied the notion of normalcy in their review of murder convictions in Oklahoma from 1973–2008 and found that homicides committed with a knife precluded normalcy (p. 40). The researchers reported that sharp force homicides were associated with a 36% reduction in the probability of receiving a normal classification during prosecution and sentencing. The researchers speculated that grisly crime scene photos depicting mutilated body parts created an impression of disproportionate brutality among the court members. The implication is that the atypical nature of knife attacks can elicit a more robust emotional response in police officers encountering a person armed with a knife.

2.4 The effect of stress on performance

Anderson, Litzenberger, and Plecas (2002) studied the effect of stress on police officers throughout their shift. The researchers paired heart-rate monitors (used to track autonomic nervous system fluctuations) with direct observations while they accompanied police officers on 76 ride-alongs. Officers experience anticipatory stress before their shift's commencement that does not fully dissipate until the end of their shift. Critical incidents accentuated this stress through the activation of bio-

logical fight-or-flight mechanisms. The authors noted that officers could modulate their emotional responses to threatening stimuli, but their physical response remained the same.

Research has shown that police officers exposed to high-stress situations during defensive tactics training performed worse than those exposed to low-stress situations. Nieuwenhuys, Caljouw, Leijsen, Schmeits, and Oudejans (2009) tested 19 Dutch police officers' self-defense skills under low and high-stress situations. They found their skills remarkedly diminished during the high-stress encounters. The researchers acknowledged that assessors in the same room might have negatively impacted subject performance during high-stress testing. However, they argued that the presence of assessors during low-stress testing was not associated with decreased performance. The researchers did not address their small sample size or how the relatively inexperienced officers' (none had more than two years) performance compared to more experienced officers. It is possible that less-experienced officers were less sure of themselves while in the presence of more experienced assessors and that more experienced officers would feel no such anxiety.

Renden et al. (2014) also found that high stress negatively affected police defensive tactic skills. The researchers evaluated 13 police officers' performance in low-stress (rubber knife) and high-stress (electric shock-knife) situations. They reported that the fear of being stabbed (stimulus-driven processing) impacted skill performance (goal-directed processing). Fear overwhelmed the officers who confronted the suspect armed with the shock-knife resulting in suboptimal performance. Fear and anxiety promote harm avoidance mechanisms across the biological spectrum, which either help or hinder performance depending on the circumstances. Despite the small sample size, this study helped explore how police officers must overcome innate avoidance tendencies when encountering dangerous situations. Oue, Hakoda, and Onuma (2008) found that a knife's pointed shape was particularly good at capturing human attention. The researchers tested 33 university students and found that their detection of pointed knives was significantly quicker than rectangular (butcher/chop style) knives. Though the sample size was small, this study supports the hypothesis that dangerous objects attract attention. The implication for the 21-foot rule is that officers may experience this weapon focus effect given the emotions evoked by the knife (fear/surprise) or the incongruity of the knife in the given context (e.g., kitchen knife in an alley).

Robinson, Vytal, Cornwell, and Grillon (2013) studied the effect of anxiety on cognition and found that the threat of shock promoted early sensory-perceptual processing and enhanced negative information detection. These processes facilitated conflict resolution to the detriment of working memory. Hypervigilance may enable officers to detect threats earlier but hinder their creative problem-solving abilities. As a result, officers may miss an opportunity to deescalate lethal force situations by resorting to stereotypical responses to atypical threats. Although these responses may not be technically incorrect, officers should be encouraged to adopt tactics that promote creative solutions to existing challenges.

Nieuwenhuys and Oudejans (2010) studied the effects of anxiety on police officers' handgun shooting behavior and found that accuracy decreased significantly under high-stress situations. The researchers tested seven police officers and reported that participants reacted quicker and made themselves smaller (to reduce the likelihood of adverse outcomes). The subjects also demonstrated a 20% reduction in shooting accuracy during the high-stress test condition. The authors cite this as an example of the speed-accuracy trade-off. While the decrease in police marksmanship accuracy during periods of heightened anxiety may support earlier police intervention during encounters

with suspects armed with a knife, the small number of test subjects limits the study's predictive value. Nieuwenhuys, Savelsbergh, and Oudejans (2012) conducted a follow-up study on the effect of anxiety on police shooting behavior. They found that police officers demonstrated a bias towards shooting during periods of high anxiety. The researchers tested 36 experienced officers in a simulated "shoot/don't shoot" exercise. They reported that officers reacted quicker, had worse accuracy, and made more fatal mistakes (shot unarmed person) during the high-anxiety test condition. They hypothesized that officer reactions were based more on their expectations and less on objectively discernable information. The implication is that the expectation of danger during high-risk encounters may impair judgment and result in suboptimal performance. These results are also somewhat inconsistent with earlier research conducted by Fleming, Bandy, and Kimble (2010). They found that bias towards action in a "shoot/don't shoot" exercise leads to faster and more accurate responses in shoot scenarios (positive outcome) and faster and more accurate responses in no-shoot scenarios (negative outcome). While Fleming tested the effect of cultural bias, not anxiety, on police shooting behavior, the results suggest the speed/accuracy trade-off is not universally applicable.

White and Klinger (2012) studied whether officers were more inclined to start shooting once another officer starts shooting. This phenomenon, known colloquially as contagious fire, suggests that the number of shots fired during a lethal force encounter increases as the number of officers present increases. More guns present should result in more shots fired. Despite anecdotal evidence, the researchers could not find a single empirical study documenting the phenomenon's existence. The researchers reviewed 795 police shootings in the city of Philadelphia from 1970–1992. They found that more guns did indeed result in more shots fired, but increased officer presence alone did not independently affect the number of rounds fired (p. 212). The researchers noted officers fired a single shot in 36% of incidents, two-to-four shots in 35% of incidents, and five or more shots in 29% of incidents. The authors acknowledged that including data from only one agency (the Philadelphia Police Department) and not including data from all years within the observation period (it included only 1970–1978 and 1987–1992) limited their study. Subsequently, Klinger, Rosenfeld, Isom, and Deckard (2016) studied lethal force by the St. Louis (MO) Metropolitan Police Department from 2003–2012. The researchers reported that a single officer fired rounds in 78% of fatal encounters. While the mean number of shots (6.5) was higher in the current study than reported by White and Klinger (3.83), an outlier event where police fired 132 rounds may have skewed the St. Louis results.

2.5 Assessing the risk posed by sharp force injuries

Sharp force injuries are the primary mechanism of homicidal injuries in many industrialized nations, including Canada and the United Kingdom, and the second leading cause of homicides (after gunshot wounds) in the United States (Hainsworth, Delaney, & Rutty, 2008; De-Giorgio et al., 2015). Besides physical trauma, assault with a knife can induce psychological distress as the victim fights for survival (Taff & Boglioli, 1998).

Felson and Messner (1996) examined more than 12,000 cases of interpersonal violence from almost five years of data (1987–1991Q2) contained within the National Crime Victimization Survey (NCVS). The researchers reported that assailants armed with a knife were 4.4 times more likely to kill their victims than assailants who used personal weapons (those assaulted with a firearm

were 40 times more likely to be killed). Weaver (2004) examined more than 238,000 aggravated assaults and 2,500 homicides within the National Incident-Based Reporting System (NIBRS) from 1995–2000. Weaver reported that victims assaulted with a knife were 2.6 times more likely to die than a victim assaulted with personal weapons while those assaulted with a firearm were almost 12 times more likely to die. Rennison, Jacques, and Berg (2011) examined more than 8,000 cases of interpersonal violence from 10-years of data (1993–2004) contained within the National Crime Victimization Survey (NCVS) and observed that knives were less lethal than firearms but more lethal than physical assaults. These results support the weapon instrumentality/lethality thesis that assaults become deadlier depending on the weapon used. Knives are more lethal than fists but less lethal than firearms.

Sharp force homicides are infrequent. People predominantly use firearms to commit homicides in the United States (Fox & Allen, 2013), and knives or personal weapons to commit aggravated assaults (Jarvis, Mancik, & Regoeczi, 2016). A review of 35 years of data contained within the FBI's Supplementary Homicide Reports (SHR) revealed that sharp force injuries accounted for 15% (103,270/670,127) of all homicides committed between 1980–2015 (Puzzanchera, Chamberlin, & Kang, 2017). Not only are sharp force homicides relatively infrequent in the general population, but they are also exceedingly rare as the mechanism of fatal injury amongst police officers. Kyriacou (2006) reviewed every line of duty death reported in New York City and London during the 20th century. Even though New York City experienced more than 7.5 times as many police homicides as London, both cities saw an officer stabbed to death about once per decade (11 officers killed in New York City vs. ten officers killed in London). These results challenge the notion that the 21-foot rule was required to combat an increase in police deaths due to knives.

2.5.1 The mechanics of sharp force injuries are unpredictable

The unpredictable nature of potentially fatal sharp force injuries complicated the defense against edged weapon attacks. Hainsworth, Delaney, and Rutty (2008) studied the penetration ability of different kitchen knives. Factors affecting lethality included: the shape, style, and sharpness of the knife; the area of the body attacked; the angle of attack; and the movement of the attacker relative to the victim (moving away or towards the blade impacts the relative energy delivered with each blow). The study indicated a blunt knife (such as a bread or butter knife) could not penetrate flesh in porcine models. This research supports the position that different kitchen knives present different threat levels when used as a weapon. An assailant brandishing a butter knife (dull, rounded blade) is less threatening than one brandishing a steak knife (sharp, pointed blade).

2.5.2 Sharp force mortality is generally low

Sharp force injuries are generally associated with low mortality rates. Multiple studies have shown that somewhere between 0.5%–3% of people suffering sharp force injuries die (Shabbir et al., 2004; Konig, 2006; Maxwell, Trotter, Verne, Brown, & Gunnell, 2007; Pallett, Sutherland, Glucksman, Tunnicliff, & Keep, 2014). While sharp force injury mortality is relatively low, a pair of studies reported elevated mortality rates of 17% and 19% (Webb, Wyatt, Henry, & Busuttil, 1999; Kristoffersen, Normann, Morild, Lilleng, & Heltne, 2016). Webb et al. reported that 20/120 persons died from sharp force injury assault in Edinburgh between 1992–1996. Notably, 15/20 persons died at the scene or before arrival at the emergency department. Excluding those who did not receive hospital care, 5/105 (4.76%) persons suffering sharp force injuries died, which is more in

line with previous estimates (0.5–3%). The researchers noted that a majority of those with potentially survivable wounds died alone. The implication is that these victims may have survived if there was someone there to summon emergency medical services. Kristoffersen et al. studied sharp force injury fatalities (assaults and self-inflicted) at the Haukeland University Hospital (Norway) between 2001–2010. The researchers reported that 17/89 persons died after being assaulted, and 22/47 persons died after deliberately injuring themselves. Notably, 35/39 persons died at the scene. Excluding those who did not receive hospital care, 4/101 (3.96%) of persons suffering sharp force injuries (assault and self-harm) died and is also more in line with previous estimates (0.5–3%). The researchers did not differentiate the place of death between the two groups. While improbable (0.3% per exposure), it is also possible that HIV may be transmitted from person to person via the bloody knife in a multiple-stabbing event (Jorgensen, Marcus, Albrecht, Suttorp, & Schürmann, 2010).

Numerous studies identified the head, neck, and chest as being commonly associated with fatal sharp force injuries (Karlsson, 1998; Webb et al., 1999; Shabbir et al., 2004; Konig, 2006; Maxwell et al., 2007; Smith, 2013; Vassalini, Verzeletti, & De Ferrari, 2014; De-Giorgio et al., 2015). Fatalities were primarily due to cardiac injury or transection of major vessels (Pallett et al., 2014; Kristoffersen et al., 2016). Smaller wounds (< 1 cm) were associated with longer survival times, while larger wounds (> 1.4 cm) were associated with shorter survival (Karger, Niemeyer, & Brinkmann, 1999). Officers increase their odds of survival when they keep their assailants farther away. The difference between nearly instant incapacitation and potentially life-saving medical attention was often millimeters. Officer safety increases when they keep assailants armed with knives farther away. Police officers may be particularly vulnerable to knife attacks because of how the pistol is held (arms generally outstretched) and the typical gap in body armor where the front and back ballistic panels meet. Even though the body armor typically worn in the United States is not designed to defeat an edged weapon attack, every little bit helps.

Thoresen and Rognum (1986) studied the survival time following fatal sharp force injuries in Olso (Norway) from 1940–1984. The researchers reviewed more than 18,000 autopsies to find 109 persons who fit their criteria for inclusion. Researchers reported only 22% (24/109) of those suffering fatal sharp force injuries could exert any physical effort following the attack and that 45% (49/109) had suffered a single fatal wound. Besides reporting that survival time decreased as the number of wounds increased, the researchers also noted a kitchen knife was the murder weapon most often used. Ormstad, Karlsson, Enkler, and Rajs (1986), in their study of 142 sharp force fatalities in Sweden, reported that 58% of victims suffered two or fewer wounds. Karger, Niemeyer, and Brinkmann (1999) also studied survival time following self-inflicted sharp force injuries in Germany and reported that the onset of death was usually quick (lasting anywhere from 10 seconds to 10 minutes). Despite the small sample size ($n = 12$), observation of the fatal injury and its aftermath makes the study incredibly informative. These case histories provide a rare glimpse into the mechanism of injury, potential for physical activity following fatal injury, and approximate survival time. The research indicates that the likelihood of survival increases with rapid transport to emergency medical care.

2.5.3 Kitchen knives can be deadly

Public outcry sometimes follows police shootings when the suspect brandished a kitchen knife. Contrary to their intended purpose, kitchen knives can be lethal weapons in the hands of a motivated offender. Karlsson (1998) found that assailants used kitchen knives to commit 48% (67/142) of all

sharp force homicides in Stockholm from 1983–1992. Rogde, Hougen, and Poulsen (2000) found that assailants used kitchen knives to commit 23% (32/141) of all sharp force homicides in Oslo and Copenhagen from 1985–1994. While informative, the authors noted they did not know the type of knife used in most cases. Hern, Glazebrook, and Beckett (2005) called for a ban on the sale of long pointed kitchen knives in an editorial appearing in The BMJ. While admitting that official data was lacking, the authors estimated assailants used kitchen knives in at least half of all stabbings in the United Kingdom. Hughes, Macaulay, and Crichton (2012) studied the homicidal use of kitchen knives by mentally ill persons in England from 1994–2010 and reported that assailants used kitchen knives in 84% (58/69) of cases that identified the type of knife used. As with Hern et al., the researchers suggested that reducing sharp kitchen knives' availability may reduce the number of sharp force homicides in the United Kingdom. Kidd, Hughes, and Crichton (2014) studied the use of kitchen knives and homicide in the Lothian and Borders region of Scotland from 2006–2011 and reported that assailants used kitchen knives to commit 94% (32/34) of sharp force homicides. The authors did not explain the "unexpectedly high rate of kitchen knife use" in their study (p. 171). Smith (2013) studied sharp force injuries reported to emergency departments in the United States from 1990–2008 contained within the National Electronic Injury Surveillance System (NEISS) and found that assailants used kitchen knives in 43% (1098/2531) of sharp force assaults. Smith reported five fatalities (out of more than 8 million cases) but did not report the underlying manner or mechanism for these fatal injuries. Smith did acknowledge that the NEISS underreports fatalities and may exclude those who died away from the emergency department. These studies provide ample evidence of the deadly potential of kitchen knives.

2.6 The effect of event factors

Police officers are frequently called upon to make life-or-death decisions in ambiguous situations. As previously discussed, research had shown that assaults were more likely to be fatal when the victim somehow precipitated the fatal outcome (Ganpat et al., 2013). As aggression begets aggression, suspects may feel obligated to retaliate against police officers to save face. While the decision to use force often appears to be made suddenly, it results from a series of previous calculations made throughout the encounter. Suspect action prompts police reaction, which then prompts a suspect reaction. The conflict between the two parties continues to escalate until it reaches a tipping point. With that in mind, researchers believe that enhanced lethal force policies may alter the calculus of police-citizen encounters and reduce the likelihood of fatal outcomes (White, 2002). By redefining the issue, police officers can alter the conflict's contours before reaching the point of no return.

2.7 The effect of gender and race

Officers were more likely to use more force on young, lower-class males (Terrill & Reisig, 2003). Men commit more than 80% of sharp force homicides (Tellez-Zenteno, Ladino, Pandya, & Vrbancic, 2013; Kidd et al., 2014; Puzzanchera et al., 2017). More than 95% of those killed by law enforcement were male (Sikora & Mulvihill, 2002; Guardian, 2016). Taff and Boglioli (1998) found no empirical evidence linking suspect size and knife lethality (small people are just as dangerous as large people). Fox and Allen (2013) found that knives were associated with females killing their children or an abusive intimate partner.

The research does not support the argument that police shoot Black suspects in more significant

numbers than their percentage of the population warrants. Kleck (2007) reported that the percentage of Blacks killed was higher than their percentage of the population but lower than those who kill police officers. Analyzing the distribution of police killings by race is made more challenging by inconsistencies in data collection and reporting. For example, Sikora and Mulvihill (2002) studied more than 5,000 deaths due to legal intervention from 1979–1997 and reported that the decedent race was 63% White, 34% Black, and 3% neither. More recently, the Washington Post (2016) reported decedent race in 2015 was 50% White, 26% Black, and 24% neither while the Guardian (2016) reported the breakdown for 2015 was 51% White, 27% Black, and 22% neither. As Sikora and Mulvihill acknowledged, their data was unable to differentiate the proportion of Hispanic decedents contained within the categories; it is possible that the more recent data more accurately reflect the racial distribution of police killings. Rennison et al. (2011) studied the impact of weapon lethality on social distance and found that weapon lethality increased 32% when the victim and offender's race or ethnicity differed. Smith (2004) analyzed the factors that influenced police killings within cities from 1994–1998 and reported that the proportion of Black residents was positively related to the total number of police homicides. Smith left unanswered whether the elevated rate of lethal police violence was due to racial animus or higher violent crime rates in communities with a greater proportion of Black residents.

2.8 The effect of mental illness

There is an apparent association between mental illness and lethal force encounters. Fuller, Lamb, Biasotti, and Snook (2015) studied the effect of mental illness in lethal force encounters and estimated that 25%–50% of those killed by the police suffered from a severe mental illness. The researchers noted the role of mental illness was not routinely captured in official homicide datasets and described the creation of their system (the Preventable Tragedies Database) to track the number of people with mental illness shot by the police. Johnson (2011) studied whether the police used force more liberally against persons with a mental illness. Using data collected from two police departments in Oregon during a single month in 1995, the researchers concluded that a distinct subpopulation of mentally ill persons was significantly more likely to act aggressively, resist arrest, and possess a weapon. Johnson recognized that his study was limited to 2 medium-sized police departments from one state and that a national sample would be beneficial. Myers (2017) took an opposing position in an article that concluded police had a positive duty under the Americans with Disabilities Act (ADA) to accommodate the mentally ill during arrests. Myers argued that people with mental illnesses were not more prone to violence and contended that police often mistake disordered thinking and non-compliance with active resistance and hostility. As a result, the police may inadvertently escalate a mental health crisis (medical emergency) into a life-threatening situation (police emergency). Myers makes a strong case for compassion when interacting with the mentally ill but is less clear on her prescription that officers "make an effort to learn about the person and her disability" before responding in a way that is "individualized in accordance with the nature and history of a person's mental illness." An officer may be hard-pressed to adopt her methodology when confronting a rapidly approaching a mentally ill person brandishing a knife.

Catanesi et al. (2011) studied 103 mentally ill persons who killed or tried to kill another person. Mentally disordered suspects demonstrated a preference for kitchen knives when committing sharp force homicides, especially when the homicide resulted from impulsive action. Disordered suspects were also correlated with an increased number of blows directed towards vital areas, thereby con-

firming their intention to kill. Hughes et al. (2012) reported similar results in their study of kitchen knife homicides committed by mentally ill persons (discussed previously). Hanlon, Coda, Cobia, and Rubin (2012) studied a small group (n = 14) of schizophrenic men divided equally between those arrested or convicted of murdering a family member and those with no criminal record. The researchers found that the men who committed murder suffered more severe neuropsychological impairments than the control group. The researchers suggested that persons suffering from hallucinations or delusions could not control their violent impulses or comprehend their proximal aggression's distal consequences.

Finally, Tellez-Zenteno, Ladino, Pandya, and Vrbancic (2013) found that reports of the link between epilepsy and aggression existed for more than 100 years. While not a mental illness *per se*, epilepsy may cause a subset of patients to experience a sudden onset of ferocious and excessive violence correlated with stressful situations and alcohol abuse. While the lack of a culpable mental state in mentally disordered persons may diminish the moral blameworthiness of their actions, it also makes achieving a non-injurious police intervention more challenging—reasoning with an unreasonable person is futile.

2.9 The effect of Suicide by Cop

According to the American Association of Suicidology (2014), suicide by cop (SBC) describes a police-citizen encounter where a suicidal person provokes the police to respond with lethal force. SBC events typically follow a familiar pattern: the suspect was armed with a weapon, acted aggressively towards police, actively resisted arrest, and ultimately escalated the situation until police interaction was necessary (Kesic, Thomas, & Ogloff, 2012). Patton and Fremouw (2016) completed this picture by describing the typical SBC individual as an intoxicated young male with a significant mental health history, experiencing heartache within a romantic relationship. Not all SBC cases are spontaneous events, and people are often the authors of their misfortune. Investigators found a suicide note in nearly one-third of SBC cases and noted that many police interventions followed a failed or interrupted suicide attempt (Miller, 2015).

Mohandie, Meloy, and Collins (2009) examined 707 officer-involved shootings from more than 90 police departments in both the United States and Canada from 1998–2006 and identified 256 SBC cases. The researchers noted that persons involved in SBC encounters were almost always male (95%) and more likely to be armed with a knife than non-SBC encounters. Additionally, police officers used more force (both lethal and less-lethal) during SBC events. Lord (2014) compared 262 SBC and 246 non-SBC encounters found within NVDRS from 2004–2008. Lord noted that 95% of SBC subjects were male, and knife usage increased five-fold (from 6% in non-SBC cases to 32% in SBC cases). The rate of firearm usage was unchanged.

Using the same data, Mohandie and Meloy (2010) investigated the prevalence of SBC amongst hostage/barricade incidents. The authors found the behavioral resolve to die, irrespective of negotiation technique was the critical determinant of lethal outcomes in SBC encounters. It appeared there was little police could do to dissuade action once the suspect made up their mind. The reduced likelihood of successful crisis negotiations supports the need for early intervention in potential SBC situations.

Mohandie and Meloy (2011) also examined the data in the specific context of female subjects.

They found that more than half (57%) of all females involved in fatal law enforcement encounters demonstrated SBC indicators. Though slightly higher, this rate is comparable to the proportion reported for males (55%) by Mohandie et al. (2009). Additionally, women were more likely to demonstrate mentally disordered thoughts and have a history of alcohol abuse.

The research indicates that police officers should be aware of the possibility that an assailant brandishing a knife may be acting against their self-interest by forcing a fatal reaction. Despite their best efforts, police officers may not be able to deescalate every encounter. Again, it is unreasonable to expect to reason with an unreasonable person.

2.10 The effect of alcohol intoxication

Alcohol abuse and intoxication are associated with fatal knife assaults. Alcohol impairs judgment and escalates police-citizen encounters. Intoxicated persons do not fully comprehend the consequences of their actions, are more prone to impulsive behavior, and demonstrate reduced tolerance for stressful situations (Miller, 2015). Research had shown that 80% of assailants were impaired when they launched their fatal knife assault (Ormstad et al., 1986), and 60% of those killed by the police in SBC incidents were impaired at the time of their death (Kesic et al., 2012). Sharp force assaults, injuries, and fatalities most frequently occurred on the weekend (Shabbir et al., 2004; Maxwell et al., 2007; Pallett et al., 2014; Kristoffersen et al., 2016). While police officers should exercise extra caution when encountering all intoxicated persons, impaired dexterity should mitigate the need for lethal force when encountering extremely inebriated individuals brandishing knives.

2.11 The effect of the locality

Although the United States leads the industrialized world in police lethality, it is unequal in distributing deaths. Western and mountain states experience three times as much lethal force encounters as northeastern states (Hirschfield, 2015). Police officers use significantly more force in neighborhoods that are poorer and have higher homicide rates. States reporting higher levels of gun ownership report higher levels of fatal law enforcement assaults. The implication is that officers may be more cautious in states where assailants kill more law enforcement officers. Additionally, there may be a correlation between states with high gun ownership and persons killed with knives because officers are more attuned to the potentiality of lethal outcomes (Swedler et al., 2014).

2.12 The effect of less-lethal weaponry

In collaboration with the police, manufacturers developed less-lethal weapons out of a desire to reduce the use of lethal force and increase the safety of those who might otherwise be shot (Klinger, 2007; Vilke & Chan, 2007). Less-lethal weapons are more humane than lethal force. They can be deployed earlier during an encounter, which affords responding officers more flexibility when de-escalating the encounter (Wyant & Burns, 2014). Less-lethal force may negate the need for lethal force, which should improve the public perception of police intervention. It is also possible that the public may perceive the police as unnecessarily escalating the situation by deploying less-lethal force too early. Either way, the suspect's reaction to the deployment of less-lethal force may be beneficial

in clarifying the suspect's intent (continued refusal to drop the knife after applying less-lethal force may justify an escalation to lethal force).

Less-lethal weapons must deliver near-instant incapacitation to prevent an armed suspect from advancing to be effective (Downs, 2007). Traditional police response options, such as brute strength and nightsticks, are ill-suited for controlling potentially armed persons because their effectiveness depends on proximity. Decreasing the distance between an armed assailant is contrary to sound tactical practices. Manufacturers developed distance weapons to overcome this shortcoming. OC (oleoresin capsicum) spray is convenient to carry but not designed for instant incapacitation. The Taser is both convenient to carry and designed for instant incapacitation. Impact munitions (generally repurposed shotguns or grenade launchers), neither convenient to carry nor designed for instant incapacitation, offer the greatest standoff distance. Klinger (2007) reported that impact munitions were more likely to be used with subjects armed with edged weapons. Brandl and Stroshine (2017) found the Taser was more likely to be used with armed, mentally ill subjects. This approach seems reasonable, given the police desire to keep as much distance as possible between themselves and an armed assailant.

The priority for responding officers must be their safety, followed by public safety, then suspect safety. Less-lethal cannot be both 100% safe and 100% effective (Downs, 2007). The paradox of the less-lethal approach is that suspect safety decreases as weapon effectiveness increases (and vice versa). Brandl and Stroshine (2017) found that the best predictor of OC spray ineffectiveness was subject resistance. Both Homant and Kennedy (2000) and Patton and Fremouw (2016) found that less-lethal measures were less effective in managing SBC encounters. These results are not surprising, given the determination to die demonstrated by SBC subjects.

Less-lethal weapons are not without risk. Impact munitions can cause serious injuries or death, especially when they cause penetrating injury to the chest (de Brito, Challoner, Sehgal, & Mallon, 2001; Thakur, Teloken, Gilfillan, & Sharma, 2013). Despite the risks, being struck with impact munitions is demonstrably less-lethal than being shot with a traditional firearm (de Brito et al., 2001).

3 Methodology

This paper has two parts: a descriptive epidemiological analysis of fatal law enforcement encounters among persons brandishing edged weapons and a pooled quantitative analysis of lethal event characteristics. This paper builds on prior research by investigating the risk factors associated with this subset of officer-involved killings. This paper involved the retrospective review and systematic evaluation of hundreds of police killings in the United States in 2015. The data were analyzed to test whether the use of the 21-foot rule enhanced officer safety because it was more effective and reliable than its alternatives, was easily understood and commonly used, and minimized the risk of fatal officer injuries.

3.1 Definition of key variables

- **Brandished**: all or part of the knife was displayed, exhibited, or otherwise alluded to, with the intent to intimidate (U.S. Sentencing Commission [USSC], 2016, p. 20)

- **Edged Weapon**: a cutting instrument, including knives, razors, hatchets, axes, cleavers, scissors, glass, broken bottles, ice picks, and other cutting or stabbing objects (FBI, 2004, p. 24)
- **Law Enforcement Officer**: a member of public governmental law enforcement agencies (including duly sworn city, university and college, county, state, tribal, and federal law enforcement officers) acting in an official capacity (FBI, 2016b)
- **Less-Lethal Force**: any weapon intended to avoid causing death or serious bodily injury to a person, including chemical weapons (tear gas/pepper spray), conducted energy weapons (Taser), impact weapons (handheld baton, impact munitions), and police canines (K9) (U.S. Department of Justice, Office of the Inspector General, 2009)
- **Lethal Force**: the intentional application of force by a law enforcement officer where death or serious bodily injury was the reasonably foreseeable result
- **The United States**: any of the several States and the District of Columbia

3.2 Procedures

This research used a non-probability convenience sample drawn from publicly reported deaths in police fatality databases compiled separately by the Washington Post and the Guardian newspapers from January 1 – December 31, 2015. Newspaper reporting, rather than official government reporting, was chosen for sampling because the newspapers captured roughly twice as many deaths and often provided more situational and demographic details (Miller et al., 2016) considerably. Open-source case histories' availability reduced the time and expense associated with conducting research and eliminated the need to obtain third-party cooperation for project completion. The unifying factor in all cases was the death of a person armed with an edged weapon at the hands of law enforcement.

The Guardian data ($N = 1146$) was downloaded from its file repository and imported into spreadsheet software (Microsoft Excel, Version 2016). The data was filtered to remove decedents whose cause of death was explicitly excluded by the definition of lethal force from inclusion ($n = 1049$). The data was then filtered to remove unarmed decedents or those armed with a weapon explicitly excluded by the definition of an edged weapon ($n = 262$). The data was then filtered to remove decedents explicitly armed with an edged weapon ($n = 152$). The remaining data ($n = 110$) was investigated to remove categorical ambiguity (disputed, other, unknown). Each decedent's name (first and last name), and the keywords "police shooting 2015," were queried in an Internet search engine. A researcher opened the articles in the sequence they appeared and reviewed them to identify the decedent's weapon (if any) at the time of the fatal encounter. Based on this review, 24 additional decedents were determined to be armed with an edged weapon and included in the Guardian data. The study excluded decedents armed with an edged weapon and a firearm (as a firearm's presence changed the calculus of dangerousness) or those killed by less-lethal weaponry. The remaining data ($n = 176$) was set aside for comparison with the Washington Post data.

The Washington Post data ($N = 2142$) was downloaded from its file repository and imported into spreadsheet software. The data were filtered to include only those decedents whose death occurred in 2015 ($n = 991$). The data was filtered to remove unarmed decedents and those armed with weapons explicitly excluded by the definition of an edged weapon ($n = 209$). The data was filtered to remove decedents explicitly armed with an edged weapon ($n = 167$). The remaining data (n

= 41) was investigated to remove categorical ambiguity (beer bottle, flagpole, lawnmower blade, metal hand tool, metal object, metal pole, metal stick, undetermined, unknown weapon). Each decedent's name (first and last name), and the keywords "police shooting 2015," were queried in an Internet search engine. A researcher opened the articles as they appeared and reviewed them to identify the decedent's weapon (if any) at the time of the fatal encounter. Based on this review, seven additional subjects were determined to be armed with an edged weapon and included in the Washington Post data. The study excluded decedents armed with an edged weapon and a firearm (as a firearm's presence changed the calculus of dangerousness) or those killed by less-lethal weaponry. The remaining data ($n = 174$) was set aside for comparison with the Guardian data.

Both the Guardian data ($n = 176$) and the Washington Post data ($n = 174$) were imported into spreadsheet software for comparison and reconciliation. The exercise revealed numerous inconsistencies that required further investigation. The anomalous cases were queried in an Internet search engine. Misclassified cases (where the decedent was not brandishing an edged weapon) were found and removed from both datasets. The Guardian misclassified three cases while the Washington Post misclassified four. Additionally, each dataset contained cases omitted from the other (the Guardian contained four cases missing from the Washington Post data while the Washington Post included one case missing from the Guardian data). The consolidated dataset contained 174 cases reported from January 1, 2015, through December 31, 2015.

A database was developed (Microsoft Access, Version 2016) to structure analysis of the case histories. A case was defined as an individual armed with an edged weapon whose death resulted from police intervention. Each case was assigned a unique identifier. The electronic template not only facilitated consistent data entry but was also designed so that multiple coders could enter and manipulate data simultaneously. All data for this project was coded and input by the author. The database was based on a 54-variable codebook developed by the author that covered the following areas: decedent details, incident details, officer details, and case narratives

Decedent details included name, age, race, gender, an indication of intoxication, an indication of mental illness, an indication of suicidal ideation, and self-harm. Basic biographical data (name and date of birth) was transposed from the spreadsheet to the database. Race was defined as Asian, Black, Hispanic, Middle Eastern, Native, Pacific Islander, White, or unspecified. Gender was either female, male, or unspecified.

Intoxication was indicated when the decedent was observed consuming intoxicants (alcoholic beverages or illicit drugs) or post-mortem toxicology screening reported the presence of intoxicants. Mental illness was indicated when the case history referenced the decedent as having received mental health services previously or was known to suffer from a mental illness. Suicidal ideation was indicated when the decedent made explicit statements expressing the desire to die, or documents were found post-incident expressing the same. Multiple sources for the indication of self-harm were noted, including witness reports, post-mortem examination, and direct police observation of self-injurious behavior.

Incident details included the date, month, day, time, time of day, and domestic violence indicators. Police-specific details included the distance between police and decedent, the number of officers present, the number of rounds fired, less-lethal interventions used, whether the shooting was justified, and the responding police agency. Assault-specific details included the knife-type, whether assailants threatened, injured, or killed civilians or police officers, and the scale of police injury.

The incident date and time were transposed from the spreadsheet to the database. The day of the week that the incident occurred was calculated using spreadsheet formulas. Time of day was defined as morning (06:00–11:59), afternoon (12:00–17:59), evening (18:00–23:59), and night (00:00–05:59) and categorized using spreadsheet formulas.

Domestic violence was indicated if the police were initially dispatched to investigate suspected domestic violence (involving persons living in the same household or related by blood or marriage). Domestic Violence was also indicated when police discovered a domestic violence situation after being dispatched to investigate another suspected crime (e.g., unknown disturbance).

The type of knife was categorized as either ax/hatchet, combat, dagger, fantasy, folding/pocket, hunting, kitchen, machete, non-knife, razor, sword, utility, or unspecified. Examples of weapons categorized as non-knives include lawnmower blades and railroad spikes.

The distance between the police officer and the decedent was defined as either the farthest estimated distance (in media reporting) or the actual known distance (as measured during the post-incident investigation) when the first shot was fired. Distances less than 12 inches (typically when the decedent was shot while stabbing another person) were recorded as 1 foot.

The number of officers in attendance was assigned to one of three categories: 1 (the officer was alone); 2–4 (more than one but less than five officers present); and 5+ (five or more officers present). The number of rounds fired was similarly categorized: 1 (single round fired); 2–4 (more than one but less than five rounds fired); and 5+ (five or more rounds fired). The number of rounds fired was not differentiated based on hits or misses.

Less-lethal was indicated when any less-lethal weapon was presented (whether successfully deployed or not) and categorized as either baton, chemical weapons, conducted energy weapons, impact munitions, or K9.

Any report that a member of the public was threatened, injured (however minor), or killed was sufficient for inclusion so long as a proximate nexus existed between the threat, injury, fatality, and the lethal police encounter. For example, a murder that happened months before the lethal police encounter was excluded while a murder that happened hours before (during which time the decedent was actively eluding the police) was included.

Any report that a police officer was threatened, injured, or killed was also sufficient for inclusion. Police officer injuries were also categorized as minor (treated at the scene), moderate (treated at the hospital), or major (hospital admission or surgical intervention required).

A shooting was ruled justified if a review board cleared the officer to return to active duty, an outside agency sanctioned the killing, or the prosecuting attorney declined to pursue criminal charges against the officers. Wrongful death lawsuits had no impact on whether a shooting was considered justified or not.

The full address (including house number, street name, city, county, state, and zip code) was recorded. Cross-streets, or the nearest address, were used when the house number was not available. The responsible police agency was the agency where the officer who fired the fatal shots was employed, not the jurisdiction agency where the shooting occurred. Where officers from different agencies discharged their firearms, the agency that employed most officers that discharged their firearms

was used. For example, a shooting where two sheriff's deputies and one city police officer discharged their firearms would be assigned to the sheriff's office. When an equal number of officers from different agencies discharged their firearms, the agency with primary jurisdiction for investigating crimes at that location was used. For example, a shooting where a sheriff's deputy and a city police officer discharged their firearms would be assigned to the police if the event occurred within city limits or to the sheriff's office if the event occurred outside the city limits.

Officer details included name, race, gender, years of service, and whether the officer discharged their firearm. Officer race was defined as Asian, Black, Hispanic, Middle Eastern, Native, Pacific Islander, Unspecified, or White. Officer gender was either female, male, or unspecified. Years of service was recorded as the total number of years an officer had worked as a sworn police officer (regardless of agency).

Case narratives included a synopsis, links to external sources, and text copied from external sources. The case synopsis, provided by both the Guardian and the Washington Post, was transposed into the database. Space was allocated to include up to five hyperlinks to outside sources and a freeform textbox for notes specific to the source. Whenever possible, the text was copied from source material to these textboxes to facilitate automated content analysis (e.g., recursive keyword searches).

All case information was transposed from the Internet into the database for analysis. Using the consolidated dataset ($n = 174$), each decedent's name (first and last name), and the keywords "police shooting 2015," were queried in an Internet search engine. The results were opened in the order they appeared, and the contents of the articles reviewed to populate the database. The two pages of search results were reviewed for each case file. Missing or incomplete information was left blank in the database. Typical results included news articles, television news reports, social media posts, and official press releases. Whenever possible, the data obtained was cross-referenced with authoritative official sources, including internal affairs investigations, district attorney memoranda, 42 U.S. Code § 1983 litigation documents, police review board decisions, and official state police-shooting databases (e.g., California and Texas). All materials retrieved were freely available open-source data posted on the Internet. Data quantity and quality varied across sources. Some sources contained a comprehensive compendium of relevant facts, while others yielded a single piece of relevant information. The primary source material was generally the most extensive (including previously unpublished material), while secondary sources sometimes contained background information missing from other sources. Upon completing the initial data entry, cases with missing data were again queried using variations of keywords in additional Internet search engines to maximize potential data capture. Although the extended search uncovered additional data, multiple cases remained incomplete.

The data were analyzed using qualitative and quantitative methodologies to understand better how socio-organizational factors influence fatal encounters. IBM SPSS Statistics (version 23) and a custom-coded Internet program (Preacher, 2001) was used to perform statistical analysis, prepare contingency tables, and display frequency distributions. Statistical tests included: analysis of variance (ANOVA), one sample t-tests, independent sample t-tests, two-way contingency tables, frequency tables, chi-square test, chi-square tests of goodness of fit and independence (with and without Yates' correction), and Fisher's exact test.

4 Expectations

It was anticipated that the data analysis would reveal patterns supporting meaningful insights into the chronology of key events. It was expected that determining the correlates of lethal force encounters would assist law enforcement agencies in developing and implementing systems and procedures designed to monitor, predict, and reduce the number of fatal police/civilian encounters. The following predictions were based on the previous research outlined in the literature review.

4.1 Male

It was expected that 92% of decedents would be male. This estimate was calculated by averaging the gender (86% male) of sharp force homicide killers (Kidd et al., 2014, p.170) with the gender (97% male) of all known law enforcement killers from 2006–2015 (FBI, 2016b, Table 41). H_0: male decedents = 92%. H_1: male decedents $\neq$ 92%.

4.2 White

It was expected that 54% of decedents would be White. This estimate was calculated by averaging the races of people killed by law enforcement (55% White; 29% Black) reported by Sikora and Mulvihill (2002), the Guardian (2016), and the Washington Post (2016) with the races of all known law enforcement killers (53% White; 41% Black) from 2006–2015 (FBI, 2016b, Table 41). H_0: White decedents = 54%. H_1: White decedents $\neq$ 54%.

4.3 31 years

It was expected that the decedent mean age would be 31 years. This estimate was based on all known law enforcement killers' average age from 2006–2015 (FBI, 2016b, Table 39). H_0: decedent mean age = 31 years. H_1: decedent mean age $\neq$ 31 years.

4.4 Mentally ill

It was expected that 50% of decedents would be mentally ill (Fuller et al., 2015) and that Taser use would be more prevalent within the mentally ill subpopulation (Brandl & Stroshine, 2017). H_0: mentally ill decedents = 50%. H_1: mentally ill decedents $\neq$ 50%.

4.5 10 feet away

It was expected that 67% of decedents would be within 10 feet when the police fired the first round. This estimate was calculated by averaging 71% of suspects killed within 10 feet reported by White (2006, p. 314) with 63% of officers killed by suspects within 10 feet in 2015 (FBI, 2016b, Table 31). H_0: decedents within 10 feet = 67%. H_1: decedents within 10 feet $\neq$ 67%.

4.6 2–4 shots fired

It was expected that the police would fire between 2–4 rounds in 50% of fatal encounters. This estimate was based on the mean number of shots (3.84) fired by police officers during lethal force

encounters (White, 2006; White & Klinger, 2012) and on the premise that officers often fail to hit what they are shooting at (Morrison & Vila, 1998; Morrison & Garner, 2011). H_0: 2–4 shots fired = 50% of cases. H_1: 2–4 shots fired ≠ 50% of cases.

4.7 13% police injury rate

It was expected that a person armed with an edged weapon would injure 13% of police officers. This estimate was based on the 10-year average percentage of officers injured during edged weapon assaults from 2006–2015 (FBI, 2016b, Table 75). H_0: police injury rate = 13%. H_1: police injury rate ≠ 13%.

4.8 Kitchen knives

It was expected that 52% of decedents would be armed with kitchen knives. This estimate is an average of the 55% kitchen knife usage reported by Hunt and Cowling (1991), the 48% reported by Karlsson (1998), and the 58% reported by Kidd et al. (2014). H_0: kitchen knife usage = 52%. H_1: kitchen knife usage ≠ 52%.

4.9 Multiple officers

It was expected that 67% of encounters would involve more than one officer. This estimate was calculated by averaging the number of officers assaulted (29.7%) while working alone (FBI, 2016b, Table 74) with the number of officers killed (36.6%) while working alone (FBI, 2016b, Table 21) in 2015 and acknowledges that back-up officers are often dispatched to high-risk calls. H_0: multiple officers = 67%. H_1: multiple officers ≠ 67%.

4.10 Weekends

It was expected that the highest number of incidents would occur over the weekend (Friday to Sunday)(Shabbir et al., 2004; Maxwell et al., 2007; Pallett et al., 2014; Kristoffersen et al., 2016). H_0: weekends ≥ 43%. H_1: weekends < 43%.

5 Results

Results reporting is divided into two sections. The first is a quantitative analysis of the distribution of fatal event predictors presented in order of their appearance. The second is a descriptive epidemiology of fatal event characteristics and follows the same order outlined in the methodology section. The section concludes with a general discussion of the practical implications and limitations of the study.

5.1 Expected Results

5.1.1 Male

Analysis of the data revealed that 94% (n = 163) of decedents were male. While this result was higher than expected (H_0: male decedents = 92%), the difference was not significant, and the null

hypothesis was not rejected. Neither the chi-square test for goodness of fit, $\chi^2(1, N = 174) = 0.70$, $p = .40$, nor chi-square test for goodness of fit with Yates' correction, $\chi^2(1, N = 174) = 0.49$,$p = .49$, were significant. The percentage of male decedents was closer to the gender distribution of police killers (97% male), $\chi^2(1, N = 174) = 5.51$, $p = .02$, than knife murderers (86% male), $\chi^2(1, N = 174) = 7.89$, $p = .005$. The descriptive statistics section contains additional analysis and discussion of the decedent's gender.

5.1.2 White

Analysis of the data revealed that 47% ($n = 82$) of decedents were White (see Table 1). While this result was less than expected (H_0: White decedents = 54%), the difference was not significant, and the null hypothesis was not rejected. Neither the chi-square test for goodness of fit, $\chi^2(1,N = 174) = 3.31$, $p = .07$, nor chi-square test for goodness of fit with Yates' correction, $\chi^2(1, N = 174) = 3.04$, $p = .08$, were significant. This result was significantly lower than the 63% reported by Sikora and Mulvihill (2002), but this may be due to methodological differences between the two studies, $\chi^2(1, N = 174) = 18.134$, $p < .001$. Sikora and Mulvihill included Hispanic decedents within the Black and White categories, whereas this study calculated the number of Hispanic decedents separately. The descriptive statistics section contains additional analysis and discussion of the decedent's race.

Table 1: Decedent Race

Race		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	White	82	47.1	47.1	47.1
	Black	41	23.6	23.6	70.7
	Hispanic	39	22.4	22.4	93.1
	Asian	6	3.5	3.5	96.6
	Native*	2	1.1	1.1	97.7
	Other	4	2.3	2.3	100.0
	Total	174	100.0	100.0	

Note. *Native includes American Indians and Alaska Natives.

5.1.3 31 years

Analysis of the data revealed that decedent mean age was 37.06, the median was 36, the mode was 26 and 30 (each appeared 8 times), and the population standard deviation was 12.38 (see Table 2). An age range of 35.45–39.37 was achieved using a 95% confidence interval of the actual mean. Since decedent age was significantly higher than expected, t (173) = 6.46, $p > .001$ using a two-tailed test, the null hypothesis (H_0: decedent mean age = 31 years) was rejected, and the alternate hypothesis (H_1: decedent mean age $\neq$ 31 years) was accepted. The results indicate that this subset of persons killed by the police in 2015 was significantly older than the 10-year average age of law enforcement killers. Additional research is necessary to determine whether all decedents, and not just those armed with edged weapons, were older than the typical police killer. The mean age for decedents in this study more closely matched the age of SBC subjects (M = 35 years, SD

= 10 years) reported by Mohandie and Meloy (2009). The descriptive statistics section contains additional analysis and discussion of the decedent's age.

Table 2: Decedent Age Distribution

Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15-19	5	2.9	2.9	2.9
	20-24	22	12.6	12.6	15.5
	25-29	31	17.8	17.8	33.3
	30-34	21	12.1	12.1	45.4
	35-39	29	16.7	16.7	62.1
	40-44	20	11.5	11.5	73.6
	45-49	16	9.2	9.2	82.8
	50-54	16	9.2	9.2	92.0
	55-59	8	4.6	4.6	96.6
	60-64	3	1.7	1.7	98.3
	70-74	1	.6	.6	98.9
	75-79	1	.6	.6	99.4
	80-84	1	.6	.6	100.0
	Total	174	100.0	100.0	

5.1.4 Mentally ill

Analysis of the data revealed that 56% (n= 97) of decedents were mentally ill (see Table 3). While this result was higher than expected (H_0: mentally ill decedents = 50%), the difference was not significant, and the null hypothesis was not rejected. Neither the chi-square test for goodness of fit, $\chi^2(1, N = 174) = 2.30$, $p = .13$, nor chi-square test for goodness of fit with Yates' correction, $\chi^2(1, N = 174) = 2.08$, $p = .15$, were significant. The number of mentally ill decedents in this study was at the top end of the estimate (25%–50%) reported by Fuller et al. (2015). Mental illness was also unequally distributed by decedent gender, with 73% of females ($n = 8$) and 55% of males ($n = 89$) displaying mental illness indicators. This result, however, was not statistically significant, $p = .35$, Fisher's exact test. The descriptive statistics section contains additional analysis and discussion of mental illness.

Table 3: Mental Illness by Gender

			Gender		
			Female	Male	Total
Mental Illness	No	Count	3	74	77
		% of Total	1.7%	42.5%	44.3%
	Yes	Count	8	89	97
		% of Total	4.6%	51.1%	55.7%
Total		Count	11	163	174
		% of Total	6.3%	93.7%	100%

5.1.5 Taser use was most prevalent within the mentally ill subpopulation

Analysis of the data revealed that the Taser was used in 30% ($n = 52$) of cases (see Table 4). Of those, 59% ($n = 31$) of decedents were reported to be mentally ill. Analysis of the subset of cases where the Taser was used revealed that neither the chi-square test for goodness of fit, χ^2 (1, $N = 52$) = 1.92, $p = .17$, nor chi-square test for goodness of fit with Yates' correction, χ^2 (1, $N = 52$) = 1.56,$p = .21$, were significant. Analysis of the entire population revealed the Taser was used in 32% ($n = 31$) of cases with mental illness indication and 27% (n =21) cases without. While Taser use was more prevalent within the mentally ill subpopulation, this result was not significant, χ^2(1, $N = 174$) = 0.45, $p = .50$.

Table 4: Taser Use and Mental Illness

			Taser		
			No	Yes	Total
Mental Illness	No	Count	56	21	77
		% of Total	32.2%	12.1%	44.3%
	Yes	Count	66	31	97
		% of Total	37.9%	17.8%	55.7%
Total		Count	122	52	174
		% of Total	70.1%	29.9%	100.0%

5.1.6 10 feet away

Analysis of the data revealed that the distance between the decedent and the police was reported in 76% ($n = 133$) of cases. The decedent was within 10 feet of the police officer when the first round was fired in 85% ($n = 113$) of cases (see Table 5). This result was significantly higher than expected; therefore, the null hypothesis (H_0: decedents within 10 feet = 67%) was rejected, and the alternate hypothesis (H_1: decedents within 10 feet $\neq$ 67%) was accepted. Both the chi-square test for goodness of fit, $\chi^2(1, N = 113) = 19.41, p < .001$, and chi-square test for goodness of fit with Yates' correction, $\chi^2(1, N = 174) = 18.61, p < .001$, were significant. The descriptive statistics section contains additional analysis and discussion of distance.

Table 5: Distance between Officer and Decedent

Distance in feet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-7	113	64.9	64.9	64.9
	8-14	7	4.0	4.0	69.0
	15-21	9	5.2	5.2	74.1
	21	4	2.3	2.3	76.4
	Unknown	41	23.6	23.6	100.0
	Total	174	100.0	100.0	

5.1.7 2–4 shots fired

The number of rounds fired was reported in 96% (n = 167) of cases (see Table 6). The data revealed that police officers fired 2–4 rounds in 56% (n = 93) of cases. While this result was higher than expected (H_0: 2–4 shots fired = 50% of cases), the difference was not significant, and the null hypothesis was not rejected. The remaining 44% (n = 74) of cases were unevenly divided: one round was fired in 13% (n = 22) of cases while five or more rounds were fired in 31% (n = 52) of cases. Neither the chi-square test for goodness of fit, $\chi^2(1, N = 167) = 2.16$, $p = .14$, nor chi-square test for goodness of fit with Yates' correction, $\chi^2(1, N = 167) = 1.94$, $p = .16$, were significant. The descriptive statistics section contains additional analysis and discussion of the number of shots fired.

Table 6: Number of Rounds Fired

Rounds Fired

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	22	12.6	12.6	12.6
	2-4	93	53.4	53.4	66.1
	5+	52	29.9	29.9	96.0
	Unknown	7	4.0	4.0	100.0
	Total	174	100.0	100.0	

5.1.8 13% police injury rate

Analysis of the data revealed that 10% (n = 18) of cases resulted in police injuries (see Table 7). While this result was less expected (H_0: police injury rate = 13%), the difference was not significant, and the null hypothesis was not rejected. Neither the chi-square test for goodness of fit, $\chi^2(1, N = 174) = 1.09$, $p = .30$, nor chi-square test for goodness of fit with Yates' correction, $\chi^2(1, N = 174) = 0.86$, $p = .35$, were significant. The descriptive statistics section contains additional analysis and discussion of the police injury rate.

Table 7: Frequency of Police vs. Civilian Injuries

			Police		Total
			No	Yes	
Civilian	No	Count	124	13	137
		% of Total	71.3%	7.5%	78.7%
	Yes	Count	32	5	37
		% of Total	18.4%	2.9%	21.3%
Total		Count	156	18	174
		% of Total	89.7%	10.3%	100.0%

5.1.9 Kitchen knives

Analysis of the data revealed the type of knife brandished by the decedent was reported in 57% (n = 99) of cases (see Table 8). Of those, 44% (n = 44) of decedents were armed with kitchen knives.

While this result was less than expected (H_0: kitchen knife usage = 52%), the difference was not significant, and the null hypothesis was not rejected. Neither the chi-square test for goodness of fit, $\chi^2(1, N = 99) = 2.26$, $p = .13$, nor chi-square test for goodness of fit with Yates' correction, $\chi^2(1, N = 99) = 1.97$,$p = .16$, were significant. Kitchen knife usage was significantly lower in this study than the 55% reported by Hunt and Cowling (1991), $\chi^2(1, N = 99) = 4.04$, $p = .04$, and the 58% reported by Kidd et al. (2014), $\chi^2(1, N = 99) = 6.92$, $p = .008$. Kitchen knife usage was not significantly lower than the 48% reported by Karlsson (1998), $\chi^2(1,N = 99) = 0.37$, $p = .54$. The descriptive statistics section contains additional analysis and discussion of kitchen knives.

Table 8: Knife Type

Type		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unknown	75	43.1	43.1	43.1
	Kitchen	44	25.3	25.3	68.4
	Hunting	9	5.2	5.2	73.6
	Non-Knife	9	5.2	5.2	78.8
	Folding	8	4.6	4.6	83.4
	Machete	7	4.0	4.0	87.4
	Utility	7	4.0	4.0	91.4
	Sword	6	3.4	3.4	94.8
	Combat	4	2.3	2.3	97.1
	Hatchett	2	1.1	1.1	98.2
	Dagger	1	.6	.6	98.8
	Fantasy	1	.6	.6	99.4
	Razor	1	.6	.6	100.0
	Total	174	100.0	100.0	

5.1.10 Multiple officers

Analysis of the data revealed that more than one officer was present in 81% ($n = 141$) of cases (see Table 9). This result was significantly higher than expected; therefore, the null hypothesis (H_0: multiple officers = 67%) was rejected, and the alternate hypothesis (H_1: multiple officers $\neq$ 67%) was accepted. Both the chi-square test for goodness of fit, $\chi^2(1, N = 174) = 15.5$, $p < .001$, and chi-square test for goodness of fit with Yates' correction, $\chi^2(1, N = 174) = 14.87$, $p < .001$, were significant. The descriptive statistics section contains additional analysis and discussion of officer presence.

5.1.11 Weekends

Analysis of the data revealed that 36% ($n = 63$) of cases occurred on the weekend (see Table 10). While this result was less expected (H_0: weekends $\geq$ 43% of cases), the difference was not significant, and the null hypothesis was not rejected. Statistical analysis was mixed. An average of 12% of cases occurred per day on the weekend compared to 16% of cases during the week. Saturday and Sunday reported fewer cases than any other day of the week. The chi-square test for goodness of fit was significant, $\chi^2(1, N = 174) = 3.85$, $p = .05$, but the chi-square test for goodness of fit

Table 9: Number of Officers Present

Count		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	33	19.0	19.0	19.0
	2-4	110	63.2	63.2	82.2
	5+	31	17.8	17.8	100.0
	Total	174	100.0	100.0	

with Yates' correction was not, $\chi^2(1, N = 174) = 3.56$, $p = .06$. The descriptive statistics section contains additional analysis and discussion of the daily distribution.

Table 10: Frequency of Incidents by Day of Week

Day		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Monday	20	11.5	11.5	11.5
	Tuesday	28	16.1	16.1	27.6
	Wednesday	30	17.2	17.2	44.8
	Thursday	34	19.5	19.5	64.3
	Friday	27	15.5	15.5	79.8
	Saturday	19	10.9	10.9	90.7
	Sunday	16	9.2	9.2	100.0
	Total	174	100.0	100.0	

5.2 Descriptive Results

5.2.1 Decedent characteristics

Analysis of the data revealed that decedent mean age varied by sex. While males were an average of two years older than females at the time of the fatal encounter (37.2 vs. 34.9), this difference was not statistically significant, F (1, 172) = 0.35, p = .55. The youngest decedent was a 17-year-old female and the oldest was an 83-year-old male. Decedent age was not associated with suicidal ideation, intoxication, t (172)t(172) = 0.19, p = .85, = -1.20, p = .23, mental illness, t (172) = 0.02, p = .98, or gender, t (172) = 0.57, p = .57. This study's decedents were closer in age to people who commit suicide by cop (M = 35 years) than people who murder police officers (M = 31 years). These results suggest that many decedents within this study population may have intended to die at the police's hands.

The distribution of decedent race or ethnicity was unequally distributed (see Table 1). The Kaiser Family Foundation State Health Facts (2017), using data from the Census Bureau's March 2016 Current Population Survey, estimated the distribution of race or ethnicity within the general population was 61% White, 12% Black, 18% Hispanic, 6% Asian, 1% American Indian/Alaska Native, and 2% other. Compared to the Kaiser Family Foundation estimate, this research found an over-representation of Black and Hispanic decedents and under-representation of White and Asian

decedents. While there were twice as many White decedents (n = 82) as Black decedents (n = 41), the significance could not be assessed using the chi-square test of independence since at least 20% of expected frequencies were less than 5. Pooling the data to compare one race or ethnicity to all others revealed a significant underrepresentation of White decedents, $\chi^2(1, N= 174) = 13.51$, $p < .001$, and a significant overrepresentation of Black decedents, $\chi^2(1, N= 174) = 20.95$, $p < .001$. Neither the underrepresentation of Asian decedents, $\chi^2(1, N= 174) = 1.56$, $p = .21$, nor the overrepresentation of Hispanic decedents, $\chi^2(1, N = 174) = 2.0$, $p = .16$, was significant.

Females (n = 11) comprised a small minority of the sample population. Females were more likely than males to have brandished a kitchen knife (83% vs. 42%), z = 1.98, p = .048, suffered a mental illness (73% vs. 55%), z = 1.17, p = .24, been shot five or more times (55% vs. 29%), z = 1.74, p = .08 (see Table 11), displayed suicidal ideation (46% vs. 30%), z = 1.07, p = .29, been intoxicated (46% vs. 23%), z = 1.71, p = .09, have less-lethal weapons used against them (46% vs. 37%), z = 0.57, p = .57 (see Table 12), and have their killing reported as justified (91% vs 74%), z = 1.24, p = .22. Females were just as likely as males to have displayed self-injurious behavior (9%), z = 0.06, p = .95, threatened the police, (91% vs. 87%)z = 0.37, p = .71, injured a member of the public (27% vs. 21%), z = 0.50, p = .62, injured a police officer (9% vs. 10%), z = -0.14, p = .89, or been involved in domestic violence (36% vs. 40%), z = -0.23, p = .82. There were no females among the decedents that committed murder before being killed by the police.

Table 11: Number of Rounds Fired by Gender

			Gender		Total
			Female	Male	
Rounds Fired	1	Count	0	22	22
		% of Total	0.0%	12.6%	12.6%
	2-4	Count	5	88	93
		% of Total	2.9%	50.6%	53.4%
	5+	Count	6	46	52
		% of Total	3.4%	26.4%	29.9%
	Unknown	Count	0	7	7
		% of Total	0.0%	4.0%	4.0%
Total		Count	11	163	174
		% of Total	6.3%	93.7%	100.0%

Table 12: Less-Lethal Usage by Gender

			Less-Lethal		Total
			No	Yes	
Gender	Female	Count	6	5	11
		% of Total	3.4%	2.9%	6.3%
	Male	Count	102	61	163
		% of Total	58.6%	35.1%	93.7%
Total		Count	108	66	174
		% of Total	62.1%	37.9%	100.0%

Analysis of the data revealed that 24% (n = 42) of decedents were under the influence of alcohol or

drugs at the time of the fatal encounter. No estimation of the level of intoxication was attempted. Intoxication was not associated with the day of the week, $\chi^2(6,\ N = 174) = 3.87,\ p = .70$, time of day, $\chi^2(3,\ N = 174) = 0.96,\ p = .81$, suicidal ideation, $\chi^2(1,\ N = 174) = 0.57$,$p = .45$, mental illness, $\chi^2(1,\ N = 174) = 0.85,\ p = .36$, or the use of less-lethal weapons, $\chi^2(1,\ N = 174) = .23,\ p = .63$.

Analysis of the data revealed that 31% ($n = 54$) of decedents demonstrated indicators of suicidal ideation, and 9% ($n = 15$) of decedents displayed self-injurious behavior (see Table 13). While 87% of self-injurious decedents demonstrated suicidal ideation, only 24% of suicidal decedents demonstrated self-injurious behavior. The correlation between self-harm and suicidal ideation was significant, $\chi^2(1,\ N = 174) = 23.74,\ p < .001$.

Table 13: Self-Harm by Indication of Suicidal Ideation

			Suicidal		Total
			No	Yes	
Self-Harm	No	Count	118	41	159
		% of Total	67.8%	23.6%	91.4%
	Yes	Count	2	13	15
		% of Total	1.1%	7.5%	8.6%
Total		Count	120	54	174
		% of Total	69.0%	31.0%	100.0%

More than one decedent left a written declaration of suicidal ideation (i.e., suicide note). Examples include a 17-year-old female who brandished a knife in a police station (a letter in the decedent's pocket indicated she did not deserve to live) and a 30-year-old male who threatened police with a 9-inch butcher knife (a note in the decedent's pickup truck apologized for his actions).

There are two possible interpretations of these results. First, it may be that self-injurious persons were more dangerous to themselves than the police. Second, it may be that police were quicker to recognize the threat cues demonstrated by self-injurious persons and kept them further away. In the current study, self-harm and police injuries were mutually exclusive (see Table 14).

Table 14: Distribution of Police Injuries by Self-Injurious Decedents

			Police Injuries		Total
			No	Yes	
Self-Harm	No	Count	141	18	159
		% of Total	81.0%	10.3%	91.4%
	Yes	Count	15	0	15
		% of Total	8.6%	0.0%	8.6%
Total		Count	156	18	174
		% of Total	89.7%	10.3%	100.0%

5.2.2 Incident characteristics

Analysis of the data revealed that July ($n = 20$) was the month with the most reported cases, and June and November ($n = 10$) were the months with the least (see Table 15). The mean and median

were 14.5, the mode was 18, 11, and 10 (each appeared two times), and the population standard deviation was 3.52. Although twice as many incidents occurred in July than June, these differences were not significant, $\chi^2(11, N = 174) = 10.28$, $p = 0.51$.

Table 15: Frequency of Incidents by Month

Month		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Jan	15	8.6	8.6	8.6
	Feb	12	6.9	6.9	15.5
	Mar	14	8.0	8.0	23.6
	Apr	18	10.3	10.3	33.9
	May	19	10.9	10.9	44.8
	Jun	10	5.7	5.7	50.6
	Jul	20	11.5	11.5	62.1
	Aug	16	9.2	9.2	71.3
	Sep	11	6.3	6.3	77.6
	Oct	11	6.3	6.3	83.9
	Nov	10	5.7	5.7	89.7
	Dec	18	10.3	10.3	100.0
	Total	174	100.0	100.0	

Analysis of the data revealed that Thursday ($n = 34$) was the day of the week with the most reported cases and Sunday ($n = 16$) was the least. Although more than twice as many incidents occurred on Thursday than Sunday, the distribution of events throughout the week was not significant, $\chi^2(6, N = 174) = 10.49$, $p = 0.11$. These results do not necessarily support the literature indicating knife violence was associated with alcohol consumption on weekends (e.g., drunken bar patrons that resort to edged weapons to settle disputes). The day with the most cases (Thursday) was also the day of the week with the most impaired decedents. Although twice as many impaired persons died on Thursday than any other day (see Table 16), these differences were not significant, $\chi^2(6, N = 174) = 3.87$, $p = 0.70$.

Analysis of the data revealed that the period between 18:00–23:59 ($n = 56$) was the most active and 00:00–05:59 ($n = 26$) was the least active (see Table 17). The number of cases increased significantly throughout the day, $\chi^2(3, N = 174) = 12.18$, $p = 0.006$. The number of incidents recorded per hour varied throughout the day. The mean was 7.25, the median was 6, the mode was 6 and 11 (each appeared four times), the range was 11 (from 2–13), and the sample standard deviation was 3.38. Dividing the day into AM/PM revealed that 63% ($n = 109$) of incidents occurred from 12:00–23:59. This result was significant, $\chi^2(1, N = 174) = 10.63$, $p = .001$. When the day was divided into an approximation of day and night, only 47% ($n = 82$) of incidents occurred from 18:00–05:59, $\chi^2(1, N = 174) = .47$, $p = .49$.

While weekend evenings and nights combined were more active than weekdays, $\chi^2(1, N = 174) = 6.09$, $p = .01$, neither weekend evenings alone, $\chi^2(1, N = 174) = 2.92$, $p = .09$, nor weekend nights alone, $\chi^2(1, N = 174) = 1.48$, $p = .23$, were. These results offer mixed support for the premise that knife violence was associated with alcohol consumption at drinking establishments, especially

Table 16: Alcohol or Drug Impairment by Day of Week

			Impaired		Total
			No	Yes	
Day	Monday	Count	15	5	20
		% of Total	8.6%	2.9%	11.5%
	Tuesday	Count	22	6	28
		% of Total	12.6%	3.4%	16.1%
	Wednesday	Count	25	5	30
		% of Total	14.4%	2.9%	17.2%
	Thursday	Count	22	12	34
		% of Total	12.6%	6.9%	19.5%
	Friday	Count	22	5	27
		% of Total	12.6%	2.9%	15.5%
	Saturday	Count	14	5	19
		% of Total	8.0%	2.9%	10.9%
	Sunday	Count	12	4	16
		% of Total	6.9%	2.3%	9.2%
Total		Count	132	42	174
		% of Total	75.9%	24.1%	100.0%

Table 17: Frequency of Incidents by Time of Day

Time of Day

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Morning	39	22.4	22.4	22.4
	Afternoon	53	30.5	30.5	52.9
	Evening	56	32.2	32.2	85.1
	Night	26	14.9	14.9	100.0
	Total	174	100.0	100.0	

since the period after the last call (typically after midnight) recorded the fewest incidents per day.

The distance (in feet) between the decedent and the police was estimated or known in 76% (n = 133) of cases. The mean was 6.22, the median was 4, the mode was 1 (appeared 58 times), the range was 44 (from 1–45), and the sample standard deviation was 6.87. The distance between decedent and police was significantly shorter in cases that reported injuries (M = 4.29, SD = 5.86) than those that did not (M = 7.42, SD = 7.21), t (133) = -2.60, p = .005. Analysis of the data revealed that 97% (n = 129) of decedents were within 21 feet of the officer before being shot.

There were four cases where police shot the decedent from more than 21 feet away. The furthest distance reported was 45 feet. It involved a suicidal male who ran towards deputies with a hunting knife (police did not report the distance they opened fire, only the distance that the decedent commenced his charge). Police officers shot a male who had just murdered his neighbor with a machete from 25 feet away after he charged at them with the machete raised over his head. A suicidal male approached 15 to 25 feet away from deputies while brandishing a hatchet and a knife before being fatally shot (farthest distance recorded). A male brandishing a knife was shot with impact munitions at a distance of 24 feet before he broke into a sprint towards officers and was mortally wounded (police did not estimate the distance when they fired their fatal shots).

These results support the hypothesis that officers were aware of the 21-foot rule and waited until the decedent crossed this threshold before responding with lethal force. The fact that 44% (n = 58) of cases occurred within 1 foot may also suggest that officers waited too long before responding in some cases. The decedent was no more than 2 feet away in 94% (n = 16) of cases that resulted in officer injuries (see Table 18). Given that a motivated assailant can cross 10 feet in one second, it was surprising that 85% (n = 113) of cases occurred within 10 feet. These officers involved waited until the last second before responding.

Table 18: Frequency of Police Injuries by Distance

			Police Injuries		Total
			No	Yes	
Distance	1-7	Count	96	17	113
		% of Total	55.2%	9.8%	64.9%
	8-14	Count	7	0	7
		% of Total	4.0%	0.0%	4.0%
	15-21	Count	9	0	9
		% of Total	5.2%	0.0%	5.2%
	21	Count	4	0	4
		% of Total	2.3%	0.0%	2.3%
	Unknown	Count	40	1	41
		% of Total	23.0%	0.6%	23.6%
Total		Count	156	18	174
		% of Total	89.7%	10.3%	100.0%

It was not surprising that distance was correlated with officer injuries, given the edged weapon attacks' proximate nature. There were cases where decedents threw knives at officers; none of these incidents resulted in police injuries. Almost every officer injured was within two feet of the decedent (the sole exception was a tactical officer who fell off a ladder during the fatal encounter).

Less than 42% (n = 25) of decedents shot within 2 feet of the police injured anyone before being fatally shot. The mean distance between the decedent and the police varied by race and gender. Police shot White and Hispanic decedents about a foot farther away than Black decedents (6 feet 6 inches vs. 5 feet 6 inches), but these differences were not significant, F (3, 129) = 0.45, p = .72. Police also shot female decedents farther away than male decedents (7 feet 6 inches vs. 6 feet), but these differences were not significant, F (1, 131) = 0.36, p = .55.

The type of edged weapon brandished by the decedent was reported in 57% (n = 99) of cases. Analysis of the data revealed that 44% (n = 44) of decedents were armed with a kitchen knife (see Table 6). The next most frequently used edged weapons were hunting knives (n = 9), non-knives (n = 9), and folding knives (n= 8). As many people were killed brandishing machetes (n = 7) as utility knives (n = 7). While kitchen knives were indicated in 53% (n = 19) of all domestic violence cases, this result was not significant (P = 0.22, Fisher's exact test).

Knowledge of knife type should help inform officer risk assessment. For example, kitchen knives belong in the kitchen and not on the street. A person carrying a kitchen knife outside the kitchen may be more cause for concern than a person carrying a pocketknife. While both are edged weapons and potentially lethal weapons, the kitchen knife is situationally incongruent. Officers may need to do a better job articulating to the public why they perceived the object possessed by the decedent as a deadly threat the moment they decided to shoot.

Analysis of the data revealed that 63% (n = 110) of cases involved 2–4 officers (see Table 7). The remaining 37% (n = 64) were evenly distributed between single officer incidents (n = *33*) and five or more officers incidents (n = 31). Officers intervened without backup in 19% of cases The percentage of officers working alone in the current study was significantly less than the 10-year average of officers that were assaulted (30%), $\chi^2(1, N = 174) = 9.10$, $p = .003$, or killed (37%), $\chi^2(1, N = 174) = 22.57$, $p < .001$, while working alone (FBI, 2016b).

The research estimated the total number of officers involved by assuming the minimum number of officers were present within each reporting category (e.g., two officers present for each case in the 2–4 officer category). At least 408 officers were present during the 174 incidents (average of 2.34 officers present per fatal encounter) using this methodology. While not an option in every case, officer safety may be increased if officers wait for backup when dispatched to a call involving a person armed with an edged weapon.

Police reported the number of rounds fired in 96% (n = 167) of cases (see Table 5). Analysis of the data revealed that police fired 2–4 rounds in 53% (n = 93) of cases. The most common scenario (n = 58) was 2–4 officers firing 2–4 rounds while the least common scenario (n = 3) was one officer firing five or more rounds (see Table 19).

Encounters with a single officer present were most often resolved with 2–4 rounds. This result was significant, $\chi^2(2, N = 32) = 9.03$, $p = .01$. Encounters with 2–4 officers present were also most often resolved with 2–4 rounds. This result was also significant, $\chi^2(2, N = 106) = 15.57, p < .001$. Scenarios involving five or more officers were most often resolved with five or more rounds, but this result was not significant, $\chi^2(2, N = 29) = 1.62$, p= .56. There was no analysis of the number of rounds fired versus the number of times the decedent was shot. While the police shot at least one other police officer, there was no estimation of civilian injuries (if any) due to errant police gunfire.

Analysis of the data revealed that less-lethal weapons were used or attempted in 38% (n = 66) of

Table 19: Relationship between Police Presence and Number of Rounds Fired

			Rounds Fired				Total
			1	2-4	5+	U*	
Police Presence	1	Count	5	24	3	1	33
		% of Total	2.9%	13.8%	1.7%	0.6%	19.0%
	2-4	Count	12	58	36	4	110
		% of Total	6.9%	33.3%	20.7%	2.3%	63.2%
	5+	Count	5	11	13	2	31
		% of Total	2.9%	6.3%	7.5%	1.1%	17.8%
Total		Count	22	93	52	7	174
		% of Total	12.6%	53.4%	29.9%	4.0%	100.0%

Note. *Indicates the number of rounds fired was unreported.

cases. The Taser ($n = 52$) was the most frequently used, and OC spray ($n = 2$) was the least (see Table 20).

Table 20: Less-Lethal Usage by Weapon Type

Weapon Type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	108	59.3	59.3	59.3
	Taser	52	28.6	28.6	87.9
	Impact Munitions	10	5.5	5.5	93.4
	K9	6	3.3	3.3	96.7
	Baton	4	2.2	2.2	98.9
	OC Spray	2	1.1	1.1	100.0
	Total	182	100.0	100.0	

The use of the Taser and impact munitions were mutually exclusive (the Taser was attempted at least once with every less-lethal weapon except impact munitions). The use of less-lethal weapons was significantly associated with officer presence (see Table 21). Less-lethal interventions were attempted in 44% ($n = 63$) of cases where more than one officer was present but only 9% ($n = 3$) of cases where a single officer was present, $\chi^2(2, N = 174) = 14.39$, $p = .001$. The research predicted that less-lethal weapon usage would increase as the number of officers on the scene increased. However, less-lethal usage decreased once there were more than four officers present.

The use of less-lethal weapons varied by time of day (see Table 22), with 51% ($n = 27$) of deployments during the afternoon and 25% ($n = 14$) during the evening. This result was significant, $\chi^2(3, N = 174) = 7.80$, $p = .05$. The use of less-lethal weapons was not associated with gender (see Table 3), $\chi^2(1, N = 174) = 0.04$, $p = .83$, or race, $\chi^2(2, N = 174) = 0.72$, $p = .70$.

The deployment pattern of less-lethal weapons reinforces the need for officers to wait for backup, whenever possible, during high-risk encounters. While it was surprising that less-lethal interventions were attempted during any single officer encounters, it was less surprising that the less-lethal weapon deployed in each case was a Taser (maximum effective range of 21 feet). Officers may be tempted to

Table 21: Less-Lethal Usage by Officer Presence

			Less-Lethal		Total
			No	Yes	
Police Presence	1	Count	30	3	33
		% of Total	17.2%	1.7%	19.0%
	2-4	Count	61	49	110
		% of Total	35.1%	28.2%	63.2%
	5+	Count	17	14	31
		% of Total	9.8%	8.0%	17.8%
Total		Count	108	66	174
		% of Total	62.1%	37.9%	100.0%

Table 22: Less-Lethal Usage by Time of Day

			Less-Lethal		Total
			No	Yes	
Time of Day	Afternoon	Count	26	27	53
		% of Total	14.9%	15.5%	30.5%
	Evening	Count	42	14	56
		% of Total	24.1%	8.0%	32.2%
	Morning	Count	24	15	39
		% of Total	13.8%	8.6%	22.4%
	Night	Count	16	10	26
		% of Total	9.2%	5.7%	14.9%
Total		Count	108	66	174
		% of Total	62.1%	37.9%	100.0%

use less-lethal weapons when confronting an assailant brandishing an edged weapon about 21 feet away when they are confident in their ability to transition to lethal force if less-lethal force fails. The deployment of less-lethal weapons did not impact the lethal force deployment distance—65% of shootings in both cases occurred within seven feet (see Table 23).

Table 23: Less-Lethal Usage by Decedent Distance

			Less-Lethal		Total
			No	Yes	
Distance	1-7	Count	70	43	113
		% of Total	40.2%	24.7%	64.9%
	8-14	Count	4	3	7
		% of Total	2.3%	1.7%	4.0%
	15-21	Count	3	6	9
		% of Total	1.7%	3.4%	5.2%
	21	Count	1	3	4
		% of Total	0.6%	1.7%	2.3%
	Unknown	Count	30	11	41
		% of Total	17.2%	6.3%	23.6%
Total		Count	108	66	174
		% of Total	62.1%	37.9%	100.0%

Analysis of the data revealed that the decedent threatened police officers in 87% (n = 152) of cases and civilians in 39% (n = 68) of cases. The decedent threatened police alone in 60% of cases (n = 105), civilians alone in 13% (n = 23) of cases, and both in 27% (n = 46) of cases (see Table 24). While police officers were significantly more likely to be the target of the aggression, χ^2 (1, N = 174) = 40.33, p< .001, this may be explained by the unequal distribution of potential victims. Police officers were present at 100% of incidents, but there was no estimation of the number of civilians present.

Table 24: Frequency of Police vs. Civilian Victimization

			Police		Total
			No	Yes	
Civilian	No	Count	0	105	105
		% of Total	0.0%	60.3%	60.3%
	Yes	Count	23	46	69
		% of Total	13.2%	26.4%	39.7%
Total		Count	23	151	174
		% of Total	13.2%	86.8%	100.0%

Analysis of the data revealed that civilians (n = 36) were twice as likely as police officers (n = 18) to be injured. Civilian injuries were not classified. Police injuries were unevenly distributed, with moderate injuries (those requiring hospital treatment) being reported the most and major injuries (those requiring admission to hospital or surgery) being reported the least (see Table 25). These differences, however, were not significant, $\chi^2(2, N = 18) = 2.13$, $p = .35$. Using the previously

discussed calculation for the minimum number of police officers present resulted in an estimated police injury rate of no more than 5%.

Table 25: Distribution of Police Injuries

Injury Type		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	156	89.7	89.7	89.7
	Major	3	1.7	1.7	91.4
	Minor	6	3.4	3.4	94.8
	Moderate	9	5.2	5.2	100.0
	Total	174	100.0	100.0	

The most common minor injuries were superficial wounds, abrasions, or contusions. Examples of injury mechanisms include officers struck in the face with fists or objects, suffering minimal injuries after being stabbed in the vest, suffering a superficial slash wound to the face, tripping while evading the attack, and falling off a ladder after discharging his rifle. The most common moderate injuries required sutures and were being slashed, hacked, or stabbed. Examples of injury mechanisms include being slashed on the hand or arm, stabbed in the leg, stabbed in the face with a flagpole, slashed on the neck, stabbed in the head with a railroad spike, and other undisclosed moderate injuries. All major injuries required surgery. Examples of injury mechanisms include being stabbed in the neck (missing the carotid artery by less than an inch), stabbed in the chest with a 13-inch butcher knife, and repeatedly slashed with a samurai sword.

Police injuries were less frequent when less-lethal weapons were used (see Table 26), $\chi^2(1,\ N = 174) = 0.36$, $p = .55$. Nevertheless, two of the three officers that suffered the most serious injuries were hurt while deploying less-lethal weapons. The first officer was stabbed in the chest while deploying a Taser, and the second officer was repeatedly slashed with a sword while deploying a less-lethal shotgun. Decedents who injured officers also tended to be younger. The mean age for the officer-injurious subpopulation was 34 years, while the mean age for the non-injurious population was 37 years old. This result, however, was not significant $F\ (1,\ 172) = 1.19, p = .28$. The youngest injury-causing assailant was an 18-year-old male, and the oldest was a 58-year-old male.

Table 26: Less-Lethal Usage by Officer Injuries

			Police Injury		Total
			No	Yes	
Less-Lethal	No	Count	98	10	108
		% of Total	56.3%	5.7%	62.1%
	Yes	Count	58	8	66
		% of Total	33.3%	4.6%	37.9%
Total		Count	156	18	174
		% of Total	89.7%	10.3%	100.0%

Excluding the decedent, all other fatalities ($n = 13$) were civilians. Analysis of the data revealed that 69% ($n = 9$) of fatalities occurred within a domestic relationship (see Table 27). This result was significant, $\chi^2(1,\ N = 174) = 5.14, p = .02$.

Table 27: Frequency of Fatalities by Indication of Domestic Violence

			Fatalities		Total
			No	Yes	
Domestic Violence	No	Count	101	4	105
		% of Total	58.0%	2.3%	60.3%
	Yes	Count	60	9	69
		% of Total	34.5%	5.2%	39.7%
Total		Count	161	13	174
		% of Total	92.5%	7.5%	100.0%

Only 15% ($n = 3$) of decedents who committed murder had a history of mental illness (see Table 28). This result was also significant, $\chi^2(1, N = 174) = 9.28, p = .002$.

Table 28: Frequency of Fatalities by Indication of Mental Illness

			Fatalities		Total
			No	Yes	
Mental Illness	No	Count	66	11	77
		% of Total	37.9%	6.3%	44.3%
	Yes	Count	95	2	97
		% of Total	54.6%	1.1%	55.7%
Total		Count	161	13	174
		% of Total	92.5%	7.5%	100.0%

The presence of civilian fatalities significantly increased the number of rounds fired (see Table 29), $\chi^2(1, N = 167) = 13.55$, $p = .001$. This result was not surprising as the presence of a gravely wounded person not only clarified the decedent's willingness to cause grievous bodily harm but also justified the need for an immediate and overwhelming police response.

Cases with a reported disposition of the lethal force investigation accounted for 75% ($n = 131$) of incidents. Authorities justified each case that involved a fatality other than the assailant and, while several cases involved training recommendations, every other incident as well. The final disposition of the remaining cases ($n = 43$) was unavailable. The investigation may have concluded, and the findings were not released, or the investigation may still be ongoing. The unreported investigations' average age was more than 800 days ($M = 815.84$, $SD = 108.76$).

Domestic violence was indicated in 40% ($n = 69$) of cases and 69% ($n = 9$) of civilian fatalities. A kitchen knife was used in 53% ($n = 19$) of domestic violence cases when the type of knife was known. Domestic violence was not associated with decedent intoxication, $\chi^2(1, N = 174) = .93, p = .34$, the day of the week $\chi^2(6, N = 174) = 6.87$, $p = .33$, or the time of day, $\chi^2(3, N = 174) = 1.76$, $p = .62$. The increased rate of kitchen knife usage in domestic violence situations was not surprising since many of these incidents occurred within the family residence (where kitchen knives are expected).

Analysis of the data revealed that 38 states and the District of Columbia reported at least one fatal encounter in 2015 (see Table 30). The distribution of deaths, however, was not equally divided throughout the country. There were 27 states (69%) that reported three or fewer fatalities and

Table 29: Number of Rounds Fired by Civilian Fatalities

			Civilian Fatalities		Total
			No	Yes	
Rounds Fired	1	Count	20	2	22
		% of Total	11.5%	1.1%	12.6%
	2-4	Count	88	5	93
		% of Total	50.6%	2.9%	53.4%
	5+	Count	46	6	52
		% of Total	26.4%	3.4%	29.9%
	Unknown	Count	7	0	7
		% of Total	4.0%	0.0%	4.0%
Total		Count	161	13	174
		% of Total	92.5%	7.5%	100.0%

were responsible for 31% ($n = 54$) of cases, ten states (26%) that reported 4–9 fatalities and were also responsible for 31% ($n = 54$) of cases, and two states (5%) that reported 16–50 fatalities and were responsible for 38% ($n = 66$) of cases. Excluding the two outliers, the distribution of cases across states was not statistically significant, $\chi^2(36, N = 108) = 23.69$, $p = .12$. Including the outliers skewed the results significantly, $\chi^2(38, N = 174) = 544.59$, $p < .001$. An analysis of why two states accounted for 38% of all fatalities is a topic for future research.

Analysis of the data revealed that 98% ($n = 149$) of agencies experienced two or fewer fatal encounters and that most ($n = 136$) experienced just one. Agency size was not correlated to the number of fatal encounters, $\chi^2(2, N = 174) = 0.17, p = .92$. Agencies with less than 100 officers ($n = 40$) were no more likely to use lethal force than those agencies with 100–1,000 officers ($n = 64$) or more than 1,000 officers ($n = 31$). The agency that experienced the most fatal encounters ($n = 6$) ranked fourth on the list of agencies with the most officers (the top three agencies experienced one fatal encounter each).

Agency type (police department vs. sheriff's office) did not significantly impact the number of fatal encounters. According to an estimate from the Census of State and Local Law Enforcement Agencies (Reaves, 2011), police departments comprise 80% of law enforcement agencies, while sheriff's offices comprise 20% of law enforcement agencies. During the study period, police departments were responsible for 74% (n = 110) of cases, while sheriff's offices were responsible for 26% (n = 38) of cases. While police departments were responsible for slightly less than their expected share of fatalities and sheriff's offices were responsible for slightly more than their expected share of fatalities, these differences were not significant ($\chi^2(1, N = 148) = 2.636$, $p = .10$). Excluded from state and local law enforcement agencies' analysis was a single case reported by a federal agency (U.S. Customs and Border Protection). The mean size of reporting agencies was 1375, the median was 282, the mode was 9863 (appeared six times), and the range was 35392 (from 3–35395).

5.2.3 Officer characteristics

The restricted or controlled release of personal officer information, compounded by methodological limitations, prevented detailed officer characteristics analysis. As previously discussed, at least 408 officers were present during the 174 fatal encounters. The gender of the officers involved was

Table 30: Frequency of Incidents by State

State		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AL	2	1.1	1.1	1.1
	AR	2	1.1	1.1	2.3
	AZ	7	4.0	4.0	6.3
	CA	50	28.7	28.7	35.1
	CO	5	2.9	2.9	37.9
	CT	1	.6	.6	38.5
	DC	2	1.1	1.1	39.7
	FL	9	5.2	5.2	44.8
	GA	4	2.3	2.3	47.1
	IL	1	.6	.6	47.7
	IN	2	1.1	1.1	48.9
	KS	1	.6	.6	49.4
	KY	3	1.7	1.7	51.1
	LA	5	2.9	2.9	54.0
	MA	3	1.7	1.7	55.7
	MD	4	2.3	2.3	58.0
	MI	1	.6	.6	58.6
	MN	1	.6	.6	59.2
	MO	3	1.7	1.7	60.9
	NC	3	1.7	1.7	62.6
	NE	2	1.1	1.1	63.8
	NH	2	1.1	1.1	64.9
	NJ	8	4.6	4.6	69.5
	NM	1	.6	.6	70.1
	NV	1	.6	.6	70.7
	NY	3	1.7	1.7	72.4
	OH	3	1.7	1.7	74.1
	OK	4	2.3	2.3	76.4
	OR	3	1.7	1.7	78.2
	PA	3	1.7	1.7	79.9
	SC	4	2.3	2.3	82.2
	TN	1	.6	.6	82.8
	TX	16	9.2	9.2	92.0
	UT	2	1.1	1.1	93.1
	VA	3	1.7	1.7	94.8
	WA	2	1.1	1.1	96.0
	WI	4	2.3	2.3	98.3
	WV	1	.6	.6	98.9
	WY	2	1.1	1.1	100.0
	Total	174	100.0	100.0	

reported in 66% (n = 270) of cases. Male officers were identified in 95% (n = 256) of cases. At least 57% (n = 233) of the officers involved were reported to have used lethal force. The gender of the officers that used lethal force was reported in 86% (n = 200) of cases. Male officers were identified in 96% (n = 191) of cases. The race of the officers involved was reported in 16% (n = 69) of cases. White officers were identified in 87% (n = 60) of cases. The years of service for the officers involved was reported in 36% (n = 145) of cases. The mean was 7.92, the median was 7, the mode was 2 (appeared 19 times), the range was 24 (from 1–25), and the population standard deviation was 5.94. Using this limited data, the profile of the typical officer involved in the fatal shooting of a person brandishing an edged weapon is clear: White male with about eight years of law enforcement experience. The age of the officers involved was not recorded.

5.3 Discussion

The data supports the hypothesis that the 21-foot rule was an essential element of officer safety because it was more effective and reliable than its alternatives, was easily understood and commonly used, and minimized the risk of fatal officer injuries. The 21-foot rule was more effective and reliable than its alternatives because less-lethal weapons were attempted in 38% of cases and were ineffective in 100% of those cases. The 21-foot rule was easily understood and commonly used because only 3% of decedents were more than 21 feet away from the police when shot. The 21-foot rule minimized the risk of fatal officer injuries because there were no police fatalities. Almost no (less than 1%) police officers suffered an injury that required hospital admission or surgery.

5.4 Limitations

This study was designed to be informative but is not without limitations. The reporting of persons killed by police was inconsistent and incomplete. Cases may be underreported and omitted due to a lack of mandatory reporting of officer-involved shootings or killings. In the absence of such reporting, the mechanisms available to estimate non-compliance with voluntary reporting regimes are imperfect and imprecise. Some fatalities received considerable media coverage, and others received almost none. Increased reporting reduced the likelihood of incomplete case histories.

Not every person shot by the police died at the scene. It is plausible that persons wounded by the police received less media attention than those killed by the police. Deaths that occurred months after the initial police encounter may have received no media coverage at all. While exceptional events receive exceptional media attention (Hirschfield & Simon, 2010), the scale of exceptionalism associated with police violence varies by community. What is extraordinary in one community is commonplace in another.

The methodology did not allow the drawing of causal inferences. The post hoc sequencing of events does not permit insight into an officer's state of mind before the fatal encounter. As with post hoc ergo propter hoc, researchers must take care when inferring causality from temporal sequences. While cases shared some commonalities (decedent, edged weapon, police, gunfire), the random interaction of event variables hindered developing a predictive model.

The information in the dataset was only as accurate as the person who reported it. Errors or omissions made at the time of origination cannot be ruled out. While official sources were preferred over secondary sources after identifying conflicting information, this bias towards official sources

may unintentionally skew the results in unpredictable ways, especially considering that some data came from officer self-reports.

Every case under observation had a fatal outcome, which skewed the assessment of the effectiveness of less-lethal alternatives within the study population. Less-lethal weapons were ineffective in 100% of cases because 100% of the subjects died. This research necessarily excluded cases where less-lethal weaponry was sufficient because these encounters did not result in fatalities.

Similarly, there was no way of knowing how many people the police did not kill while brandishing edged weapons. It is possible that less-lethal weapons were generally effective in managing these situations and the 174 persons killed by the police in 2015 were the exception to that rule. It is unknown how many times police shot at an assailant but missed or how many people were shot but did not die. The incomplete dataset prevented a comprehensive assessment of less-lethal intervention strategies. Consequently, this research studied the worst, rather than the best, possible outcome of police-citizen encounters and may provide an unnecessarily harsh assessment of police tactics.

6 Conclusion

This research aimed to examine the law enforcement use of lethal force against people brandishing knives in the United States. It attempted to answer whether it was reasonable for a law enforcement officer to use lethal force to repel the attack of a person armed with a knife. It also examined the so-called 21-foot rule and assessed the viability of less-lethal response options as an alternative to lethal force when confronting a person armed with a knife.

The purpose of this paper was not to second-guess the split-second decisions made by officers in situations that were "tense, uncertain and rapidly evolving" (*Graham v. Connor*, 1989). The public expects police officers to handle these situations in a decidedly different manner than themselves. Police officers are highly trained professionals equipped with the tools and training needed to manage situations that might otherwise overwhelm civilians. Society should expect more from the police than it expects from itself. While "detached reflection cannot be demanded in the presence of an uplifted knife" (*Brown v. United States*, 1921), it is reasonable to expect police officers consider alternatives to lethal force if time permits. Officers should be encouraged to keep a reasonable distance between themselves and those brandishing edged weapons. Creating distance affords officers more time to consider alternatives and enhances both officer and public safety.

The 21-foot rule reduces the decision to use lethal force to a simple formula: suspect armed with a knife within 21 feet = shoot; suspect armed with a knife beyond 21 feet $\neq$ shoot. The decision to not shoot someone armed with a knife within 21 feet is more complex and demands certainty in the face of ambiguity. This paper does not suggest that officers value the lives of those trying to kill them more than they value their own—such notions of altruism border on the absurd. However, police officers must be mindful that they were sworn to serve and protect all citizens—even when doing so increases their own risk of injury.

The challenge is to reframe police interactions away from an adversarial fight of good versus evil and toward a holistic embrace of harm reduction. The calculus of force should include evaluating whether a given intervention is more likely to help, rather than harm, a member of the public.

There can be little doubt that a small percentage of the population seems compelled to chart a path to their destruction. Whenever possible, the police should prevent people from doing so. Officers are trained to help those experiencing crisis and have an ethical obligation to help people when they cannot (or will not) help themselves. Harm reduction should be the underlying principle of all modern police interventions.

There is insufficient data to assess the merits of the 21-foot rule definitively. The police killed at least 174 people brandishing edged weapons in 2015. At the same time, no police officers suffered fatal injuries due to an edged weapon attack. Did those officers survive because they used lethal force to defend themselves? There is no way to know. What is known is that two police officers in this study were seriously injured while attempting to deploy less-lethal weapons during lethal force encounters. It is plausible that those two police officers are alive because other police officers used lethal force to defend their lives.

The paucity of police officer data hampered statistical analysis. The collection of meaningful statistics is required to support research, advance public policy, and inform public debate. Officer information was absent in almost 13% ($n = 22$) of cases. Transparency is necessary to repudiate claims that officers routinely use excessive force and essential to ensure jurisdictions do not become islands of the law unto themselves. Allowing lethal force without a modicum of transparency violates the spirit of due process and leaves the impression that officers are above the law. It is counterintuitive that the public knows more about violence directed at the police than violence committed by the police. While it is unreasonable to expect to know the details of everyone who assaults or kills a police officer (as some suspects must surely elude capture and identification), it is reasonable to expect police release basic officer biographical data following critical incidents. Without necessarily releasing officer names, the public should demand that police agencies release sufficient data to permit a comprehensive review of police behavior patterns and practice. At a minimum, the following data should be made public: officer gender, race, age, years of service, and whether they used lethal force. A non-identifiable unique identifier would help identify patterns over time. Law enforcement agencies are part of civil service, and their employees are civil servants. Withholding data following a fatal encounter is a breach of the covenant between the police and the public they swore to protect.

This paper contributes to the growing body of research into police violence and may be useful to law enforcement agencies developing and implementing systems and procedures designed to monitor, predict, and reduce the number of fatal police/civilian encounters.

7 References

American Association of Suicidology (2014). *Suicide by cop (2014)* . Retrieved from http://www.suicidology.org/Portals/14/docs/Resources/FactSheets/2011/SuicideCop2014.pdf

Anderson, G. S., Litzenberger, R., & Plecas, D. (2002). Physical evidence of police officer stress. *Policing: An International Journal of Police Strategies & Management*, *25* (2), 399–420. https://doi.org/10.1108/13639510210429437

Batton, C. (2006). Police murders: An examination of historical trends in the killing of law enforcement officers in the United States, 1947 to 1998. *Homicide Studies*, *10* (2), 79–97. https:

//doi.org/10.1177/1088767905285449

Biggs, A. T., Brockmole, J. R., & Witt, J. K. (2013). Armed and attentive: Holding a weapon can bias attentional priorities in scene viewing. *Attention, Perception, & Psychophysics* , *75* (8), 1715–1724. https://doi.org/10.3758/s13414-013-0538-6

Bishop, S. J. (2007). Neurocognitive mechanisms of anxiety: An integrative account. *Trends in Cognitive Sciences*, *11* (7), 307–316. https://doi.org/10.1016/j.tics.2007.05.008

Blair, J. P., Pollock, J., Montague, D., Nichols, T., Curnutt, J., & Burns, D. (2011). Reasonableness and reaction time. *Police Quarterly*, *14* (4), 323–343. https://doi.org/10.1177/1098611111423737

Brandl, S. G., & Stroshine, M. S. (2017). Oleoresin capsicum spray and Tasers: A comparison of factors predicting use and effectiveness.*Criminal Justice Policy Review*, *28* (3), 279–306. https://doi.org/10.1177/0887403415578732

Brown v. United States, 256 U.S. 335 (1921). Retrieved from https://scholar.google.com/scholar_case?case=7879018576695819162

Catanesi, R., Carabellese, F., Troccoli, G., Candelli, C., Grattagliano, I., Solarino, B., & Fortunato, F. (2011). Psychopathology and weapon choice: A study of 103 perpetrators of homicide or attempted homicide.*Forensic Science International*, *209* (1–3), 149–153. https://doi.org/10.1016/j.forsciint.2011.01.019

Centers for Disease Control and Prevention. (2016, December). *Underlying cause of death 1999-2015 on CDC WONDER online database, released December, 2016. Data are from the Multiple Cause of Death Files, 1999-2015, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program* [Data file and code book]. Available from the CDC site:http://wonder.cdc.gov/ucd-icd10.html

Cole, S., Balcetis, E., & Dunning, D. (2013). Affective signals of threat increase perceived proximity. *Psychological Science*, *24* (1), 34–40. https://doi.org/10.1177/0956797612446953

Covington, M. W., Huff-Corzine, L., & Corzine, J. (2014). Battered police: Risk factors for violence against law enforcement officers. *Violence and Victims*, *29* (1), 34–52. https://doi.org/10.1891/0886-6708.VV-D-12-00022

de Brito, D., Challoner, K. R., Sehgal, A., & Mallon, W. (2001). The injury pattern of a new law enforcement weapon: The police bean bag.*Annals of Emergency Medicine*, *38* (4), 383–390. https://doi.org/10.1067/mem.2001.117272

De-Giorgio, F., Lodise, M., Quaranta, G., Spagnolo, A. G., d'Aloja, E., Pascali, V. L., & Grassi, V. M. (2015). Suicidal or homicidal sharp force injuries? A review and critical analysis of the heterogeneity in the forensic literature. *Journal of Forensic Sciences*, *60*, S97–S107. https://doi.org/10.1111/1556-4029.12673

Department of Justice. (1995). *Attorney General October 17, 1995 Memorandum on Resolution 14*. Retrieved from https://www.justice.gov/archives/ag/attorney-general-october-17-1995-memorandum-resolution-14-attachment-0

DePrang, E. (2013). How the Houston cop who killed an unarmed, disabled man was found innocent. *The Texas Observer*. Retrieved from https://www.texasobserver.org/hpd-clears-officer-killed-unarmed-disabled-man/

Dilchert, S., Ones, D. S., Davis, R. D., & Rostow, C. D. (2007). Cognitive ability predicts objectively measured counterproductive work behaviors. *Journal of Applied Psychology*, *92* (3), 616–627. https://doi.org/10.1037/0021-9010.92.3.616

Downs, R. L. (2007). Less lethal weapons: A technologist's perspective.*Policing: An International Journal of Police Strategies & Management, 30* (3), 358–384. https://doi.org/10.1108/13639510710778796

Estate of Serrano v. Trieu (Dist. Court, ND California 2016). Retrieved from https://scholar.google.com/scholar_case?case=11037843515383178447

Federal Bureau of Investigation. (2004). *Uniform Crime Reporting handbook*. U.S. Department of Justice. Retrieved from https://www2.fbi.gov/ucr/handbook/ucrhandbook04.pdf

Federal Bureau of Investigation. (2016a). *Crime in the United States, 2015*. Retrieved from https://ucr.fbi.gov/crime-in-the-u.s/2015/crime-in-the-u.s.-2015/home

Federal Bureau of Investigation. (2016b). *Law enforcement officers killed and assaulted, 2015*. Retrieved fromhttps://ucr.fbi.gov/leoka/2015

Felson, R. B., & Messner, S. F. (1996). To kill or not to kill? Lethal outcomes in injurious attacks*. *Criminology*, *34* (4), 519–545. https://doi.org/10.1111/j.1745-9125.1996.tb01218.x

Fessler, D. M. T., Holbrook, C., & Snyder, J. K. (2012). Weapons make the man (larger): Formidability is represented as size and strength in humans. *PLoS ONE* , *7* (4), e32751. https://doi.org/10.1371/journal.pone.0032751

Fleming, K. K., Bandy, C. L., & Kimble, M. O. (2010). Decisions to shoot in a weapon identification task: The influence of cultural stereotypes and perceived threat on false positive errors. *Social Neuroscience*, *5* (2), 201–220. https://doi.org/10.1080/17470910903268931

Forster, S., Nunez-Elizalde, A. O., Castle, E., & Bishop, S. J. (2014). Moderate threat causes longer lasting disruption to processing in anxious individuals. *Frontiers in Human Neuroscience*, *8*. https://doi.org/10.3389/fnhum.2014.00626

Fox, K. A., & Allen, T. (2013). Examining the instrumental–expressive continuum of homicides. *Homicide Studies*, *18* (3), 298–317. https://doi.org/10.1177/1088767913493420

Fuller, D. A., Lamb, H. R., Biasotti, M., & Snook, J. (2015). *Overlooked in the undercounted: The role of mental illness in fatal law enforcement encounters* (p. 28). Treatment Advocacy Center. Retrieved from http://www.treatmentadvocacycenter.org/overlooked-in-the-undercounted-2015

Garner, B. (2009). *Black's Law Dictionary, 9th*. St. Paul, Minn.: West Pub. Co.

Ganpat, S. M., van der Leun, J., & Nieuwbeerta, P. (2013). The influence of event characteristics and actors' behaviour on the outcome of violent events: Comparing lethal with non-lethal events.*British Journal of Criminology*, *53* (4), 685–704. https://doi.org/10.1093/bjc/azt017

Geller, W. A., & Scott, M. (1992). *Deadly force: What we know – A practitioner's desk reference on police-involved shootings.*Washington, DC: Police Executive Research Forum (PERF).

Graham v. Connor, 490 U.S. 386 (1989). Retrieved from https://scholar.google.com/scholar_case?case=4306215806680760770

Gross, J. P. (2016). Judge, jury, and executioner: The excessive use of deadly force by police officers. *Texas Journal on Civil Liberties & Civil Rights*, *21* (2), 155–181. Retrieved from https://search-proquest-com.ezproxy2.apus.edu/docview/1799010331

Guardian. (2016). *The counted: Killed by police, 2015–2016*[Data file and code book]. Available from the Kaggle site: https://www.kaggle.com/the-guardian/the-counted

Hainsworth, S. V., Delaney, R. J., & Rutty, G. N. (2008). How sharp is sharp? Towards quantification of the sharpness and penetration ability of kitchen knives used in stabbings. *International Journal of Legal Medicine*, *122* (4), 281–291. https://doi.org/10.1007/s00414-007-0202-6

Hanlon, R. E., Coda, J. J., Cobia, D., & Rubin, L. H. (2012). Psychotic domestic murder: Neuropsychological differences between homicidal and nonhomicidal schizophrenic men. *Journal of Family Violence*,*27* (2), 105–113. https://doi.org/10.1007/s10896-011-9410-4

Harris, A. R., Thomas, S. H., Fisher, G. A., & Hirsch, D. J. (2002). Murder and medicine: The lethality of criminal assault 1960-1999.*Homicide Studies*, *6* (2), 128–166. https://doi.org/10.1177/108876790200600203

Hern, E., Glazebrook, W., & Beckett, M. (2005). Reducing knife crime.*BMJ*, *330* (7502), 1221–1222. https://doi.org/10.1136/bmj.330.7502.1221

Hirschfield, P. J., & Simon, D. (2010).Legitimating police violence: Newspaper narratives of deadly force. *Theoretical Criminology*, *14* (2), 155–182. https://doi.org/10.1177/1362480609351545

Hirschfield, Paul J. (2015). Lethal policing: Making sense of American exceptionalism. *Sociological Forum*, *30* (4), 1109–1117. https://doi.org/10.1111/socf.12200

Homant, R. J., & Kennedy, D. B. (2000). Effectiveness of less than lethal force in suicide-by-cop incidents. *Police Quarterly*, *3* (2), 153–171. https://doi.org/10.1177/1098611100003002002

Hontz, T. A. (1999). Justifying the deadly force response. *Police Quarterly*, *2* (4), 462–476. https://doi.org/10.1177/109861119900200404

Hughes, N. S., Macaulay, A. M., & Crichton, J. H. M. (2012). Kitchen knives and homicide by mentally disordered offenders: A systematic analysis of homicide inquiries in England 1994-2010. *Journal of Forensic Psychiatry & Psychology*, *23* (5–6), 559–570. https://doi.org/10.1080/14789949.2012.721132

Hughey, M. W. (2016). There's something happening here: A comment on Hirschfield's "lethal policing." *Sociological Forum*, *31* (1), 225–229. https://doi.org/10.1111/socf.12231

Hunt, A. C., & Cowling, R. J. (1991). Murder by stabbing.*Forensic Science International*, *52* (1), 107–112. https://doi.org/10.1016/0379-0738(91)90102-D

Jarvis, J. P., Mancik, A., & Regoeczi, W. C. (2016). Police responses to violent crime. *Criminal Justice Review*, *42* (1), 5–25. https://doi.org/10.1177/0734016816684198

Johnson, N. J. (2017). Lawful gun carriers (police and armed citizens): License, escalation, and race. *Law and Contemporary Problems,80* (2), 209–231. Retrieved from http://scholarship.law.duke.edu/lcp/vol80/iss2/9

Johnson, R. R. (2011). Suspect mental disorder and police use of force.*Criminal Justice and Behavior*, *38* (2), 127–145. https://doi.org/10.1177/0093854810388160

Jonas, E., McGregor, I., Klackl, J., Agroskin, D., Fritsche, I., Holbrook, C., ... Quirin, M. (2014). Threat and defense. In *Advances in Experimental Social Psychology* (Vol. 49, pp. 219–286). Elsevier. https://doi.org/10.1016/B978-0-12-800052-6.00004-4

Jorgensen, P., Marcus, U., Albrecht, H., Suttorp, N., & Schürmann, D. (2010). Serial knife stabbings with HIV exposure? Implications for post-exposure prophylaxis. *Journal of Infection*, *60* (1), 76–78. https://doi.org/10.1016/j.jinf.2009.10.046

Karger, B., Niemeyer, J., & Brinkmann, B. (1999). Physical activity following fatal injury from sharp-pointed weapons. *International Journal of Legal Medicine*, *112* (3), 188–191. https://doi.org/10.1007/s004140050230

Karlsson, T. (1998). Homicidal and suicidal sharp force fatalities in Stockholm, Sweden. *Forensic Science International*, *93* (1), 21–32. https://doi.org/10.1016/S0379-0738(98)00025-5

Kesic, D., Thomas, S. D. M., & Ogloff, J. R. P. (2012). Analysis of fatal police shootings: Time, space, and suicide by police.*Criminal Justice and Behavior*, *39* (8), 1107–1125. https://doi.org/10.1177/0093854812440084

Kidd, S., Hughes, N., & Crichton, J. (2014). Kitchen knives and homicide: A systematic study of people charged with murder in the Lothian and Borders region of Scotland. *Medicine, Science and the Law*, *54* (3), 167–173. https://doi.org/10.1177/0025802413496409

Kleck, G. (2007). Are police officers more likely to kill African American suspects? *Psychological Reports*, *100* (1), 31–34. https://doi.org/10.2466/pr0.100.1.31-34

Kleider, H. M., & Parrott, D. J. (2009). Aggressive shooting behavior: How working memory and threat influence shoot decisions. *Journal of Research in Personality*, *43* (3), 494–497. https://doi.org/10.1016/j.jrp.2008.12.007

Klinger, D. (2005). Social theory and the street cop: The case of deadly force. *Ideas in American Policing*, *7*. Retrieved from https://www.policefoundation.org/publication/social-theory-and-the-street-cop-the-case-of-deadly-force/

Klinger, D. (2007). Impact munitions: A discussion of key information.*Policing: An International Journal of Police Strategies & Management*, *30* (3), 385–397. https://doi.org/10.1108/13639510710778804

Klinger, D., Rosenfeld, R., Isom, D., & Deckard, M. (2016). Race, crime, and the micro-ecology of deadly force. *Criminology & Public Policy*, *15* (1), 193–222. https://doi.org/10.1111/1745-9133.12174

Konig, T. (2006). Stabbing: Data support public perception. *BMJ*, *333* (7569), 652–652. https://doi.org/10.1136/bmj.333.7569.652

Kristoffersen, S., Normann, S.-A., Morild, I., Lilleng, P. K., & Heltne, J.-K. (2016). The hazard of sharp force injuries: Factors influencing outcome. *Journal of Forensic and Legal Medicine*, *37*, 71–77. https://doi.org/10.1016/j.jflm.2015.10.005

Kyriacou, D. N. (2006). Police deaths in New York and London during the twentieth century. *Injury Prevention*, *12* (4), 219–224. https://doi.org/10.1136/ip.2005.010827

Loftin, C., Wiersema, B., McDowall, D., & Dobrin, A. (2003). Underreporting of justifiable homicides committed by police officers in the United States, 1976–1998. *American Journal of Public Health*, *93* (7), 1117–1121. https://doi.org/10.2105/AJPH.93.7.1117

Lord, V. B. (2014). Police responses in officer-involved violent deaths: Comparison of suicide by cop and non-suicide by cop incidents.*Police Quarterly*, *17* (1), 79–100. https://doi.org/10.1177/1098611114522040

Luini, L. P., & Marucci, F. S. (2015). Prediction–Confirmation Hypothesis and Affective Deflection Model to account for split-second decisions and decision-making under pressure of proficient decision-makers. *Cognition, Technology & Work*, *17* (3), 329–344. https://doi.org/10.1007/s10111-015-0328-0

Manning, P. K. (2008). Performance rituals. *Policing*, *2* (3), 284–293. https://doi.org/10.1093/police/pan050

Marenin, O. (2016). Cheapening death: Danger, police street culture, and the use of deadly force. *Police Quarterly*, *19* (4), 461–487. https://doi.org/10.1177/1098611116652983

Maxwell, R., Trotter, C., Verne, J., Brown, P., & Gunnell, D. (2007). Trends in admissions to hospital involving an assault using a knife or other sharp instrument, England, 1997–2005. *Journal of Public Health*, *29* (2), 186–190. https://doi.org/10.1093/pubmed/fdm018

Mays, G. L., & Keys, D. (2011). Normal homicides, normal defendants: Finding leniency in Oklahoma's murder conviction machinery. *Western Criminology Review*, *12* (1), 35–42. Retrieved from https://search-proquest-com.ezproxy2.apus.edu/docview/859121961

Miller, L. (2015). Why cops kill: The psychology of police deadly force encounters. *Aggression and Violent Behavior*, *22*, 97–111. https://doi.org/10.1016/j.avb.2015.04.007

Miller, T. R., Lawrence, B. A., Carlson, N. N., Hendrie, D., Randall, S., Rockett, I. R. H., & Spicer, R. S. (2017). Perils of police action: A cautionary tale from US data sets. *Injury Prevention*,*23* (1), 27–32. https://doi.org/10.1136/injuryprev-2016-042023

Mohandie, K., & Meloy, J. R. (2010). Hostage and barricade incidents within an officer-involved shooting sample: Suicide by cop, intervention efficacy, and descriptive characteristics. *Journal of Police Crisis Negotiations*, *10* (1–2), 101–115. https://doi.org/10.1080/15332581003799737

Mohandie, K., & Meloy, J. R. (2011). Suicide by cop among female subjects in officer-involved shooting cases. *Journal of Forensic Sciences*, *56* (3), 664–668. https://doi.org/10.1111/j.1556-4029.2010.01686.x

Mohandie, K., Meloy, J. R., & Collins, P. I. (2009). Suicide by cop among officer-involved shooting cases. *Journal of Forensic Sciences*, *54* (2), 456–462. https://doi.org/10.1111/j.1556-4029.2008.00981.x

Mol, N., Baas, J. M. P., Grillon, C., van Ooijen, L., & Kenemans, J. L. (2007). Startle potentiation in rapidly alternating conditions of high and low predictability of threat. *Biological Psychology*,*76* (1–2), 43–51. https://doi.org/10.1016/j.biopsycho.2007.05.005

Morrison, G. B., & Garner, T. K. (2011). Latitude in deadly force training: Progress or problem? *Police Practice and Research*,*12* (4), 341–361. https://doi.org/10.1080/15614263.2011.563968

Morrison, G. B., & Vila, B. J. (1998). Police handgun qualification: Practical measure or aimless activity? *Policing: An International Journal of Police Strategies & Management*, *21* (3), 510–533. https://doi.org/10.1108/13639519810228804

Myers, C. A. (2017). Police violence against people with mental disabilities: The immutable duty under the ADA to reasonably accommodate during arrest. *Vanderbilt Law Review*, *70* (4), 1393–1426. Retrieved from https://search-proquest-com.ezproxy2.apus.edu/docview/1910226654

National Center for Health Statistics. (2003). *Medical examiners' and coroners' handbook on death registration and fetal death reporting*. Hyattsville, MD: Department of Health and Human Services, Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/nchs/data/misc/hb_me.pdf

Nieuwenhuys, A., Caljouw, S. R., Leijsen, M. R., Schmeits, B. A. J., & Oudejans, R. R. D. (2009). Quantifying police officers' arrest and self-defence skills: Does performance decrease under pressure? *Ergonomics*, *52* (12), 1460–1468. https://doi.org/10.1080/00140130903287981

Nieuwenhuys, A., Cañal-Bruland, R., & Oudejans, R. R. D. (2012). Effects of threat on police officers' shooting behavior: Anxiety, action specificity, and affective influences on perception. *Applied Cognitive Psychology*, *26* (4), 608–615. https://doi.org/10.1002/acp.2838

Nieuwenhuys, A., & Oudejans, R. R. D. (2010). Effects of anxiety on handgun shooting behavior of police officers: A pilot study.*Anxiety, Stress & Coping*, *23* (2), 225–233. https://doi.org/10.1080/10615800902977494

Nieuwenhuys, A., & Oudejans, R. R. D. (2012). Anxiety and perceptual-motor performance: Toward an integrated model of concepts, mechanisms, and processes. *Psychological Research*, *76* (6), 747–759. https://doi.org/10.1007/s00426-011-0384-x

Nieuwenhuys, A., Savelsbergh, G. J. P., & Oudejans, R. R. D. (2012). Shoot or don't shoot? Why police officers are more inclined to shoot when they are anxious. *Emotion*, *12* (4), 827–833. https://doi.org/10.1037/a0025699

Novy, M. (2012). Cognitive distortions during law enforcement shooting. *Activitas Nervosa Superior*, *54* (1), 60–66. https://doi.org/10.1007/BF03379584

Ormstad, K., Karlsson, T., Enkler, L., & Rajs, J. (1986). Patterns in sharp force fatalities—A comprehensive forensic medical study.*Journal of Forensic Sciences*, *31* (2), 12284J. https://doi.org/10.1520/JFS12284J

Oue, W., Hakoda, Y., & Onuma, N. (2008). The pointed shape of a knife influences eyewitness perception. *Asian Journal of Criminology*, *3* (2), 193–200. https://doi.org/10.1007/s11417-007-9043-y

Pallett, J., Sutherland, E., Glucksman, E., Tunnicliff, M., & Keep, J. (2014). A cross-sectional study of knife injuries at a London major trauma centre. *The Annals of The Royal College of Surgeons of England*, *96* (1), 23–26. https://doi.org/10.1308/003588414X13824511649616

Patton, C. L., & Fremouw, W. J. (2016). Examining "suicide by cop": A critical review of the literature. *Aggression and Violent Behavior*, *27*, 107–120. https://doi.org/10.1016/j.avb.2016.03.003

Payne, B. K. (2001). Prejudice and perception: The role of automatic and controlled processes in misperceiving a weapon. *Journal of Personality and Social Psychology*, *81* (2), 181–192. https://doi.org/10.1037/0022-3514.81.2.181

Peelo, M. (2006). Framing homicide narratives in newspapers: Mediated witness and the construction of virtual victimhood. *Crime, Media, Culture*, *2* (2), 159–175. https://doi.org/10.1177/1741659006065404

Police Executive Research Forum. (2015). *Re-engineering training on police use of force*. Retrieved from https://doi.org/10.1037/0022-3514.81.2.181

President's Task Force on 21st Century Policing, (2015). *Testimony of Chief Richard Beary, President of the International Association of Chiefs of Police, before the President's Taskforce on 21st Century Policing, listening session: Building trust and legitimacy*. Washington, DC: Office of Community Oriented Policing Services. Retrieved from https://cops.usdoj.gov

Preacher, K. J. (2001). Calculation for the chi-square test: An interactive calculation tool for chi-square tests of goodness of fit and independence [Computer software]. Available from http://quantpsy.org

Puzzanchera, C., Chamberlin, G., and Kang, W. (2017). *Easy access to the FBI's Supplementary Homicide Reports: 1980-2015*. Online. Retrieved from http://www.ojjdp.gov/ojstatbb/ezashr/

Quinet, K. D., Bordua, D. J., & Lassiter, W. (1997). Line of duty police deaths: A paradoxical trend in felonious homicides in the United States. *Policing and Society*, *6* (4), 283–296. https://doi.org/10.1080/10439463.1997.9964758

Reaves, B. (2011). *Census of state and local law enforcement agencies, 2008*. U.S. Department of Justice, Bureau of Justice Statistics. Retrieved from https://www.bjs.gov/content/pub/pdf/csllea08.pdf

Renden, P. G., Landman, A., Geerts, S. F., Jansen, S. E. M., Faber, G. S., Savelsbergh, G. J. P., & Oudejans, R. R. D. (2014). Effects of anxiety on the execution of police arrest and self-defense skills.*Anxiety, Stress, & Coping*, *27* (1), 100–112. https://doi.org/10.1080/10615806.2013.810213

Rennison, C. M., Jacques, S., & Berg, M. T. (2011). Weapon lethality and social distance: A national test of a social structural theory.*Justice Quarterly*, *28* (4), 576–605. https://doi.org/10.1080/07418825.2010.516006

Robinson, O. J., Vytal, K., Cornwell, B. R., & Grillon, C. (2013). The impact of anxiety upon cognition: Perspectives from human threat of shock studies. *Frontiers in Human Neuroscience*, *7*. https://doi.org/10.3389/fnhum.2013.00203

Rogde, S., Hougen, H. P., & Poulsen, K. (2000). Homicide by sharp force in two Scandinavian capitals. *Forensic Science International*, *109* (2), 135–145. https://doi.org/10.1016/S0379-0738(99)00230-3

Rosenfeld, R. (2015). Ferguson and police use of deadly force.*Missouri Law Review*, *80* (4), 1077. Retrieved from http://law.missouri.edu/lawreview/files/2016/04/11.-Rosenfeld.pdf

Ross, D. L., & Myers, J. J. (2009). Officer safety trumps passenger privacy: Arizona v. Johnson (2009). *Criminal Justice Review,34* (3), 468–481. https://doi.org/10.1177/0734016809342066

Shabbir, J., McDonnell, C., O'Sullivan, J., Cahill, K., Moore, A., Raminlagan, R., ... Grace, P. (2004). Is this a dagger I see before me? An audit of stabbings and gunshot wounds in Limerick. *Irish Journal of Medical Science*, *173* (2), 102–104. https://doi.org/10.1007/BF02914568

Sikora, A. G., & Mulvihill, M. (2002). Trends in mortality due to legal intervention in the United States, 1979 through 1997. *American Journal of Public Health*, *92* (5), 841–843. https://doi.org/10.2105/AJPH.92.5.841

Somashekhar, S., & Rich, S. (2016, January 6). Final tally: Police shot and killed 986 people in 2015. *Washington Post*. Retrieved from https://www.washingtonpost.com

Smith, B. W. (2004). Structural and organizational predictors of homicide by police. *Policing: An International Journal of Police Strategies & Management* , *27* (4), 539–557. https://doi.org/10.1108/13639510410566262

Smith, G. A. (2013). Knife-related injuries treated in United States emergency departments, 1990–2008. *The Journal of Emergency Medicine*, *45* (3), 315–323. https://doi.org/10.1016/j.jemermed.2012.11.092

Swedler, D. I., Kercher, C., Simmons, M. M., & Pollack, K. M. (2014). Occupational homicide of law enforcement officers in the US, 1996–2010.*Injury Prevention*, *20* (1), 35–40. https://doi.org/10.1136/injuryprev-2013-040799

Taff, M. L., & Boglioli, L. R. (1998). Science and politics of cutting and stabbing injuries in the USA. *Journal of Clinical Forensic Medicine*, *5* (2), 80–84. https://doi.org/10.1016/S1353-1131(98)90059-1

Tellez-Zenteno, J., Ladino, Pandya, N., & Vrbancic, M. (2013). Epilepsy and homicide. *Neuropsychiatric Disease and Treatment*, 667. https://doi.org/10.2147/NDT.S45370

Terrill, W., & Reisig, M. D. (2003). Neighborhood context and police use of force. *Journal of Research in Crime and Delinquency,40* (3), 291–321. https://doi.org/10.1177/0022427803253800

Thakur, S., Teloken, P. E., Gilfillan, I., & Sharma, S. (2013). Non-lethal? Penetrating chest injury due to beanbag bullet. *Case Reports*, *2013*. https://doi.org/10.1136/bcr-2012-008482

The Kaiser Family Foundation State Health Facts. (2017).*Population distribution by race/ethnicity, 2016* [Data file and code book]. Available from the KFF site: http://www.kff.org/other/state-indicator/distribution-by-raceethnicity/

Thoresen, S. Ø., & Rognum, T. O. (1986). Survival time and acting capability after fatal injury by sharp weapons. *Forensic Science International*, *31* (3), 181–187. https://doi.org/10.1016/0379-

0738(86)90186-6

Tueller, D. (2004). How close is too close? Retrieved from http://www.theppsc.org/Staff_Views/Tueller/How.Close.htm

U.S. Department of Justice, Office of the Inspector General. (2009).*Review of the Department of Justice's use of less-lethal weapons*. Evaluation and Inspections Division. Retrieved from https://oig.justice.gov/reports/plus/e0903/final.pdf

U.S. Sentencing Commission. (2016). Introduction, authority, and general application principles. In *Guidelines Manual* (pp. 1-53). Retrieved from http://www.ussc.gov/sites/default/files/pdf/guidelines-manual/2016/CHAPTER_1.pdf

Vassalini, M., Verzeletti, A., & De Ferrari, F. (2014). Sharp force injury fatalities: A retrospective study (1982–2012) in Brescia (Italy). *Journal of Forensic Sciences*, *59* (6), 1568–1574. https://doi.org/10.1111/1556-4029.12487

Vilke, G. M., & Chan, T. C. (2007). Less lethal technology: Medical issues. *Policing: An International Journal of Police Strategies & Management*, *30* (3), 341–357. https://doi.org/10.1108/13639510710778787

Washington Post. (2016). *2015 Police Shootings* [Data file and code book]. Available from the GitHub site: https://github.com/washingtonpost/data-police-shootings

Weaver, G. S. (2004). Violent encounters: A criminal event analysis of lethal and nonlethal outcomes. *Journal of Contemporary Criminal Justice*, *20* (4), 348–368. https://doi.org/10.1177/1043986204269381

Webb, E., Wyatt, J., Henry, J., & Busuttil, A. (1999). A comparison of fatal with non-fatal knife injuries in Edinburgh. *Forensic Science International*, *99* (3), 179–187. https://doi.org/10.1016/S0379-0738(98)00189-3

White, M. D. (2002). Identifying situational predictors of police shootings using multivariate analysis. *Policing: An International Journal of Police Strategies & Management*, *25* (4), 726–751. https://doi.org/10.1108/13639510210450659

White, M. D. (2006). Hitting the target (or not): Comparing characteristics of fatal, injurious, and noninjurious police shootings. *Police Quarterly*, *9* (3), 303–330. https://doi.org/10.1177/1098611105277199

White, M. D., & Klinger, D. (2012). Contagious fire? An empirical assessment of the problem of multi-shooter, multi-shot deadly force incidents in police work. *Crime & Delinquency* , *58* (2), 196–221. https://doi.org/10.1177/0011128708319581

Wyant, R., & Burns, T. (2014). Why we use less lethal. In R. Wyant & T. Burns, *Risk Management of Less Lethal Options* (pp. 27–42). CRC Press. https://doi.org/10.1201/b16847-3

This research was derived from work originally submitted to the Faculty of American Military University by Bruece Machacynski in partial fulfillment of the requirements for the degree of Master of Arts in September 2017 and was updated for clarity and conciseness in October 2020. The author assumes total responsibility for meeting the requirements set by United States copyright law for the inclusion of any materials that are not the author's creation or in the public domain. This paper and the research behind it would not have been possible without the support of Dr. Kevin Brannon.