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Patterns of Injury in Homicide Relationships: Clinical, Psychological, and Investigative Implications

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by

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This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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ABSTRACT

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by

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Despite accounting for only 1.3% of all violent crime, homicide still, perhaps more than ever, garners widespread fascination. It has long been recognized as a complex event characterized by variations in behavioral style, level of violence, motivation, and personal interaction. Mixed findings and methodological variation (i.e., lack of standardized method of measuring injury severity, sampling bias, varying definitions of victim-offender relationships) regarding severity of wounding and victim-offender relationship highlight the need for more empirical research. The importance of considering multiple elements of a crime when attempting to obtain a psychological understanding of victim-offender dynamics has been neglected. In an effort to respond to these shortcomings, the current study employed a series of multinomial logistic regressions to examine various demographic and offense characteristics across a nonrandom, national U.S. sample of 242 homicide cases reflecting a variety of homicide subtypes and victim-offender relationships. Findings support the assertion that severe facial wounding is associated with more intimate relationships. While additional findings suggest that variations in wounding do indeed exist between relationships and homicide types, caution should be taken by investigators due to nuanced differences related to frequency and severity of wounds.

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Chapter One

Murder is considered the most heinous of violent offenses and offenders are subject to the most extreme forms of punishment within the legal system, including death. The term *murder* can be dated back to before the 12th century and stems from Middle English *murdre* and Old English *morþor*; meaning "secret killing of a person, unlawful killing" (Online Etymology Dictionary, 2001). The term *homicide* dates back to the 13th and 14th centuries, and stems from the Latin word *homicidium; homo* meaning "man" and *cidium* meaning "to kill" (Online Etymology Dictionary, 2001). Murder – often used interchangeably with the word homicide – is defined by the United States Department of Justice (2016) as "the willful (non-negligent) killing of one human being by another."

Some forms of homicide are considered justifiable or excusable; as in the case of war, in defending one's life, or as the result of an accident. In the case of manslaughter, a term that originated in the 14th century, the unlawfulness of the act remains, but the actor is considered less culpable than in the case of criminal homicide (Flowers, 2013). For instance, if a person's negligence results in the death of another person, it would be considered involuntary manslaughter. On the other hand, if a person is killed in the heat of the moment, without premeditation or malice, the offender may be charged with voluntary (non-negligent) manslaughter (Flowers, 2013). The following discussion focuses on criminal homicide as defined by the U.S. Department of Justice, and encompasses both murder and voluntary manslaughter.

Despite accounting for only 1.3% of all violent crime (U.S. Department of Justice, 2016), homicide is still, perhaps more than ever, a phenomenon that garners widespread fascination and has long been recognized as a complex event often characterized by variations in behavioral

style, level of violence, motivation, and personal interaction. Violent crime in general, and homicide in particular, is said to be a social event through which the relationship between two or more people determines how the violence ensues (Silverman & Mukherjee, 1987). As the first known homicide, the biblical story of Cain and Abel contains many of the elements of a typical homicide as we understand it today (Schlesinger, 2004). It is suggested that Cain's anger and jealousy as a result of God's preference for his brother led him to murder. Moreover, it would seem that the killing was preceded by some kind of verbal exchange, possibly an argument; and that "Cain rose up" suggests the murder itself may have been the result of an explosive attack (Schlesinger, 2004). Indeed, research and national crime statistics have long indicated that most people are killed by someone they know (family member, friend, intimate partner, or acquaintance), and the killing is often the result of an argument (U.S. Department of Justice, 2016; Miethe & Regoeczi, 2004).

Integral to the investigation and scientific study of homicide since the 1930s are the Uniform Crime Reports (UCR) provided to the public by the U.S. Department of Justice. In line with the historic trends of the last century, the UCR indicates that the majority of homicide victims and offenders are young adult, black males who are casual acquaintances or strangers (U.S. Department of Justice, 2016). Female victims of homicide are typically intimate or former intimate partners of male perpetrators (U.S. Department of Justice, 2016; Thomas, Dichter, & Matjkowski, 2011). Most homicides consist of a single offender and single victim, and homicides involving multiple offenders or multiple victims are a rarity (Bureau of Justice Statistics, 2005; U.S. Department of Justice, 2016).

In 2015, approximately 21% of reported homicide victims were female (U.S. Department of Justice, 2016), and approximately 80% of all homicides whereby the circumstances could be

verified in 2015 were committed by someone with whom the victim was familiar (e.g., current or former intimate partner, family member, friend, acquaintance, co-worker, etc.). Estimates contend that approximately 5% of male murder victims were killed by an intimate or former partner (spouse, ex-spouse, same-sex partner, boyfriend or girlfriend), whereas nearly half of female homicide victims were killed by an intimate partner (Cooper & Smith, 2011). Indeed, women are believed to be nine times more likely to be killed by an intimate partner than by a stranger (Campbell, Glass, Sharps, Laughon, & Bloom, 2007), a trend that has been found throughout the scientific literature dating back 60 years (Wolfgang, 1958).

A Closer Look at Offense and Offender Characteristics

While the above cited statistics indicate a person is more likely to be killed by someone they know, homicide investigators and researchers have long explored ways of further refining methods of identifying potential perpetrators by examining crime scene behavior. To that end, one area of homicide research suggests that location of wounds, severity of wounds, and the weapon used to inflict injury or cause death may be valuable indicators of victim-offender relationship and may vary depending on the type of homicide (Douglas, Burgess, Burgess, & Ressler, 2006; Ressler, Burgess, & Douglas, 1992).

National crime statistics indicate that 72% of all homicides in 2015 were committed with firearms (U.S. Department of Justice, 2016). “Other dangerous weapons” (e.g., blunt objects) were used in 12.4% of cases, knives and cutting instruments were used in 11.5% of homicides, and personal weapons (e.g., hands, fists, or feet) in 4.5% of cases. However, not all homicides follow national trends, and a large body of literature finds that violence inflicted upon a victim could be critical in classifying a crime (Douglas et al., 2006) and the way that violence is inflicted may vary depending on victim-offender relationship and/or type of crime (Thomas,

Dichter, & Matjowski, 2011). For instance, Douglas and colleagues (2006) state that, “Generally, the more evidence there is of overkill, the closer the relationship is between the victim and offender” (p. 39). Similarly, it has been postulated that more intense interpersonal bonds result in more impulsive and emotional homicides characterized by increased violence (Gillies, 1976).

Despite the implied association between wounding severity and victim-offender relationship, findings from empirically-based research suggest this association is complex, and extreme violence and emotional elements may or may not exist regardless of relationship. In a study of attempted murder, Fritzon and Ridgeway (2001) found variations in the intensity of violence based on victim resistance. In other words, more resistance was associated with a more violent attack and had little to do with the victim-offender relationship. Conversely, Douglas et al. (2006) posit that a close-range, personalized attack (e.g., stabbing, beating, or strangulation) may be reminiscent of sexual or domestic homicides, whereby the offender may be a complete stranger or an intimate partner. Indeed, Safarik, Jarvis, and Nussbaum (2002) and Safarik and Jarvis (2005) examined 128 sexual homicides of elderly females, whereby the relationship between the victim and offender were classified as stranger or acquaintance. Strangulation was the most common cause of death and injuries sustained were most often caused by hands, fists, and feet. Using a standardized method of rating injury severity, the researchers found that a large number of the cases examined across both relationship categories exhibited excessive and brutal injuries beyond that which was necessary to commit the murder, thereby making injury severity a poor predictor of victim-offender relationship in their particular sample. Accordingly, the type of homicide (sexual), and perhaps victim characteristics (elderly females), may be important variables to consider.

In a study of 57 homicides in Florida, Drawdy and Myers (2004) studied the correlations between victim-offender relationship and three independent variables: motive, weapon choice and number of injuries. The researchers operationalized relationship as "primary" (e.g., family, friends, spouses), or "secondary" (e.g., acquaintances and strangers). Injury was operationalized dichotomously as consisting of a single wound or multiple wounds, and weapons were operationalized as "firearm," "contact weapon" (e.g., hands, feet, blunt object, or knife), or "combination." Arguments were found to be the main motive significantly more often among primary relationship homicides, but no associations emerged regarding weapon choice or number of injuries and victim-offender relationship. This study was limited by a small sample size.

In a recent study of 123 single-victim, single-offender homicides in Cincinnati, Trojan and Krull (2012) operationalized injury severity as being indicated by the number of wounds inflicted. They hypothesized that variations in frequency and location of wounds occurring during a homicide would depend upon the intimacy of the victim-offender relationship (stranger/just met, acquaintance, friend/family, and intimate). While the overall frequency of wounds did not differ between relationship categories, injuries to the face and head were found to occur significantly more frequently in the intimate and family/friend categories. The researchers additionally found that a weapon from the scene differentiated intimate relationships from all other relationships, and manual violence in conjunction with head and face injuries appeared to differentiate intimate and family/friend relationships from strangers and acquaintances.

Some researchers have suggested that the presence and degree of facial injury may hold significant psychological meaning, and therefore may be a useful indicator of victim-offender relationship (Douglas et al., 2006; Salfati & Canter, 1999; Trojan & Krull, 2012). While facial

injury is mentioned often in the literature as one of many important indicators of a close relationship, there is a shortage of research exploring facial injury specifically and its various implications. This is especially important because the presence of facial injury may be a crime scene behavior guiding intuitive assumptions concerning the trajectory of an investigation. Indeed, facial injury may be presented in many ways and to varying degrees (e.g., stab wounds, blunt trauma, deliberate mutilation, and gunshot wounds). Some researchers postulate that severe facial injury may indicate depersonalization (symbolic destruction of who a person is through destruction of the face), or may simply be a method employed to hinder identification of the victim (Douglas et al., 2006; Salfati & Canter, 1999).

Mixed findings and methodological variation (i.e., lack of standardized method of measuring injury severity, sampling bias, varying definitions of victim-offender relationships, and small sample sizes) in the literature regarding severity of wounding and victim-offender relationship highlight the need for more empirical research in this area and underscore the importance of looking at multiple elements of a crime when attempting to obtain a psychological understanding of victim-offender dynamics (Salfati, 2003). While the psychological, medical, and criminological communities have extensively explored the prevalence rates of victim, offender, and offense characteristics, very few have specifically explored variations in wounding patterns and associated crime scene behaviors across victim-offender relationship and type of homicide (Trojan & Krull, 2012).

In an effort to shed more empirically supported light on this area of research, the current study aimed to address the following research questions: 1) Does overall injury severity (i.e., level of violence) differ between types of homicide and/or between victim-offender relationships? 2) Does the severity of facial injury differ between victim-offender relationships?

And finally, 3) do varying types of homicide and different victim-offender relationships differ in terms of cause of death and whether or not the weapon used was brought to the scene? To answer these questions a series of multinomial logistic regressions were carried out on an archival, nonrandom, national sample of 242 homicide case files. Independent variables were victim/offender demographic characteristics (age, gender, race) and offense characteristics (cause of death, facial injury severity, general homicide injury severity, and whether the weapon was one of opportunity). The dependent variables were type of homicide (sexual, felony, or domestic) and victim-offender relationship (strangers, acquaintances, or close/intimate).

Several features of the dataset and research design employed in this study were implemented to address many of the difficulties associated with conducting empirical research on the nature and level of violence in homicide events. For instance, previous research has cited limitations related to sample size, operationalization of victim-offender relationship, and operationalization of injury severity. The use of a relatively large sample in the current study allows for the use of inferential statistics, so that the results of this study provide additional information over that typically found in exploratory and descriptive work. Moreover, the current study utilizes standardized measures of injury severity rather than the subjective assessment utilized in previous studies; thereby lending validity and reliability to comparisons. While previous studies have explored the nature and level of violence with respect to victim-offender relationship, none have explored such characteristics across homicide subtypes. The current study includes a comparison of sexual, general felony, and domestic (intimate partner) homicides as well as comparisons across victim-offender relationships.

Despite the current study's effort to overcome the methodological limitations of previous research, the nature of archival data involves a number of difficulties and limitations. At the

forefront of these difficulties is that there is no universal standard for collecting the data contained in homicide case files. Therefore, there are inconsistencies across cases as to the extent and nature of the data contained therein. Another limitation is that the samples obtained are nonrandom and therefore limited in their generalizability. Efforts were made to conduct comparisons with the existing literature where available. Similarly, the relative rarity of sexual homicides, the tendency for some cases to fit into more than one subtype, and difficulties inherent to categorizing victim-offender relationship further limits their representativeness.

Despite limitations, the results of the current study have important implications for a number of practitioners. For example, homicide investigators and law enforcement agencies may implement some of the findings into existing investigative strategies based on level and nature of violence, as well as victim and offender characteristics. Researchers may incorporate some features of this study's design and coding scheme into future studies in order to address some of the difficulties noted with regard to conducting empirical research on this topic. Results pertaining to level and nature of violence could be utilized by clinical practitioners in developing or modifying risk assessment protocols during evaluations of those at risk for committing subsequent violent acts.

Chapter Two

Review of the Literature

A Brief History of Homicide in the Western World

Descriptions of criminal homicide can be found throughout history (Ramsland, 2005) and include mass murder, sexual homicide, contract killing, domestic homicide, and assassination, to name a few. The Bible provides us with the first known homicide in the story of Cain and Abel:

> Now Adam knew Eve his wife, and she conceived and bore Cain, saying, "I have gotten a man with the help of the Lord." And again, she bore his brother Abel. Now Abel was a keeper of sheep, and Cain a worker of the ground. In the course of time Cain brought to the Lord an offering of the fruit of the ground, and Abel also brought of the firstborn of his flock and of their fat portions. And the Lord had regard for Abel and his offering, but for Cain and his offering he had no regard. So Cain was very angry, and his face fell. The Lord said to Cain, "Why are you angry, and why has your face fallen? If you do well, will you not be accepted? And if you do not do well, sin is crouching at the door. Its desire is for you, but you must rule over it." Cain spoke to Abel his brother. And when they were in the field, Cain rose up against his brother Abel and killed him. Then the Lord said to Cain, "Where is Abel your brother?" He said, "I do not know; am I my brother's keeper?" (Genesis 4:1-9, English Standard Version)

The Roman Empire. According to Ramsland (2005), the Roman Empire, particularly in the first century, was characterized by corruption and aristocratic privilege that served as a catalyst for the heinous crimes of the elite (e.g., deviant sexual acts, domestic homicide, gladiatorial sport, end extreme forms of punishment for minor offenses). Power was passed down through families, and it was not uncommon for family members to kill each other to obtain

it. It was during this time period that that the services of herbologists were in high demand due to their ability to concoct highly effective poisons. Locusta was a purveyor of poison and her services are said to have enabled and maintained Nero's emperorship from 54-68 A.D. by eliminating his predecessor and potential challengers to the throne. It is believed that Nero allowed Locusta to also experiment on prisoners; however, only five deaths are confirmed to have been at her hand (Ramsland, 2005). While poison was the weapon of choice for many killers, stabbing – as in the case of Julius Caesar – was also common. Still others employed more extraordinary methods. The wealthy Zu Shenatir in Yemen during the 5th century preferred to throw young boys out of windows after luring them to his home with food and sodomizing them (Newton, 2006).

The Middle Ages. Although limited in reliability, official records from specific time periods and regions during the Middle Ages in Europe (12th to 16th century) indicate violence was often the result of insults to one's honor and feuding. Feuds referred to altercations "between rival families, competing factions, neighboring lords and their retainers, members of opposed camps in a military conflict, or between two groups that had close internal bonds for still other reasons" (Spierenburg, 2008, p. 14). According to Spierenburg (2008), murder in the Middle Ages was a predominately male-on-male event that often occurred within classes rather than between them; however, that is not to say that other forms of violent behavior refrained from crossing class boundaries (e.g., robbery, assault, or rape; Eisner, 2003). In rural areas of England, robbers and bandits committed 10-20% of homicides (Gurr, 1989). Members of the upper class largely committed planned vendetta murders, whereas it is suggested that members of the lower class committed more spontaneous murders during chance encounters; such as when a member of a rival walked into a tavern. The concept of honor played a significant role in the

perpetration of violence and manifested as seemingly ritualistic violent acts (Spierenburg, 2008). For instance, the face and head of an individual were often the targets of honor-related violent attacks because they symbolized the person and his reputation. Spierenburg (2008) reports that 30% of homicides were the result of knife wounds in England during the 13th century. Sticks, stones, and agricultural instruments accounted for the remaining 70%. The following century, however, saw a dramatic increase in the use of stabbing instruments, which accounted for 73% of killings. Knives, daggers, pikes, swords, axes, and hammers were commonly carried on one's person, and although the 15th century marked increased prohibitions on carrying weapons, they were poorly enforced.

The Early Modern Era. The late 16th and early 17th centuries (the beginning of the early modern era) marked a shift in the nature of murder as recorded by historians (Eisner, 2003; Spierenburg, 2008). The concept of honor became increasingly associated with moral values and civility rather than one's physical appearance and prowess (Spierenburg, 2008). Murder perpetrated by the elite became a rare occurrence, and was largely restricted to dueling (Eisner, 2003). Homicides were often spontaneous in nature (Gurr, 1989), and often occurred in taverns or on the street (Roth, 2009). Unpremeditated murder often involved knives and blunt instruments; however, handguns, known as "pocket dags," accounted for approximately 7% of homicides (Gurr, 1989). Accounts from the early modern era in Europe and North America describe violence under the auspices of political, ethnic, religious, and occupational bonds (Spierenburg, 2008). While such violence was largely confined to fights, when death did occur, it was often the result of a stabbing. In France and England, insults to honor, defending one's reputation, and property disputes were significant factors leading to violent encounters (Roth, 2009). Economic hardship led to the formation of bands of robbers and smugglers, and also

significantly contributed to the fear and violence of the era (Spierenburg, 2008). While smugglers primarily operated in rural regions and employed violence directed at law enforcement officials, robbers would often torture and shoot their victims and operated both in rural and urban settings. Bands often consisted of demobilized veterans who are also said to have accounted for as much as a third of homicides perpetrated in the first several decades of settlement in North America (Roth, 2009).

Colonial North America. While some knowledge about homicide is gleaned from the limited court records kept by European countries, very little reliable and substantiated information is available regarding rates and trends of violent crime in North America during the early modern era (Eisner, 2003). According to Roth (2009), while Europe began making progress in regards to establishing infrastructure and governmental organization, the North American colonies were experiencing political instability and a lack of solidarity amongst settlers. Homicide rates are estimated to have been between 100 and 500 per 100,000 people; and approximately one-third of murders during early colonial times were the result of robbery, revenge, or vigilantism (Roth, 2009). The ebb and flow of homicide rates in early America appear to coincide with political instability:

> The pattern of homicides that appeared in the early years of colonization – government-sponsored homicides, robbery murders, terrorist murders, and murders among soldiers – reappeared on subsequent frontiers in the eighteenth and nineteenth centuries. From vigilante killings of horse thieves and murders of Indian allies in the Shenandoah Valley of Virginia in 1750s and early 1760s, to robbery murders of travelers in Georgia backcountry in the 1790s, to deadly fights among soldiers in the Scioto Valley of Ohio during the War of 1812, the motives and circumstances of frontier homicides were the

> same. Wherever conflict among rival powers made it impossible to achieve political stability and to agree upon a system arbitrating legal disputes, private and government-sponsored homicides among unrelated adults were commonplace. (Roth, 2009, p. 46)

Rare, but notable, were murders containing sexual elements. Such killings accounted for many murders of women by nonrelatives (Roth, 2009). The nonlethal rape of women and children of lower social status was a frequent occurrence in Europe and North America during this time; particularly in North America where indentured servitude was prevalent and made women and children vulnerable. However, violence during nonlethal rape was often employed only as a method to control the victim. In cases of sexual homicide on the other hand, violence was often extreme and disfiguring. Roth (2009) recounts the homicide of Hannah Willix in New Hampshire whereby it was observed that her neck had been broken and her genitals had been "muche abused" (p. 55).

Roth (2009) contends that indentured servitude not only led to unspeakable physical, sexual, and psychological abuse, but is also thought to account for a significant proportion of homicides; both of masters and servants, and perpetrated by or against males and females. Homicides committed by women were rare; however, historical accounts suggest that the homicides they did commit were primarily against family members and indentured servants. The dehumanization of servants and the intense resentment toward masters are thought to have contributed: "In the mid-seventeenth century, indentured servitude was responsible for 29% of all nonfamily, nonpolitical homicides among colonists in New England, 50% in Virginia, and 67% in Maryland" (Roth, 2009, p. 57).

By the 18th century homicide rates significantly decreased as political, religious and racial solidarity increased (Roth, 2009). Manhood was no longer measured by the use of violence to

resolve disputes and protect one's honor. Instead, there grew an appreciation of the use of intelligence rather than brute force to resolve disputes (Roth, 2009). Despite the drop in overall homicide rates among European colonists, African Americans were being killed at a rate of 10-15 per 100,000 adults until the mid-18th century when rates dropped to 0-4 per 100,000 (Roth, 2009). Similar to indentured servitude, slavery sometimes resulted in the death of the slave or slave-owner. Violence was often used against slaves to punish or to deter them from resisting or running away; however such practices declined as slaves became accustomed to their way of life, and slave owners realized it was bad for business.

According to Roth (2009), the late 18th century and early 19th century saw a profound increase in homicide rates as revolutionary and civil wars broke out across Europe and North America, thereby destabilizing local and national governments. In North America during and after the American Revolution, people were often divided among issues such as slavery, the treatment of Indians, loyalties, ethnic differences and economic policy (Roth, 2009). For example, port cities saw high rates of homicide between American and foreign sailors through the War of 1812 as a result of ethnic differences. Similar to previous centuries, unification in several regions disintegrated along with law and order, and resulted in high rates of politically motivated homicides, robbery homicides, revenge killings, and vigilante killings among settlers (Roth, 2009). Concerns over protecting one's reputation led to the resurgence of dueling among public figures in North America, England, Italy, Belgium, Portugal and Ireland; however, after the murder of Alexander Hamilton in the U.S. it was made clear that dueling would result in public ostracism there (Roth, 2009; Spierenburg, 2008).

The Modern Era. The end of the War of 1812 marked a shift in the nature of violence in the United States, whereby homicide rates declined significantly in the free North and Mountain

South, but increased dramatically in the slave South and the new frontiers to the West (Roth, 2009). Although short-lived, in the North the economy and patriotism boomed. In the South and West, government instability, racial tensions, class tensions, and fights over territory led to yet more robbery homicides, killings of slaves, political homicides, property disputes, and vigilantism. According to Roth (2009) violence in the North aimed to humiliate or intimidate – not kill – and was relegated to riots, gang fights, and bare-knuckle prizefights to settle disputes or to make public statements. The use of firearms in the commission of homicide declined dramatically in the North but increased in the South. Roth (2009) suggests that this reflects a decrease in planned murders in the North and the tendency for homicides to occur impulsively or accidentally there. In the South, a number of concealed weapons laws were passed in the 1830s and 1840s acknowledging that the knives and guns people were carrying on their persons were adding to the quickness with which one would turn to homicidal violence during disputes (Cramer, 1999). Unfortunately such laws had little impact on the homicide rate at the time due to lack of enforcement.

The mid-19th century saw decreasing homicide rates paired with widespread patriotism and legitimization of government across the western world; however, the U.S. diverged from this trend (Roth, 2009). Roth (2009) explains that industrialization and immigration, the division of the North and South, the new frontier conditions of the West, and economic hardship contributed greatly to increases in homicides; especially in the previously peaceful North. While the Civil War, the Emancipation Proclamation, and the 15th Amendment giving Blacks the right to vote all led to an increase in violence between Blacks and Whites, predatory killings and murders related to petty differences and turf dominated. People once again took matters into their own hands due to a lack of confidence in the government and legal system, and they defended their pride with

violence (Roth, 2009). According to Roth (2009), a growing number of women were committing homicides against unrelated adults than in previous centuries due to their expanding roles outside of the home as laborers, prostitutes, and proprietors of taverns, brothels, and inns. Although rape-murders were rare, there was a resurgence of these homicides during this time period along with the emergence of the first serial sexual homicide offenders of young girls and women in the U.S. (Masters & Lea, 1963). While multiple murders were not uncommon in the U.S., predatory multiple murders whereby sexual elements were indicated had only been documented in Europe (Roth, 2009).

Civil War and post-Civil War America was especially violent with the formation of guerrilla groups (e.g., the Ku Klux Klan, jayhawkers, and bushwhackers) and outlaw gangs comprised of Union and Confederate soldiers and civilians who committed extraordinary numbers of mass murders, lynchings, vigilante killings, lootings, and robberies (Fellman, 1989). Some states were divided in terms of Confederate and Union support; pitching neighbors against neighbors and friends against friends (Fellman, 1989). In the post-Civil War, bipartisan South, Roth (2009) reports "an extreme sensitivity about one's standing in society, a need to dominate others, and a terror of being dominated" (p. 350). Stranger killings increased, and Roth additionally reports that homicides committed with guns increased among Blacks and Whites. For instance, gun homicides in the plantation counties of Georgia and South Carolina before the Civil War occurred at a rate of 7% for Blacks and 38% for Whites. After the war, those rates rose to 57% for Blacks and 80% for Whites.

In the West and Southwest, inter- and intraracial violence proliferated among Hispanics, Chinese, Indians, and Whites as they competed for employment, land, livestock, and civil rights (Roth, 2009). In the words of Ramsland (2005), "settling the American Wild West inspired

hundreds of cold-blooded killings, because it was difficult to keep law and order – especially when some lawmen were outright killers themselves" (p. 67). Open range cattle grazing led to sometimes deadly competition between cattlemen and shepherds, and also led to the emergence of "cattle rustling" (Gard, 1999). Mining, especially for gold, attracted multitudes of armed, single men and led to a high demand for saloons, brothels, dancing halls, and gambling halls; all of which commonly contributed to alcohol fueled quarrels and subsequent homicides (Roth, 2009). In the Wild West, the fear of being victimized by robbers, claim jumpers, cattle rustlers, bandits, Mexicans, and Indians led to a heavily armed population that tended to shoot first and ask questions later (Roth, 2009); however, robberies are thought to have only accounted for 13% of homicides (Miethe & Regoeczi, 2004).

The Gilded Age to the present. Homicide in settled regions of the U.S. evolved yet again in the last two decades of the 19th century through the turn of the 20th century (Roth, 2009). It was a time period that shaped the modern American economy and catapulted it to the forefront of the world economy through the rise of big business and capitalism, urbanization, industrialization, immigration, innovations in science and technology, and enormous railroad expansion (Calhoun, 2007). Labor violence contributed to the homicide rate as workers went on strike for better wages and improved working conditions in factories, on railroads, and in mines (McNamara, 2013). With the exception of the Chinese, homicide trends that emerged during this time period persist to this day. Homicide rates soared among groups experiencing the most discrimination and marginalization (e.g., minorities and the poor): rates among blacks surpassed those of whites in cities and industrialized towns of the North, South, and Midwest; Chinese and Hispanic rates exceeded whites and blacks in the West (particularly in Los Angeles and San Francisco); and white homicide rates dominated in the rural South (Roth, 2009). In a study

conducted in Chicago, approximately half of prison inmates convicted of murder in 1920s Chicago were black (Miethe & Regoeczi, 2004). Today, 53.3% of homicide offenders are black (United States Department of Justice, 2016).

According to Langberg (1967), homicide rates followed a steady increase that continued past World War I and peaked in 1933 at 9.7 per 100,000 people. Similar to previous centuries, and enduring today, arguments and brawls were cited as the precipitating factor leading to the majority of lethal events (Miethe & Regoeczi, 2004). Rates then declined as the end of prohibition decreased much of the gang and bootlegging-related violence; immigration quotas addressed many concerns over competition for jobs; the union movement allowed for collective bargaining and provided opportunities previously unseen for black workers; and President Roosevelt gave Americans hope for a better future (Roth, 2009). The decline endured until 1964 when rates again rose in correspondence with the Vietnam War, the Civil Rights Movement, racial integration, and the cocaine epidemic of the 1980s and 90s; whereby rates reached their highest in the 20th century at 10.7 per 100,000 (Stolinsky, 2001). Similar to previous centuries, rates and circumstances of homicide varied across regions throughout the U.S. and depended largely upon urbanization, racial tensions, economy, socioeconomic divisions, and government legitimacy (Brearley, 1932; Roth, 2009). For instance, Brearley (1932) discusses the homicide rate for the state of North Carolina between 1920 and 1924 as being 13.44 for every 100,000 people; however within the state, rates ranged from 2.02 in one rural county to 82.8 in a large city.

Scientific Study of Homicide

The early 20th century saw increasingly substantive scientific inquiry into the study of homicide after vital statistics compiled from data supplied by federal registration bureaus across

the United States were expanded and made more accessible (Brearley, 1932; Eckberg, 1995). Although the accuracy and reliability of early vital statistics data remains questionable, the formation and implementation of the Uniform Crime Reporting (UCR) Program by the International Association of Chiefs of Police (IACP) and the Federal Bureau of Investigation (FBI) in 1930 aimed to address reliability issues and provide widely accessible, uniform national statistics (United States Department of Justice, 2010). These reports outline national and local crime statistics, and provide specific details pertaining to different types of offenses (e.g., age, race, gender, circumstances, weapons used), including homicide and other felony offenses (e.g., burglary, robbery, and rape). By 1950, the UCR provided homicide data for 2,297 cities encompassing almost seventy million people (Wolfgang, 1958).

In a pioneering study of homicide using vital statistics, Brearley (1932) aimed to examine the nature and extent of homicide in the U.S. amid international and national assertions painting America as "the most lawless of civilized nations" (p. 8). Brearley (1932) found that perpetrators of homicide tended to be black, uneducated males, who were "on the average not far from thirty years of age" (p. 82). He further states that murder was less likely to be premeditated, but rather, carried out "in sudden heat and passion" (p. 72). Moreover, alcohol often played a role. While black homicide rates far surpassed those of whites due to intraracial violence, he additionally found that whites were more likely to kill blacks than vice versa. Victims of homicide were described as four times more likely to be male than female, between the ages of 15 and 44. In terms of weapon use, between 1920 and 1926, 71.5% of the 63,906 reported homicides were committed with firearms (Brearley, 1932). This was in stark contrast to other countries such as England and Australia where, in 1923, firearms were used in 10.4% and 17% of homicides

respectively. It was additionally found that firearms were slightly more likely to be used in rural settings, and were more commonly the method preferred among blacks than whites.

In an effort to further explore the etiology of homicide from a sociological perspective, Wolfgang (1958) conducted research examining the police files of 588 homicide victims and 621 homicide offenders between 1948 and 1952 in Philadelphia, whereby it was determined that the homicide rate was comparable to that of other urban cities in the U.S. Similar to the findings of Brearley (1932), black males and females exceeded white males and females as both victims and offenders of homicide despite their minority status in the population. In terms of age, Wolfgang found that offenders tended to be younger than victims, and both white and black offenders indicated the strongest proclivity for homicide between the ages of 20 and 24. Black females were more inclined to commit homicide between the ages of 25 and 34, whereas white females were split between two age groups: 20-24 and 35-39.

In partial contrast to the findings of Brearley (1932), who emphasized the robustness of shootings as the leading method of death in the state of Pennsylvania, Wolfgang (1958) found that shootings comprised only 33% of homicides in Philadelphia. To explain the disparity, he suggests that "individuals are socialized positively or negatively toward special objects, that the culture-bound personality is by race, sex, age, social class, and other gross social attributes oriented to react in amazingly uniform ways" (Wolfgang, 1958, p. 83). The leading method by which homicide was committed by black offenders was stabbing, whereas beating was the preferred method amongst white offenders. White male victims were more likely to be beaten (46.6%), whereas white females were almost equally likely to be shot (32.6%) or beaten (30.2%); and black males and females alike were more likely to be stabbed (48.3% and 41.7% respectively). Unlike Brearley (1932), Wolfgang (1958) closely examined the role of alcohol and

victim-offender relationship. Accounts of alcohol as a significant element in lethal violence date back to colonial America (Miethe & Regoeczi, 2004). Alcohol was present in either the offender only or the offender and the victim in 58% of the cases whereby the offender was black, and 47% of cases whereby the offender was white (Wolfgang, 1958). In the 550 cases whereby the victim-offender relationship was known, 65% were committed by primary contacts (e.g., close friend, family member, or intimate partner) and 35% were committed by non-primary contacts (e.g., acquaintance, stranger, sex rival or enemy).

In an effort to analyze the structure of homicide situations on a national level in the U.S. from 1976-1998, Miethe and Regoeczi (2004) used the Supplemental Homicide Report (SHR) as a part of the UCR data for 439,954 homicides. This included 73,942 from the late 1970s, 189,014 from the 1980s, and 176,998 from the 1990s. The authors were interested in finding unique combinations of victim, offender, and offense characteristics that underlie homicides. Findings indicated that univariate frequency distributions generally remained similar for victim, offender, and offense characteristics across the 3 decades; however, unique situational contexts did emerge. Two unique profiles that were more prevalent in the 70s than the 80s or 90s were females who killed male intimate partners, and juveniles who committed felony-related murder with a weapon other than a firearm. One of the unique profiles that emerged in the 1980s also involved the use of a weapon other than a firearm in felony-related murders, but was associated with male offenders in their 20s. Another unique structure in the 1980s was multiple, white, adult male offenders involved in events with victims of the same age, gender or race. While the unique profiles of the 70s and 80s accounted for only 7% of the homicides, the unique situational contexts of the 90s (e.g., the emergence of crack-cocaine and heroin) accounted for a much larger proportion of the homicides of that time period. The major distinguishing features of the

unique profiles in the 90s included juvenile offenders, the use of guns, black offenders, same gender, large city locations, non-intimates and non-family members, multiple offenders, and instrumental motives (i.e., to obtain some good via robbery, rape, burglary, or motor vehicle theft).

Miethe and Regoeczi (2004) additionally noted several trends and commonalities that prevailed throughout the time period studied. Generally speaking, offenses overwhelmingly involved black males as both victims and offenders, over three-quarters were non-strangers, most involved a single perpetrator (89%), a firearm was the most prevalent weapon of choice (66%), the crime was more likely to occur in an urban location (66%), and the motive was slightly more likely to be expressive in nature (54%; e.g., due to an argument, brawl, romantic triangle, or youth gang killing). Analyses also indicated that homicides between strangers increased from accounting for approximately one-eighth of the homicides in Wolfgang's (1958) study, to about one-fifth in the 1970s, and to almost a quarter of homicides in the 1990s. Intimate partner homicides perpetrated by females decreased; but more importantly, the authors found evidence underlining the importance of disaggregating homicide events based on victim-offender relationship. For instance, several attributes were found to be particularly unique to stranger killing profiles: instrumental motivation, use of a firearm, interracial, and male offenders. In family homicides, unique profiles overwhelmingly contained the attributes: male against male, expressive motivation, and the use of a firearm. Indeed, one of the most prevalent areas of empirical study in the criminological, sociological, and psychological homicide literature is conceptualized under the auspices of Feshbach's (1967) instrumental and expressive aggression themes.

A Theoretical Construct of Aggression

Feshbach (1967) suggested that responses to instinctual aggressive actions in infancy and childhood reinforce the way we learn to express aggression throughout our lives. For those of us who aggress toward others for the sake of harm (hostile/expressive), the pain caused in the other person is seen as rewarding; possibly arising from "its status and power implications" (p. 265). This type of aggression is often retaliatory and in response to some sort of pain – psychological or physical – being caused by or discharged (displaced) upon the person toward whom the aggression is focused. On the other hand, there are those who utilize aggression to achieve an objective, such as sex or money (instrumental). This is also a process reinforced by early experiences, but less impulsive in nature and often mediated by the consequences of the aggressive act.

Similar to Feshbach (1967), Toch (1969) and Heusmann and Eron (1989) contend that most violence and aggression is learned and strategically employed to deal with interpersonal conflicts, and by examining the histories of violent persons, similar approaches to interpersonal relationships will be found. Salfati and Canter (1999) conclude that the "interpersonal interactive strategies" that people develop through the formation of cognitive scripts early in life remain "thematically consistent across an individual's lifespan" (p. 395). This contention was in fact supported when Salfati and Canter found that instrumental and expressive interactional themes displayed through crime scene behavior were relatively consistent with offenders' interactional style prior to the homicide. More specifically, characteristics of offenders loading on the expressive theme indicated a history of relationship and emotional issues, and characteristics loading on the instrumental theme strongly indicated an extensive history of criminal activity. Indeed, crime prevention and intervention strategies differ depending upon the interactional

theme an individual exhibits (Miethe & Regoeczi, 2004). For instance, treatment targeting impulsivity and anger management aim to deter expressive crime, while job training and educational programs target the conditions that often precede instrumental crime (Miethe & Regoeczi, 2004).

Anchored in the theoretical constructs provided by Feshbach (1967) and Toch (1969), several recent studies have modeled homicide styles within the framework of the instrumental and expressive dichotomy, and have identified many crime scene behaviors and elements that tend to co-occur within particular themes and contexts. Some researchers conceptualize the motive as instrumental or expressive, while others conceptualize individual crime scene behaviors as being instrumental or expressive. Either way, "it is often assumed that instrumental and expressive crimes are unique in the characteristics of their offenders, victims, and situational elements" (Miethe & Regoeczi, 2004, p. 102). In terms of the crime and motivation, Miethe and Regoeczi (2004) were able to distinguish homicide situations unique to expressive or instrumental motives based on victim-offender relationship, the offender's age, number of offenders, intrasex relations, intraracial relations, and the offender's gender. For instance, stranger relationships were found in two-thirds of instrumental homicide situations, but were nonexistent in expressive homicide situations. In comparison to instrumental situations, expressive homicide situations were over-represented by offenders in their 30s (77% vs. 18%), intraracial attacks (99.8% vs. 74%), and involving nonstrangers (100% vs. 35%).

In an effort to illustrate that thematic distinctions could be made regarding instrumental and expressive crime scene behaviors, Salfati and Canter (1999) identified three crime scene themes: 1) Expressive (impulsive): characterized by multiple, frenzied wounds, bringing a weapon or using a weapon at the scene, many different types of wounds, and injuries to the face;

2) Instrumental (opportunistic): characterized by opportunistic victims (e.g., women and the elderly), manually inflicted injury to the neck, concealing the face, indications of a sexual element, and centered around property being taken; and 3) Instrumental (cognitive): characterized by attempts to hide the body and/or destroy evidence. After correctly classifying 65% of the cases, the largest proportion fell into the expressive category. With a larger sample and more extensive data, Salfati (2000; 2003) studied expressive and instrumental themes in an analysis of 36 crime scene behaviors. Expressive scenes were characterized by excessive wounds to specific areas of the body (e.g. face and torso), a weapon being brought to the scene, and hiding or moving the body. In instrumental scenes, manual and neck wounding, and weapon of opportunity occurred more frequently than other variables.

In an effort to expand upon the argument that certain behaviors indicate more expressive aggression and that expressive violence is more likely to occur in homicides where there is a close personal relationship, Last and Fritzon (2005) examined the crime scene behaviors of 27 intrafamilial, 30 acquaintance, and 27 stranger homicide offenders. The majority of the sample was diagnosed with a primary or secondary psychotic disorder, followed by personality disorders and mood disorders. Major findings indicate that the "high" expressiveness category was almost primarily made up of intrafamilial cases and was characterized by no weapon/weapon from the scene, facial injuries, excessive and multiple wounds, a lack of post-mortem activity, and manual violence. The "low" category was primarily comprised of acquaintance and stranger cases and was characterized by a weapon being brought to the scene, minimal wounding, no facial injuries or manual violence, manipulation of or injury to the body post-mortem, and single wounds to body parts. Furthermore, it was found that the two most significant variables differentiating the relationship categories were use of a weapon and location of wounds.

Limitations to expressive/instrumental themes. Expressive aggression can be said to be a violent, impulsive attack against the person, with strong indications of a close personal relationship; and instrumental aggression is often characterized by minimal violence, extensive offender criminal histories, and aggression as a means to obtaining something like sex or property. However, despite the dichotomous nature of these thematic constructs, not all homicides fit neatly into either category. For instance, to further develop knowledge regarding the interaction between victim and offender, and look more closely at the victim-offender relationship, Fritzon and Garbutt (2001) utilized four thematic modes in the study of intrafamilial homicide: instrumental object, instrumental person, expressive person, and expressive object. These authors found that most uxoricides (the killing of one's wife) fit into the expressive object mode, whereby the victim is an object upon which the offender acts out his frustration. On the other hand, they found that approximately half of mariticides (the killing of one's husband) fit into the instrumental person mode, whereby the victim is a means to an end and the crime scene indicates more planning. Indeed, many intimate partner violence studies indicate that women who kill their partners often do so to end abuse against themselves (Campbell et al., 2007).

In a study of three groups of offenders (non-violent, reactive, and instrumental), Cornell et al. (1996) found that criminal offenders do not necessarily exhibit exclusively instrumental or reactive (expressive) characteristics, and most violent crime is reactive in nature. Indeed, research has substantiated that there are several expressive behaviors that occur in otherwise predominantly instrumental themes, and when all delineations between themes are removed, variable frequencies indicate that expressive behaviors occur much more frequently across all cases than instrumental behaviors (Salfati, 2003). Salfati (2000) further postulates that due to the high frequency of several expressive variables in all cases, her findings support the contention

that expressive elements exist in the majority of homicides. She also cautions that when taken out of context and not as one of a group of associated behaviors, some of the behaviors on their own could be misclassified. One such behavior, facial injury, is considered by several researchers to be an expressive behavior that is inferred to hold meaning in regards to the level intimacy between the victim and offender, but may also be indicative of violence used instrumentally to incapacitate or control a victim (Douglas et al., 2006; Salfati & Canter, 1999; Trojan & Krull, 2012).

In summary, empirical findings from the instrumental/expressive literature suggest that a close victim-offender relationship may be indicated by expressive crime scene behaviors such as excessive wounding, injuries to the face, and a weapon of opportunity (Last & Fritzon, 2005; Trojan & Krull, 2012; Salfati, 2003); however, the practical application of such a classification system remains unknown due to the prevalence of expressive behaviors across many homicide situations and a variety of victim-offender relationships. Moreover, it could be argued that all aggressive behavior is instrumental because "it is an attempt to achieve what people value" (Felson, 1993, p. 104). Therefore, it may be of more practical value to examine victim, offender, and offense characteristics in the context of subtypes of homicide which also encompass different victim-offender relationships. Indeed, some authors contend that violence inflicted upon a victim is critical in classifying a crime (Douglas et al., 2006) and may vary depending on victim-offender relationship and/or type of crime (Thomas, Dichter, & Matjowski, 2011).

Homicide Subtypes

Intimate partner homicide. Intimate partner homicide is defined as the willful killing of a person who was a spouse, ex-spouse, boyfriend, girlfriend, former boyfriend/girlfriend, live-in partner, or former live-in partner of the offender (Astion & O'Brien, 2009). The intimate partner

homicide (IPH) researchers contend that the dynamics of IPH differ from other types of homicide (Campbell, Glass, Sharps, Laughon, & Bloom, 2007); thereby underscoring the importance of delineations between types of homicide as well as between victim-offender relationships. A number of studies of intimate partner violence (IPV) have identified several risk factors associated with IPH. In reviewing the literature on IPH, Campbell and colleagues (2007) identify a history of domestic violence as the primary risk factor followed by gun availability, a history of estrangement, previous nonfatal strangulation, forced sex, stalking, and alcohol or drug use.

Weapon use. National crime statistics indicate that 72% of all homicides in 2015 were committed with firearms (U.S. Department of Justice, 2016). Knives and cutting instruments were used in 11.5% of homicides, "other dangerous weapons" in 12.4% of cases, and personal weapons (e.g., hands, fists, or feet) in 4.5% of cases. In a study examining data collected over a 28-year period from 1980 to 2008, Cooper and Smith (2011) reported that the trends found in intimate partner homicides are similar to U.S. national trends, with firearms accounting for over two-thirds of murders. Indeed, the availability of a firearm in domestic violence situations is found to increase risk of homicide almost 500% (Campbell et al., 2007; Campbell et al., 2016; Mercy & Saltzman, 1989). Early research findings additionally indicate that in the homicides of spouses from 1976-1985, men were more likely to be killed by stabbing and women were more likely to be bludgeoned with an object or beaten with fists, hands, or feet when the mechanism of death was not a firearm (Cooper & Smith, 2011).

It is important to note that these trends may vary depending upon the availability of guns across states and countries. Roof (2011) reports that in New York State in 2010 – where guns are difficult to obtain legally – blunt instruments, knives, and other cutting instruments were used in

40% of IPHs, whereas guns were used in 32% of cases. Silverman and Mukherjee (1987) examined homicides and victim-offender relationships in a Canadian sample whereby they found that stabbing and beating were the most common causes of death except when the intimate relationship reflected divorce or separation. National trends in that country indicate stabbing then shooting as the most common causes of death in homicide. In a comparison of 71 intimate partner (IP) homicides to 291 non-intimate partner (non-IP) homicides in Indiana, Thomas et al. (2011) found that weapon choice was more variable for IP offenders. Non-IP offenders were significantly more likely to use a firearm (69% vs. 48%), whereas IP offenders were significantly more likely to strangle or suffocate their victims (22.4% vs. 7%). They additionally found that 27% of IP offenders versus 18% of non-IP offenders used sharp objects, and only 10% of IP offenders bludgeoned their victims with an object or fists versus 17% of non-IP offenders.

In a related study conducted by Trojan and Krull (2012), findings indicate that current or former intimate partners are significantly less likely to be shot than victims from other relational categories (e.g., stranger/just met, acquaintance, family/friend), thereby underscoring the importance of delineating between type of homicide rather than closeness of relationship. Moreover, stabbings and manual violence were significantly more likely to occur among intimates than non-intimates. The authors additionally explored impulsivity by coding whether a weapon was brought to the scene or used from the scene. Findings suggest that offenders known to the victim were more likely to use a weapon of opportunity (34.1%) than strangers (13.3%). When the authors collapsed victim-offender relationship into “intimate” and “nonintimate,” a weapon of opportunity was indicated in 72.2% of intimate cases as opposed to only 20.2% of nonintimate cases.

Location and severity of wounding. In an early study of victim-offender relationship and injury severity, Heller, Ehrlich, and Lester (1983) found that death or serious bodily injury was significantly more likely to occur when the victim and offender were family members or intimates. In a review of the medical and dental records of 364 female patients, Arosarena, Frirsch, Hsueh, Aynehchi, and Haug (2009) found that domestic assault was the third leading cause of facial injury. Indeed, injuries sustained to the head, neck, and face (HNF) have been identified as the most common locations of intimate partner related violence and are most often caused by blunt force (e.g., fist or object) or strangulation (Curca, Dermengiu, & Hostiuc, 2012; Sheridan & Nash, 2007).

According to Douglas and colleagues (2006), when extensive facial battery is present along with other extensive injuries, a close relationship and depersonalization may be indicated. With 74% of their sample composed of victims and offenders who knew each other, Salfati and Canter (1999) propose that severe injury to the face could be indicative of hindering identification or further objectifying the victim out of shame. Additionally, facial injury might symbolize the emotional meaning the victim has for the offender, and therefore destruction of the face symbolizes destruction of the person, otherwise known as depersonalization (Douglas et al., 2006; Salfati & Canter, 1999). Indeed, Trojan and Krull (2012) found that injury to the face was one of several factors significantly differentiating intimate from nonintimate homicides in their study.

Sexual homicide. Despite its rarity (Meloy, 2000), sexual homicide, both single and serial, provokes unmatched fear and intrigue due to its heinous and seemingly motiveless nature (Ressler, Burgess, & Douglas, 1992). One of the problems central to the study of sexual homicide is variation in the way researchers define it and ambiguity in definitions (Schlesinger,

2004). Inquiry into the subject dates back to the seminal work of German psychiatrist, Richard von Krafft-Ebing, in *Psychopathia Sexualis*; a text originally published in 1886. Krafft-Ebing (1903/1965) intricately described single- and multiple-victim offenders deriving sexual gratification from various acts of brutality including mutilation, cannibalism, and other ritualistic behaviors. He recounts a case from 1895 of Vacher the Ripper who was found guilty of eleven murders in which he strangled, eviscerated, and mutilated the genitals of his victims. Upon apprehension, Vacher additionally admitted to having sexual intercourse with some of his victims after death. Krafft-Ebing further describes "lust murder" as the culmination of the association between lust and cruelty:

> When the association of lust and cruelty is present, not only does the lustful emotion awaken the impulse to cruelty, but *vice versa*; cruel ideas and acts of cruelty cause sexual excitement, and in this way are used by perverse individuals. (p. 57)

Brittain (1970) and Grubin (1994) differentiated between sexually motivated murder and sexual murder that is committed during the course of a sexual assault. According to Burgess, Hartman, Ressler, Douglas, and McCormack (1986) sexual homicide is the killing of a person "in the context of power, control, sexuality, and aggressive brutality" (p. 252). Ressler et al. (1992) describe sexual homicide as "murders with evidence or observations that indicate that the murder was sexual in nature" (p. xiii). Such observations include state of the victim's attire (e.g., pants pulled down), exposure of sexual body parts (e.g., breasts or genitals), and the insertion of foreign objects (e.g., a branch inserted into the rectum or vagina). Schlesinger (2004) describes sexual homicide as "motivated primarily by a breakthrough of underlying sexual conflicts or where the killing itself is sexually gratifying" (p. 1). Douglas and colleagues (2006) differentiate

between sexual homicide and sadistic sexual homicide. Sexual homicide "involves a sexual element (activity) as the basis in the sequence of acts leading to death" (p. 212), whereas sadistic sexual homicide refers to sexual gratification achieved "from torture involving excessive mental and physical means" (p. 227). The former may involve pre- or post-mortem intercourse, or "symbolic sexual assault" (the insertion of foreign objects), whereas the latter is said to involve sadistic sexual fantasies whereby "sexual acts are paired with domination, degradation, and violence are translated into criminal action that results in death" (p. 227).

While Krafft-Ebing's work paved the way for early inquiry into sexual homicide, the field of forensic psychiatry paved the way for contemporary research and understanding of the personalities and behaviors of such offenders. DeRiver (1958) discussed the role of sexual sadism as an integral factor in the commission of many sexual homicides, and further suggested torture and genital mutilation as behaviors often exhibited in such murders. Sexual sadism is defined as "…acts (real or imagined) in which the psychological or physical suffering (including humiliation) of the victim is sexually exciting to the person" (American Psychiatric Association, 2000). Revitch (1957) highlighted the role of violent sexual fantasies combined with factors such as resentment towards women and sexual preoccupation. He further suggested that the attack itself may be a substitute for overt sexual acts such as intercourse or ejaculation (Revitch, 1965). Brittain's (1970) description of the sadistic murderer suggests an introspective individual and echoes the integral role of a rich, sadistic sexual fantasy life. He further contends that such individuals tend to be narcissistic, have very few meaningful social relationships, may be regarded as "strange" by others, are often of substantial intelligence, and usually lack a criminal record.

Prevalence. There is no data collected in the United States on sexual homicide, and therefore the base rate of such homicides remains unknown (Meloy, 2000; Schlesinger, 2004). Some researchers have utilized indirect methods to estimate the prevalence of sexual homicide (i.e., calculating percentage based on homicides classified as "unknown," "other sex offenses," "rape," or "prostitution"), suggesting that sexual homicide accounts for less than 1% of all homicides (Meloy, 2000). However, such methods are questionable and vulnerable to the definitional problems outlined above. For instance, if a sexual homicide is one in which the act of killing is sexually gratifying, then including the category "rape" in calculating base rate may contain homicides in which the killing was to silence the victim, thereby inflating the actual occurrence of sexual homicide.

The Federal Bureau of Investigation's (FBI) Behavioral Science Unit (BSU) undertook the first empirical examination of 36 single and serial sexual homicide offenders in a pioneering study conducted between 1979 and 1983 (Burgess et al., 1986; Ressler, Burgess, Douglas, Hartman, & D'Agostino, 1986). The basis of the study was to empirically explore crime scene behaviors that could thereby provide information regarding offender characteristics, or "profiles;" an undertaking that had begun on an informal basis in the 1970s in an effort to address the growing number of seemingly "motiveless" homicides being reported (Burgess et al., 1986). Despite the foundation provided by this study, research has been limited by a lack of agreement in the terminology used to describe and define sexual homicide (Ressler et al., 1992; Schlesinger, 2004), deficient official statistics (Meloy, 2000; Ressler et al., 1992; Schlesinger, 2004), difficulties in differentiating sexual homicide from other types of homicide (MacDonald, 1971; Schlesinger, 2004), and problematic research methodology (Busch & Cavanagh, 1986).

Classification of sexual homicide.

FBI typology. At the forefront in the classification of sexual homicide offenders is the FBI's Behavioral Science Unit. Formulated from years of experience and subsequent exploratory research, agents at the BSU developed the organized/disorganized/mixed typology based on facts about the crime and the crime scene behaviors of offenders (Douglas et al., 2006; Ressler et al., 1992). The basis for classification is that "facets of the criminal's personality are evident in his offense" (Ressler et al., 1986, p. 291).

According to Ressler and colleagues (1992), the organized offender tends to be of above average intelligence, is socially proficient, and often lives with a significant other. The personalities of organized offenders are often characterized as antisocial, psychopathic, or narcissistic (Schlesinger, 2004). The crime scene of the organized offender often reflects his intelligence in that it is methodical and indicates careful planning and control. A stranger is often targeted, and although he or she may appear to be a victim of opportunity, they are carefully selected based upon certain criteria such as age, appearance, occupation, or life-style. Because of his social competence and non-threatening appearance, the offender may attempt to manipulate the victim through conversation as a "verbal means to capture the victim rather than physical force" (Ressler et al., 1992, p. 123).

In contrast, Ressler and colleagues (1992) describe the disorganized offender as being of lower intelligence and coming from a family whereby he experienced harsh discipline as a child. He has a poor work history and is socially awkward and inadequate. He tends to live with family or alone, is most likely sexually inexperienced, and may even find sexual acts aversive. Schlesinger (2004) contends that the disorganized offender is more likely to be mentally unstable and may have schizoid, schizotypal, schizophrenic, or borderline personality characteristics. The

disorganized crime scene "shows great disarray; it has a spontaneous, symbolic, unplanned quality" (Ressler et al., 1992, p. 131). The victim of the disorganized offender may be someone he knows and is not chosen with forethought. Control of the victim is often achieved through a blitz-style, violent attack. The victim is often killed quickly, thereby making restraints unnecessary. The crime scene itself may be wrought with forensic evidence such as footprints, fingerprints, bite marks, saliva, and semen. There is usually no attempt to move or hide the body, but if mutilation is present, the body may be positioned in a personally meaningful way to the offender.

The mixed type of offender may reflect both organized and disorganized characteristics. In fact, many offenders fall into this category since a variety of factors may influence the offender's behavior during the course of a sexual homicide event. According to Douglas and colleagues (2006), a mixed crime scene may reflect more than one offender, the youthfulness of the offender, an inability of an otherwise organized offender to control the victim, or the use of drugs or alcohol. Despite the widespread utilization of the FBI's typology, it has been the focus of several criticisms in terms of the methodology used in the development of the organized/disorganized typology (e.g., small sample size based primarily on serial homicide offenders), its applicability to other types of offenders, and its validity (Chan & Heide, 2009).

Other typologies. Since the development of the FBI's sexual homicide offender typology, several researchers have proposed their own classifications encompassing sexual murder in general and sexual murder of specific victim types (Chan & Heide, 2009). Schlesinger (2004) suggests that sexual homicides can be classified as *catathymic* (acute or chronic) or *compulsive.* Acute catathymic sexual homicide refers to an event whereby the offender, who struggles with deep-rooted feelings of sexual inadequacy, resorts to violence after having their adequacy or

sexuality challenged by the victim or the person for whom the victim is a substitute (e.g., the offender's mother). The event is sudden and unplanned, and results in the release of emotional tension after which the offender is able to reestablish psychic homeostasis. The victim is often a stranger, the scene is excessively violent and reflects a lack of planning, and there may be evidence of necrophilia and dismemberment. Chronic catathymic homicides are planned events that consist of three stages: 1) Incubation: the offender becomes depressed and fixated on the future victim, and suicidal thoughts become homicidal and intensify; 2) Violent act; and 3) Feeling of relief: after the emotional tension is released by the violent act, the offender often feels relief; however, he may be horrified by what he has done and residual conflicts may lead to suicide or attempted suicide (Schlesinger, 2004). The victims in this type of homicide are often well-known to the offender, may have been stalked prior to the event, and may have symbolic meaning (e.g., symbol of purity). Sexual activity and postmortem sexual behavior are rare. The crime scene may be violent, but less disorganized than in acute catathymic homicides.

Compulsive offenders are motivated to commit homicide by an internal drive that often involves deviant sexual fantasies and sexual gratification through acts of aggression (Schlesinger, 2004). Sexual elements may not be overt, but rather manifest as sadistic behaviors such as torture, humiliation, and degradation of the victim. Schlesinger (2004) contends that compulsive offenders lie on a continuum whereby on one end lie meticulously planned murders, and on the other end lay impulsive, unplanned murders. The personality and psychopathology of the offender determines where upon the continuum they lie. Planned compulsive murderers almost always engage in some type of sexual activity at the scene, often engage in ritualistic behavior, and often repeat their crime due to their ability to elude law enforcement. The victim in

planned compulsive homicides is often a stranger, and in unplanned homicides, a victim of opportunity.

Beauregard and Proulx (2002) proffer a simple typology of nonserial sexual murderers of adult women consisting of two categories: sadistic and anger. Using cluster analysis with 36 sexual homicide offenders, sadistic sexual murders were found to be premeditated attacks on strangers or targeted victims, and involved the use of physical restraints, verbal abuse, humiliation, and mutilation. The crime often lasted more than 30 minutes, and a different site was used for body disposal. The anger-sexual murder was found to last less than 30 minutes, involved a victim of opportunity, and the body was left at the crime scene. Physical restraints were often used, and the crime often involved mutilation. The sadistic sexual murderer closely resembles the FBI's organized offender, whereas the anger-sexual murderer closely resembles the FBI's disorganized offender (Chan & Heide, 2009).

Offenders and offense characteristics. Sexual homicide offenders are typically white, male, and between the ages of 18 and 39 (Flowers, 2013). According to Meloy (2000), they tend to select female victims who are casual acquaintances or strangers.

Weapon. In contrast to nonsexual homicides, sexual homicides rarely involve the use of firearms (Langevin, Ben-Aron, Wright, Marchese, & Handy, 1988). Sexual homicide offenders are said to prefer a "hands-on," close-in method of killing (Brittain, 1970; Chan & Heide, 2008; Douglas et al., 2006). Langevin et al. (1988) found that sex killers were more likely to stab, strangle, or beat their victims to death. Harbot and Mokros (2001) studied 22 sexual murderers in Germany and found that 49% asphyxiated their victims manually or with a ligature, 23% bludgeoned their victims, and 23% stabbed their victims. When weapons are used, organized crime scenes frequently indicate a weapon being brought to the scene, whereas disorganized

crime scenes indicate the use of a weapon of opportunity found at the crime scene (Ressler et al., 1992). Some researchers have examined weapon use within the context of victim type; however, such research is negligible, and some contradictory evidence exists (Chan & Heide, 2009). For example, Fox and Levin (1991) found that firearms were the leading weapon of choice among elderly female homicide victims, while Safarik, Jarvis and Nussbaum (2002) found the use of firearms in only 1% of cases. In examining sexual murders of children, strangulation was the leading method of killing (Beauregard, Stone, Proulx, & Michaud, 2008); and in a study of ten sexual murders of adult men, weapons were used in eight of the cases (Beauregard & Proulx, 2007).

Location and severity of injury. Due to problems of definition, small sample sizes, and a lack of consistent delineation between single and serial offenders, research is limited in providing clear and consistent empirical evidence as to the nature of injuries sustained in sexual homicides. According to Ressler et al. (1992), restraints may be used by sexual homicide offenders and there is often evidence of torture. Depersonalization in the form of actions taken to conceal the personal identity of the victim is sometimes evident, and sexually sadistic acts (e.g., mutilation, defecation, and evisceration) are often performed post-mortem (Ressler et al., 1992). There may be excessive injuries, particularly to the face. Similar to intimate partner homicides, excessive facial injury may indicate an attempt to dehumanize the victim, or may reflect depersonalization in that the victim is or represents someone the offender knows (Ressler et al., 1992).

Felony homicide. In 2015, 23.1% of homicides in the U.S. occurred during the commission of another felony such as a burglary, robbery, rape, motor vehicle theft, larceny, arson, violation of narcotic drug laws, or gambling (U.S. Department of Justice, 2016).

According to the Uniform Crime Reports (U.S. Department of Justice, 2016), of the 1,094 felony murders in 2015 whereby victim-offender relationship was known, 38% were committed by stranger and 43% were committed by an acquaintance. Guns were used in 75% of felony murders, followed by knives and other cutting instruments (11.8%). Robbery and drugs accounted for the majority of felonies during which homicides were committed (40.4% and 21.4% respectively; U.S. Department of Justice, 2016)

Felony murder typology. In the "motivational spectrum" proposed by Schlesinger (2004), most felony murders can be classified as "situational homicides," whereby "stress stemming from external or internal sources" (p. 94) lead to the homicidal event. For example, during the commission of a robbery, an offender is exposed to a multitude of potentially stressful factors that could lead to homicide such as potential witnesses, uncooperative victims, interruptions, and the fear of being apprehended. Additionally, situational homicides may be premeditated or spontaneous (Schlesinger, 2004). Regardless, property crime is the primary motivation for felony murder, whereas the murder itself is secondary (Douglas et al., 2006). In their *Crime Classification Manual*, Douglas et al. (2006) propose two types of felony homicide offenders with defining victim and offense characteristics: the indiscriminate murderer and the situational murderer.

Indiscriminate felony murder. According to Douglas et al. (2006), this type of felony murder is premeditated and the victim is one of opportunity. For example, he or she may be working the night shift, or may walk into the house during a robbery. The offender plans to kill the victim regardless of any resistance or threat he or she may pose. The weapon is usually brought to the scene and removed at the completion of the crime, and the scene reflects the control and planning of the offender. While death is usually caused by a firearm, the victim's

body may show evidence of restraints or blunt trauma. Indiscriminate offenders tend to be young adult males with criminal histories.

Situational felony murder. This type of murderer is consistent with Schlesinger's (2004) situational offender in that the homicide is committed spontaneously in response to stressful factors. Douglas et al. (2006) contend that the victimology for this type of murder is identical to that of the indiscriminate murder, except that the victim is perceived as a threat to the offender. The crime scene reflects the panic of the offender in that there may be evidence of disarray and blitz-style attack. Sharp instruments or blunt trauma occur more frequently, and if a gun is used, wounds are often contact or near-contact. Offenders are usually male, may have a substance abuse history contributing to their volatility, and in contrast to indiscriminate offenders, tend to be criminally inexperienced and more youthful.

Aims of the Current Study

The scant amount of literature that currently exists exploring body injury patterns posits that more severe body injury is often associated with closer victim-offender relationships; however, none has explored this hypothesis across different types of homicide (Last & Fritzon, 2005; Trojan & Krull, 2012). Moreover, empirical examinations of body injury severity to date have been restricted by methodological limitations related to sampling, a lack of standardized measures of injury severity, and inconsistent definitions of victim-offender relationship (Drawdy & Myers, 2004; Safarik & Jarvis, 2005; Trojan & Krull, 2012). In an effort to respond to these shortcomings, the current study aims to examine the nature of injury in homicides using validated injury severity instruments, and explore patterns of body injury in different types of homicide as well as across different types of victim-offender relationships.

The current study is based on the notion that a homicide event reflects a convergence of situational and psychological elements that vary between different types of homicides and different victim-offender relationships. Multivariate analyses were used with the goal of identifying victim, offender, and offense characteristics and injury patterns that may differentiate between types of homicide and types of victim-offender relationships. If empirical examination of injuries sustained along with other crime scene and demographic characteristics culminates in unique patterns across homicide type and/or relationship, such patterns may provide important information that may help to inform investigative efforts.

Due to the dearth of research exploring injury patterns and associated crime scene variables, the current study is largely exploratory; however, the following hypotheses were analyzed:

Hypothesis 1. The extant research finds that severe injury (i.e., injury that is excessively brutal and beyond that which is necessary to kill) is indicative of a more emotional victim-offender dynamic, and therefore associated with closer victim-offender relationships. It is therefore hypothesized that intimate victim-offender relationships and domestic homicides will result in more severe injury than less personal relationships found in sexual or felony homicides.

Hypothesis 2. Facial injury as an indicator of depersonalization, either as a symbol of destruction of the person or to thwart identification, is postulated throughout the literature. Extensive facial injury has been found to be associated with closer victim-offender relationships, thereby supporting the notion that depersonalization in the form of destruction of the person is dominant. Therefore, it is hypothesized that more severe facial injury will be associated with closer victim-offender relationships.

Hypothesis 3. Although a close-in, personal attack is said to be common in both domestic and sexual homicides, the extant literature suggests that the weapons and methods used to cause death may vary between these two samples as well as between different victim-offender relationships. Cooper and Smith (2011) found intimate partner homicides to follow U.S. national homicide trends where shootings and stabbings are the leading causes of death. Conversely, Langevin et al. (1988) state that firearms are rarely used in sexual homicides where the offenders are more likely to be strangers or acquaintances. Some authors contend that sexual homicide offenders prefer a "hands-on," close-in method of killing (Brittain, 1970; Chan & Heide, 2008; Douglas et al., 2006). It is additionally suggested by Trojan and Krull (2012) that the weapon used is more likely to be one of opportunity when the relationship between offender and victim is intimate. It is therefore hypothesized that firearms and weapons of opportunity will be more prevalent in domestic and intimate/close homicides, whereas manual/ligature strangulation and more close-in methods will be more prevalent in sexual and stranger/acquaintance homicides.

Chapter Three

Method

Data Set and Sampling

The data for this research was supplied by the FBI's Behavioral Sciences Unit and taken from closed, fully adjudicated state and local homicide cases that were contributed by law enforcement agencies from around the country for the purpose of research. All identifiers, including names of victims, suspects, offenders, officers, departments, and correctional agencies were removed. Only aggregate data are reported. Because of the archival nature of this research, this is a non-random sample.

Three samples were extracted from the archived homicide case files and used for comparative analysis. Data was collected from case files classified as domestic homicides (DH, n = 79), single-sexual homicides (SH, n = 77), and homicides committed during the course of a felony (FH, n = 86). Homicides occurred from the 1970s to the 2000s. Case file selection and coding was conducted by the primary researcher and Master's level research assistants who had received extensive training; all were supervised by a senior researcher and clinician. Each case file was selected based on a strict set of eligibility criteria pertaining to sampling as a group and within each homicide subtype (described below). All cases were required to contain full or partial autopsy reports adequate enough to facilitate the assessment of injury severity. A total of 242 cases were identified as meeting eligibility criteria.

Cases were reviewed and information was coded with respect to victim and offender demographics (e.g., age, race, and gender) and offense characteristics, such as the type of weapon; whether the weapon was one of opportunity; cause of death (COD); injury severity; and victim-offender relationship. Ages for offender and victim were coded into 5 age cohorts:

Juvenile (age 0-17), Young Adult (age 18-29), Adult (age 30-49), Middle Age (age 50-64), and Older Adult (age 65 and above). Race was coded into 5 categories: 1=Unknown, 2=White, 3=Black, 4=Latino, and 5=Other (e.g., Native American, Asian, Middle Eastern, etc.).

COD is used throughout this work but manner of death (MOD) is more commonly used in the forensic and investigative community to describe the way (or manner) in which the injuries were perpetrated. Cause of death, often confused with manner of death, typically is a medical term and describes the actual injury, or injuries, that led to the loss of life. The mechanism (aka tool or weapon) that perhaps is responsible for the wound is often secondary to this determination. That noted, COD will be used throughout this dissertation to refer to the totality of the behavior that led to the lethal outcome in the incidents examined.

Operationalizing Homicide Type

Domestic homicide (DH) is defined as "murder or non-negligent manslaughter in which the victim was known to have a domestic relationship with the offender, including intimate partners or another family member" (Roof, 2011, p. 1). The archive of DH case files included matricides, filicides, patricides, and family annihilators. However, due to likely differences in the psychological and characterological underpinnings of various subtypes of domestic homicide, the DH case files selected were restricted to intimate partner homicides to ensure homogeneity. DH cases included spouses, ex-spouses, heterosexual or same-sex partners, and former intimate partners. Cases were excluded if there was more than one perpetrator, as in the case of love triangles, whereby the relational dynamic is unduly influenced by a third party. The occurrence of such cases was rare in this dataset and led to the exclusion of only two cases.

Sexual homicide (SH) cases were used in this study because 1) there is a dearth of empirical research on this type of homicide; and 2) some authors contend that crime scene

characteristics may be similar to those seen in intimate partner homicides, and the current study is interested in parsing out if there is empirical support for this contention (Douglas et al., 2006). Moreover, SH cases are likely not to involve intimate partners, thereby allowing for more variability in victim-offender relationship. For the purposes of the current study, sexual homicides (SH) were defined as the killing of another person whereby the killing itself is sexually gratifying or sexual elements are indicated in the crime scene, such as: state and/or lack of attire; exposure of the victim's sexual body parts; evidence of pre- or post-mortem oral, anal, or vaginal sexual activity; sexual positioning of the body; insertion of foreign objects into body cavities; and evidence of substitute sexual activity or sadistic fantasy (Ressler et al., 1986; Ressler et al., 1992). SH cases were excluded if the case file indicated that the homicide was committed to cover up a sexual assault, or if there were multiple offenders. Because this study is interested in single homicide events, and research suggests distinct differences between non-serial and serial sexual homicides, serial cases were excluded.

Felony homicides (FH) are murders committed during the course of a felony as indicated by the U.S. Department of Justice (2016) in the Uniform Crime Reports. Felonies are defined as forcible rape, burglary, robbery, arson, larceny-theft, motor vehicle theft, gambling, and narcotic drug law violations. While murders committed during the course of a felony can be premeditated or spontaneous, they could also be accidental or intentional (i.e., the victim of a robbery falls during a struggle, hits their head and dies vs. the offender shoots the victim of a robbery because they are resisting or struggling). Regardless of intent or whether or not an individual actually committed the homicide, each person involved in the commission of the felony can be charged with murder, depending on the laws of the state in which the crimes were committed.

Seventeen FH cases (19.8%) were committed by more than one perpetrator. Unlike DH and SH cases whereby cases with multiple perpetrators are a rarity and were excluded in this study (only 2.5% of cases), multiple perpetrators were identified in about 1 in 5 felony murder cases and were therefore included due to their relative frequency. However, multiple perpetrator FH cases were excluded if there was insufficient information regarding the individual who committed the murder. In cases whereby the individual who committed the murder was easily identified, only that individual was coded for the study.

Operationalizing Victim-Offender Relationship

The importance of victim-offender relationship is emphasized throughout the homicide literature; however, very little guidance is provided in terms of universal definitions of relationship categories (Loftin, Kindley, Norris, & Wiersema, 1987). For example, some researchers conceptualize relationships as being dichotomous, such as stranger vs. non-stranger or primary vs. secondary (Drawdy and Myer, 2004; Messner & Tardiff, 1985; Smith & Parker, 1980). Others have differentiated between relationships by creating various compilations of the following: strangers, family, relatives, spouses, romantically linked, acquaintances, crime partners, co-workers, sex partners, neighbors, paramours, enemies, sex rivals, and friends (Decker, 1993; Trojan & Krull, 2012). While Decker (1993) contends that "the utility of finer distinctions in defining this relationship is that they enable us to distinguish conceptually between different types of events" (p. 591), Loftin and colleagues (1987) urge caution and identify three problems inherent to victim-offender relationship classification: 1) researchers are unable to make sound comparisons due to unstandardized classification schemes; 2) categories often overlap; and 3) categories are often vaguely defined. Overlap of categories has been particularly problematic for researchers (Loftin et al., 1987). For instance, Wolfgang's (1958)

paramour/mistress/prostitute and enemy categories may also be considered acquaintances, an entirely separate category in his study.

Problems with differentiating between friends and acquaintances and between acquaintances and strangers have also been identified by researchers (Decker, 1993; Loftin et al., 1987; Safarik et al., 2002; Wolfgang, 1958). Decker (1993), Wolfgang (1958), and Loftin et al. (1987) contend that the circumstances, duration, and frequency of contact are key components in differentiating between friends and acquaintances; however, Decker also submits that the intensity of the relationship may be perceived differently by the victim or the offender. In other words, a relationship may hold deep emotional meaning to one person, but may be casual to the other. In terms of strangers and acquaintances, Safarik and colleagues (2002) contend that there is a gray area wherein a victim and offender may be "marginally" acquainted. For instance, routine activities such as grocery shopping or taking the bus may make the victim and/or offender familiar by sight, but otherwise they are "apparent" strangers. The authors suggest that classification of such a relationship as "stranger" may inflate the number of stranger homicides reported in the literature.

The following guidelines from Cao, Hou, and Huang (2008) were used in coding victim-offender relationship with the added category of "close friend" in an attempt to overcome the problems discussed above. "Stranger" homicide refers to the absence of any known relationship between the victim and the offender prior to the homicide event. In addition to individuals with no contact prior to the homicide event, this category includes individuals who become acquainted immediately preceding the homicide event. For instance, in a bar or at a friend's house. "Acquaintance/friend" homicide refers to relationships that may exist between people who recognize each other for a number of weeks, months, or years and have some shared history.

This category reflects relationships that are based less on friendship and more on frequency of contact and circumstances (e.g., co-workers, fellow students, neighbors, and relationships whereby individuals may be familiar by sight). “Close friend” refers to relationships whereby the victim and offender have had extensive previous interaction or the intensity of the relationship is implied to be closer to a familial relationship than an acquaintance relationship. Inclusion in this category followed the guidelines provided by Loftin et al. (1987) stating that a close friend relationship is based on friendship, circumstances, and contact at least once a week for three months or more. For “intimate” homicide, inclusion in this category reflected strong and/or long-lasting bonds that encompasses husbands and wives, ex-husbands and ex-wives, and current and previous romantic links. In some instances, FH or SH cases were committed by individuals falling under the intimate category (e.g., in-laws and extended family members).

Operationalizing Injury Severity

Injury severity was determined using the Homicide Injury Scale (HIS) as developed by Safarik and Jarvis (2005), and the Abbreviated Injury Scale (AIS; Association for the Advancement of Automotive Medicine, 2006). The HIS was developed to provide a standard measure of degree of injury in homicide cases, and attempts to “capture the qualitative element of a victim’s fatal injuries (within the context of homicide) in a quantitative manner” based on medical examiner reports (Safarik & Jarvis, 2005, p. 190). Table 1 illustrates the values and related interpretations of the HIS scoring scheme. In their study of elderly homicide victims, Safarik and Jarvis (2005) found the HIS to be highly correlated with Injury Severity Scores (ISS; $r = .77$) derived from Abbreviated Injury Scale scores. Additional validation of the HIS has been established in Tamsen, et al. (2015).

Table 1.
The Homicide Injury Scale (HIS)

Score	Qualitative Description
1	Single cause of death only: internal injuries only with no visible related external injuries (e.g., smothering, strangulation, ruptured organs resulting from blunt force trauma)
2	Single cause of death only: internal injuries only with minor related external injuries (e.g., smothering with related abrasions and/or contusions of mouth and face, strangled with related abrasions or ligature marks)
3	Single cause of death only: related external moderate to serious injuries not identified as either excessive or overkill
4	Two or more causes of death: related internal and/or external injuries not identified as either excessive or overkill
5	Single cause of death only: related external injuries identified as either excessive or overkill
6	Two or more causes of death: related internal and/or external injuries in at least one of the causes of death identified as either excessive or overkill

*Safarik and Jarvis (2005)

The ISS was developed in 1974 to calculate the cumulative effects of injury throughout the body whereby each injury is assigned an Abbreviated Injury Scale (AIS) score of 1 (minor) to 6 (not survivable) across six body regions: head and neck, face, chest, abdomen or pelvis, extremities, and external areas (Safarik & Jarvis, 2005). Only the most severe injury in each body region is scored and used in the calculation of a cumulative score. The ISS used by Safarik and Jarvis (2005) and Tamsen et al. (2015) is one of several derivative scales upon which the AIS serves as a basis to calculate a cumulative score. According to the developers of the AIS, the Association for the Advancement of Automotive Medicine (AAAM), it was originally developed in 1971 to classify and rate the severity of injuries sustained during traumatic events – such as car accidents – to determine probability of survival and prioritize treatment interventions (AAAM, 2006). The current edition, AIS 2005, is an internationally accepted revision of the AIS based on advances in medicine which have enabled greater precision and detail of the AIS. While the AIS provides information as to the "threat to life" of each injury, the ISS provides a

cumulative score (ranging from 0-75) that highly correlates with mortality and length of hospital stay (Orlando Regional Medical Center, 2001).

Utilization of the ISS in the current study would be redundant – as the HIS has been found to be highly correlated with the ISS – so the AIS face region score was used to explore the hypothesis that facial injury severity differs between victim-offender relationships. Facial injury is defined as any injury to the facial skeleton as well as soft tissue injuries to the eyes, nose, chin, ears, cheeks, forehead, or mouth. In addition to the AIS manual (2005), the following guidelines outlined by Robertson (2015) were used to assist in scoring of the AIS: a score of 0 indicates no injury to the face; a score of 1 indicates injury is minor (e.g., superficial abrasions, contusions, lacerations, or minor fractures; a score of 2 indicates injury is moderate (e.g., more serious lacerations or abrasions of skin and underlying tissues, open fractures or displacement of the jaw); a score of 3 indicates a serious but non-life threatening injury (e.g., complex fractures, penetration of soft tissues, blood loss <20% by volume); a score of 4 indicates severe and potentially life threatening injury (e.g., complex fractures, exposure or loss of brain tissue); a score of 5 indicates critical injuries whereby survival is unlikely (e.g., penetrating injuries, crushing injury of whole face, and/or major blood loss >20% by volume); and a score of 6 indicates the injury was unsurvivable.

Statistical Analyses

Statistical analyses were conducted utilizing version 23 of Statistical Package for the Social Sciences (SPSS). Data analysis procedures include descriptive statistics (frequency, percentage, cross-tabulation, mean, and standard deviation), Chi-Square tests of independence (see Appendix D & Appendix E) and multinomial logistic regressions (see Appendices A, B, & C).

Descriptive statistics present the victim and offender demographics (gender, age, race). The relationships between the offender and victim demographic characteristics were assessed using Chi-Square tests of independence. The effect size for the Chi-Square test was calculated using Cramer's Phi in the case of tests with one degree of freedom (2X2 cross-tabulations), and Cramer's V for all the other degrees of freedom. If the Chi-Square test was statistically significant, the adjusted standardized residuals were calculated for each cell to determine which cells in the cross-table contributed to the statistically significant difference. According to Agresti (2007), "a[n adjusted] standardized residual having absolute value that exceeds about 2 when there are few cells or about 3 when there are many cells indicates lack of fit of Ho in that cell" (p. 80). To calculate the residual, the difference between the observed and expected values was obtained.

Moderator variables were identified by performing multiple cross-tabulations, with victim-offender relationship or type of homicide cross-tabulated with victim or offender demographic characteristics. The Chi-Square test of independence determined if the relationship was statistically significant, while the effect size was calculated using Cramer's Phi in the case of tests with one degree of freedom (2X2 cross-tabulations), and Cramer's V for all the other degrees of freedom. A strong statistically significant test result indicated the demographic variable had the potential to be a Moderator variable in the multinomial logistic regression models.

Before the multinomial logistic regression models were applied, the assumptions necessary to be met before analyzing the data using multinomial regression models were checked. The first assumption is that the dependent variable is measured at the nominal level. This assumption is met, as both victim-offender relationship (stranger, acquaintance,

close/intimate) and type of homicide (domestic, felony, sexual) are measured at the nominal level with three categories each. The second assumption is that the independent variables are continuous, ordinal or nominal. This assumption is also met, as all the independent variables, including the potential Moderator variables, are measured at an ordinal or nominal level. The third assumption is that the observations are independent and the dependent variable has mutually exclusive and exhaustive categories. This assumption is met, as each case file are independent of each other, and there is no overlap in the possible categories of victim-offender relationship or type of homicide. The fourth assumption is that the predictor variables are not highly correlated to each other. To test the multicollinearity assumption, the following steps were followed. As all the predictor variables were categorical, they were transformed in x-1 dummy variables, where x was the number of categories in a variable. For example, the victim age had five categories (juvenile, young adult, adult, middle age adult, old adult), and as such four dummy variables were created with older adult category as the reference category. The juvenile age dummy was coded with 1 if the victim was a juvenile and 0 for all other cases. The young adult, adult and middle age adult dummy variables were coded in a similar way. To test for multicollinearity, the indicator dummy variables for all the independent variables, including the Moderator variables, were entered as independent variables in a linear regression model. The dependent variable was either the victim-offender relationship variable or the type of homicide variable. Multicollinearity was assessed using the Variance Inflation Factor (VIF) values, where a lower VIF value indicates a lower multicollinearity. The VIF square root indicates the inflation of the standard error, compared with the standard error if there was no correlation between that variable and the other predictor variables in the model. A VIF value over 10 would indicate high multicollinearity and as a result, one or more predictor variables should be removed from the

model. The fifth assumption states that there are no outliers in the data. As all the data are nominal in nature, there were no outliers identified and this assumption was met.

The first hypothesis was tested using four multinomial logistic regression models (Model 1.1a & 1.1b, Model 1.2a & 1.2b). Models 1.1a & 1.1b have the victim-offender relationship as the dependent variable and a condensed HIS score (HISCon) as the independent variable. Limited observations in the "close friend" category (<5) resulted in the combination of the "close friend" and "intimate" relationship categories. The decision to combine these two categories as opposed to the "close friend" and "acquaintance" categories was made based on the depth of emotional investment both parties have in such relationships.

The condensed HIS score variable (HISCon) was derived after cell counts <5 were found for HIS scores of 1 (one cause of death and no external injuries). As a result, cases with HIS scores of 1 were combined with HIS scores of 2 (one cause of death and minimal external injuries) to create a single variable to ensure adequate cell size for statistical analysis. Identified moderator variables were also added as independent variables in the model. Models 1.2a and 1.2b had the type of homicide as the dependent variable and the condensed HIS score (HISCon) as the independent variable. Identified moderator variables were also added as independent variables in the model.

The second hypothesis was tested using two multinomial logistic regression models (Model 2.1a and 2.1b). Model 2.1a and 2.1b have victim-offender relationship as the dependent variable and the condensed AIS score combined with the number of facial injuries (FacAISCon and AreaFacInj) as the independent variable. Similar to HIS score categories, some AIS score categories suffered from low cell counts. As a result, the AIS was recoded into 3 categories: no facial injury, non-life threatening (AIS scores of 1-3), and life-threatening (AIS scores of 4-6).

AIS scores were combined based on how they were operationalized in Robertson (2015). Frequency of injury to a single region is not considered by AIS scores but is of interest here based on the extant literature (Trojan & Krull, 2012), so the number of wounds (none, single wound, or multiple wounds) were combined with the AIS severity score to create one variable with the following categories: no injuries, single wound/non-life threatening, single wound/life threatening, multiple wounds/non-life threatening, and multiple wounds/life threatening. Moderator variables were identified and also added as independent variables in the model.

The third hypothesis was tested using eight multinomial logistic regression models (Model 3.1a & b, Model 3.2a & b, Model 3.3a & b, and Model 3.4a & b). Models 3.1a through 3.2b explored victim-offender relationship or homicide type as the dependent variables and the cause of death (CODCon) as the independent variable. Identified moderator variables were also added as independent variables in the model. Model 3.3a through 3.4b explored victim-offender relationship or homicide type as the dependent variables and weapon of opportunity (WeapOp) as the independent variable. Identified moderator variables were added as independent variables in the model. The level of statistical significance set for the Chi-Square tests of independence and the multinomial logistic regressions was set to 0.05. Thus, the probability of rejecting the null hypothesis when there is no relationship at the population level (Type I error) is 5%.

Interrater Reliability

A research assistant was trained and employed to assist with coding AIS and HIS scores. Upon conclusion of coding, 10% of the cases (n = 25) from each homicide subtype were randomly selected to assess inter-rater reliability by calculating the Cohen's kappa (κ) between raters. Cohen's kappa tests for the agreement between two raters over and above chance agreement, and is predicated on the following five assumptions: 1) that the judgement is

measured on a categorical scale and the categories are mutually exclusive; 2) that both raters are rating the same observations; 3) each response variable must have the same number of categories and must be symmetric; 4) the raters are independent; and 5) the same two raters are used to judge all observations in the analysis (Laerd Statistics, 2013). Cohen's kappa was selected due to the categorical nature of the assessments. The classification scale used to determine strength of agreement were taken from Altman (1999), whereby <0.2=Poor, 0.21-0.40=Fair, 0.41-0.60=Moderate, 0.61-0.80=Good, and 0.81-1.0=Very Good.

Chapter Four

Results

Demographic Information

This section provides a narrative summary of the victim and offender demographic characteristics (age, race, and gender). The sample size in this study was limited to a total of 242 case files. Each case file was selected based on a strict set of eligibility criteria, described in detail in the *Methods* chapter. The demographic characteristics for both victims and offenders are presented in Table 2. The majority of victims were female (70.2%), whereas the majority of perpetrators were male (93.8%). The victims were mostly White (78.5%), followed by Black (11.2%), Latino (5.0%) and Other (4.5%). The perpetrators' race followed the same pattern, with most perpetrators being White (66.9%), followed by Black (24.4%), Latino (5.4%) and Other (2.9%). With regards to age, the mean victim age was 38.64 (*SD* = 18.49), while the mean offender age was slightly younger at 30.97 years old (*SD* = 10.91). When the age was grouped in categories, most victims were young adults (36.4%) or adults (35.5%), with the fewest victims in the juvenile category (3.3%). Similarly, most perpetrators were either young adults (52.1%) or adults (37.2%), with the fewest offenders in the juvenile category (1.2%).

Table 2

Demographic Characteristics for the Victims and the Offenders in the Selected Case Files (n = 242)

Characteristic		Victim	Offender
Gender			
	Female	170 (70.2%)	12 (5.0%)
	Male	72 (29.8%)	227 (93.8%)
	Unknown	0 (0.0%)	3 (1.2%)
Race			
	White	190 (78.5%)	162 (66.9%)
	Black	27 (11.2%)	59 (24.4%)
	Latino	12 (5.0%)	13 (5.4%)

	Other	11 (4.5%)	7 (2.9%)
	Unknown	1 (0.4%)	1 (0.4%)
Age			
	Juvenile	8 (3.3%)	3 (1.2%)
	Young Adult	88 (36.4%)	126 (52.1%)
	Adult	86 (35.5%)	90 (37.2%)
	Middle Age	30 (12.4%)	16 (6.6%)
	Older Adult	30 (12.4%)	7 (2.9%)

Crosstabulations were run to examine victim and offender characteristics across type of homicide and victim-offender relationship. Demographic characteristics followed similar patterns to those that emerged in the sample as a whole. Results indicate that 87% of the DH victims in this sample were female, 64% of FH victims were male, and 91% of SH victims were female. The majority of domestic, felony, and sexual homicide victims were White (77%, 73%, and 87% respectively), followed by Black (9%, 14%, and 11% respectively), and Latino (8%, 5%, and 3% respectively). Adults accounted for 48.1% of domestic homicide victims, followed by young adults (32.9%), middle aged victims (15.2%), older adults (2.5%), and juveniles (1.3%). Adults accounted for 33.7% of FH victims, followed by young adults (24.4%), older adults (23.3%), middle age adults (16.3%), and juveniles (2.3%). 53.2% of SH victims were young adults, followed by adults (24.7%), older adults (10.4%), juveniles (6.5%), and middle age adults (5.2%).

An examination of victim characteristics by victim-offender relationship found that females accounted for 57.1% of stranger victims, 66.7% of acquaintance victims, and 80.8% of the close/intimate victims. Similar to type of homicide, the majority of stranger, acquaintance, and close/intimate victims were White (80.4%, 78.2%, and 78.6% respectively). Approximately 9% of stranger victims were Latino, followed by Black (7.1%) and Other (3.6%). Approximately 15% of acquaintance victims were Black, followed by Other (5.6%), and Latino (1.1%).

Approximately 10% of close/intimate victims were Black, followed by Latino (6.1%) and Other (4.1%). Young adults accounted for 44.6% of stranger homicides, followed by adults (25%), middle age adults (14.3%), older adults (12.5%), and juveniles (3.6%). Young adults accounted for 32.2% of acquaintance homicides, followed by adults (29.9%), older adults (21.8%), middle age adults (11.5%), and juveniles (4.6%). Adults accounted for 46.5% of close/intimate homicides, followed by young adults (35.4%), middle age adults (12.1%), older adults (4%), and juveniles (2%).

Males accounted for 88.6% of DH perpetrators, 96.4% of FH perpetrators, and 100% of SH perpetrators. The majority of DH offenders were White (74.7%), followed by Black (13.9%), Latino (7.6%), and Other (3.8%). Similar racial patterns were found with FH offenders (58.1%, 32.6%, 5.8%, and 3.5% respectively), and SH offenders (68.8%, 26%, 2.6%, and 2.6% respectively). Adults accounted for 45.6% of DH offenders, followed by young adults (31.6%), middle aged victims (16.5%), and older adults (6.3%). There were no juvenile DH offenders. The majority of FH offenders were young adults (65.1%) followed by adults (30.2%). Middle age adult offenders (2.3%), older adults (1.2%), and juveniles (1.2%) constituted a total of 4 cases. Young adults accounted for 58.4% of SH offenders, followed by adults (36.4%) and juveniles (2.6%). Middle age and older offenders accounted for only 2 SH cases.

An examination of offender characteristics by victim-offender relationship found that males accounted for 96.3% of stranger offenders, 98.8% of acquaintance offenders, and 90.9% of the close/intimate offenders. The majority of stranger offenders were White (69.6%), followed by Black (21.4%), Latino (5.4%), and Other (3.6%). Similar racial patterns were found with acquaintance offenders (54%, 37.9%, 4.6%, and 3.4% respectively), and close/intimate offenders (76.8%, 14.1%, 5.3%, and 2.9% respectively). Young adults accounted for 66.1% of stranger

offenders, followed by adults (32.1%), and middle aged offenders (1.8%). There were no juvenile or older adult stranger offenders. The majority of acquaintance offenders were young adults (59.8%) or adults (32.2%), followed by juveniles (3.4%). Middle age adults (2.3%) and older adults (2.3%) committed a total of 4 acquaintance homicides. Adult offenders committed 44.4% of close/intimate homicides, followed by young adults (37.4%), middle age adults (13.1%), and older adults (5.1%). There were no juvenile close/intimate offenders.

Victim and offender demographic characteristics relationships. To determine if there were any relationships between the demographic characteristics of the victim and the offender, multiple Chi-Square tests of independence were applied. The pairs of variables being tested were victim gender and offender gender, victim gender and offender age, victim gender and offender race, victim age and offender gender, victim age and offender age, victim age and offender race, victim race and offender gender, victim race and offender age, and victim race and offender race. The results indicate that the following relationships were statistically significant: victim and offender gender ($\chi^2 = 17.82$, d.f. = 1, p = 0.000, Cramer's Phi = 0.273), victim gender and offender age ($\chi^2 = 17.27$, d.f. = 4, p = 0.000, Cramer's V = 0.267), victim and offender age ($\chi^2 = 51.27$, d.f. = 16, p = 0.000, Cramer's V = 0.230), and victim and offender race ($\chi^2 = 340.44$, d.f. = 16, p = 0.000, Cramer's V = 0.628). The remaining relationships were not statistically significant at the 95% level, indicating there was no relationship between the victim and offender demographics. The results are presented in Table 3.

Table 3.
Relationship Between Victim and Offender Demographic Characteristics

		Offender								
		Gender			Age			Race		
		χ^2	df	p-value	χ^2	df	p-value	χ^2	df	p-value
Victim										
	Gender	17.82	1	0.000*	17.27	4	0.002*	1.74	4	0.783

Age	2.95	4	0.566	51.27	16	0.000*	13.19	16	0.659
Race	1.57	4	0.815	14.97	16	0.070	380.44	16	0.000*

Note. * Statistically significant at the 0.05 level

Furthermore, to identify which combinations of victim and offender gender, victim gender and offender age, victim and offender age and victim and offender race combinations were most likely to contribute to the statistically significant difference, the adjusted standardized residuals were calculated for each cell. The adjusted residuals, along with the observed counts and expected counts for the three combinations, are presented in Tables 4, 5, 6, and 7.

Table 4.

Statistics (Counts, Expected counts, Percentage, Adjusted Residual) for Victim Gender and Offender Gender

		Offender Gender	
Victim Gender	Statistic	Male	Female
	Count	60	10
	Expected Count	66.5	3.5
Male	Adj Residual	-4.2	4.2
	Count	167	2
	Expected Count	160.5	8.5
Female	Adj Residual	4.2	-4.2

Table 5.

Statistics (Counts, Expected counts, Percentage, Adjusted Residual) for Victim Gender and Offender Age

		Offender Age				
Victim Gender	Statistic	Juvenile	Young Adult	Adult	Middle Age	Older Adult
	Count	1	52	16	2	1
	Expected Count	0.9	37.5	26.8	4.8	2.1
Male	Adj Residual	0.1	4.1	-3.1	-1.6	-0.9
	Count	2	74	74	14	6
	Expected Count	2.1	88.5	63.2	11.2	4.9
Female	Adj Residual	-0.1	-4.1	3.1	1.6	0.9

Table 6.
Statistics (Counts, Expected counts, Percentage, Adjusted Residual) for Victim Age and Offender Age

		Offender Age				
Victim Age	Statistic	Juvenile	Young Adult	Adult	Middle Age	Older Adult
	Count	0	5	3	0	0
	Expected Count	0.1	4.2	3.0	0.5	0.2
Juvenile	Adj Residual	-0.3	0.6	0.0	-0.8	-0.5
	Count	1	63	21	3	0
	Expected Count	1.1	45.8	32.5	5.8	2.5
Young Adult	Adj Residual	-0.1	4.6	-3.2	-1.5	-2.0
	Count	1	37	42	5	1
	Expected Count	1.1	44.8	32.0	5.7	2.5
Adult	Adj Residual	-0.1	-2.1	2.8	-0.4	-1.2
	Count	0	11	9	7	3
	Expected Count	0.4	15.6	11.2	2.0	0.9
Middle Age	Adj Residual	-0.7	-1.8	-0.9	3.9	2.5
	Count	1	10	15	1	3
	Expected Count	0.4	15.6	11.2	2.0	0.9
Older Adult	Adj Residual	1.1	-2.2	1.6	-0.8	2.5

Table 7.
Statistics (Counts, Expected counts, Percentage, Adjusted Residual) for Victim Race and Offender Race

		Offender Race				
Victim Race	Statistic	White	Black	Latino	Other	Unknown
	Count	147	35	6	2	0
	Expected Count	126.9	46.5	10.2	5.5	0.8
White	Adj Residual	6.7	-4.2	-3.0	-3.3	-1.9
	Count	7	20	0	0	0
	Expected Count	18.0	6.6	1.5	0.8	0.1
Black	Adj Residual	-4.8	6.4	-1.3	-1.0	-0.4
	Count	3	2	6	1	0
	Expected Count	8.0	2.9	0.6	0.3	0.0
Latino	Adj Residual	-3.2	-0.6	7.0	1.1	-0.2
	Count	4	2	1	4	0
Other	Expected Count	7.3	2.7	0.6	0.3	0.0

	Adj Residual	-2.2	-0.5	0.6	6.8	-0.2
	Count	0	0	0	0	1
	Expected Count	0.7	0.2	0.1	0.0	0.0
Unknown	Adj Residual	-1.4	-0.6	-0.2	-0.2	15.5

The results indicate that male perpetrators killed fewer males and more females, whereas female perpetrators killed more males and fewer females than expected by chance alone. Male victims were more likely to be killed by a young adult then it would be expected by chance alone, while the female victims were more likely to be killed by an adult. Young adult victims were more likely to be killed by young adult offenders, middle age victims were more likely to be killed by middle age offenders, while adult offenders were less likely to kill young adult victims. Lastly, White offenders were more likely to kill White victims and less likely to kill Black or Latino victims, Blacks were less likely to kill White victims and more likely to kill Black victims, and Latinos were less likely to kill White victims and more likely to kill Latino victims than expected by chance alone. Other race perpetrators were also less likely to kill White victims, and more likely to kill Other race victims. Overall, victim race tended to match the race of the perpetrator.

Research Question 1

This section presents the results of the inferential statistics employed to explore the first research question, stated in the first hypothesis: Does overall injury severity (i.e., level of violence) differ between types of homicide and/or between victim-offender relationships?

Hypothesis 1. The extant research finds that severe injury (i.e., injury that is excessively brutal and beyond that which is necessary to kill) is indicative of a more emotional victim-offender dynamic, and therefore associated with closer victim-offender relationships. It is therefore hypothesized that intimate victim-offender relationships and domestic homicides will

result in more severe injury than less personal relationships (e.g., strangers or acquaintances) found in sexual or felony homicides.

To explore the first hypothesis four multinomial logistic regression models were applied. The first multinomial logistic regression model (Model 1.1a; see Appendix A) had the victim-offender relationship (strangers, acquaintances, close/intimate) as the dependent variable with strangers as the reference category, and the independent variable was the HIS (one cause of death and no/minimum external injury, one cause of death and moderate injury, multiple cause of death and not overkill, one cause of death and overkill, multiple causes of death and overkill). The second multinomial logistic regression model (Model 1.1b; See Appendix A) had the victim-offender relationship (strangers, acquaintances, close/intimate) as the dependent variable with acquaintances as the reference category. The independent variable was the HIS (one cause of death and minimum injury, one cause of death and moderate injury, multiple cause of death and not overkill, one cause of death and overkill, multiple causes of death and overkill).

The third multinomial logistic regression model (Model 1.2a; see Appendix A) had the type of homicide (domestic, sexual, felony) as the dependent variable with sexual homicide as the reference category and the HIS as the independent variable (one cause of death and no/minimum external injury, one cause of death and moderate injury, multiple cause of death and not overkill, one cause of death and overkill, multiple causes of death and overkill). The fourth multinomial logistic regression model (Model 1.2b; see Appendix A) had the type of homicide (domestic, sexual, felony) as the dependent variable with felony homicide as the reference category and the HIS as the independent variable (one cause of death and minimum injury, one cause of death and moderate injury, multiple cause of death and not overkill, one cause of death and overkill, multiple causes of death and overkill). The models also included the moderator

variable/s identified using Chi-square tests of independence between the victim or offender demographics and the victim-offender relationship variable or type of homicide.

Moderator variables – victim offender relationship models. Before running the multinomial logistic regressions on victim-offender relationship models, any moderator demographic characteristics were identified and the multinomial logistic regression assumptions were tested. To identify the moderator variables, multiple Chi-Square tests of independence were applied. Based on the Chi-Square test results, there was a statistically significant relationship between victim-offender relationship and victim gender ($\chi^2 = 10.42$, d.f. = 2, p = 0.005, Cramer's V = 0.207), offender gender ($\chi^2 = 6.32$, d.f. = 2, p = 0.042, Cramer's V = 0.163), offender race ($\chi^2 = 16.74$, d.f. = 8, p = 0.033, Cramer's V = 0.186), victim age ($\chi^2 = 20.36$, d.f. = 8, p = 0.009, Cramer's V = 0.205), and offender age ($\chi^2 = 29.03$, d.f. = 8, p = 0.000, Cramer's V = 0.245). There was no relationship between victim-offender relationship and victim race ($\chi^2 = 8.49$, d.f. = 8, p = 0.387, Cramer's V = 0.133). The results are presented in Table 8.

Table 8.
Relationship Between Victim-Offender Relationship and Victim and Offender Demographic Characteristics

Victim-Offender Relationship					
		χ^2	df	p-value	Effect Size (Cramer's V)
Victim					
	Gender	10.42	2	0.005*	0.207
	Age	20.36	8	0.009*	0.205
	Race	8.49	8	0.387	0.133
Offender					
	Gender	6.32	2	0.042*	0.163
	Age	29.03	8	0.000*	0.245
	Race	16.74	8	0.033*	0.186

Note. * Statistically significant at the 0.05 level

According to the strength of the relationships between the victim and offender demographics and the victim-offender relationship variable, represented by Cramer's V statistic, victim gender, victim age, offender age and offender race were possible moderator variables. Due to sample size limitations, as well as multicollinearity concerns, only victim gender and victim age were introduced in the multinomial logistic model as moderator variables. The models focused on victim variables because these are typically among the first pieces of information learned by law enforcement in the initial stages of a homicide investigation. Furthermore, victim gender and offender age had a strong statistically significant relationship between them (χ^2 = 17.27, d.f. = 4, p = 0.000, Cramer's V = 0.267). As such, the moderator effects from the offender age variable were partially accounted for by the victim gender variable.

Multicollinearity was tested by running a linear regression with victim-offender relationship as the dependent variable and indicator variables for victim age and homicide injury scale combined with the number of causes of death (one cause of death and minimum injury, one cause of death and moderate injury, multiple causes of death and not overkill, one cause of death and overkill, multiple causes of death and overkill), as well as victim gender variable as the independent variables. The VIF values varied between 1.042 and 2.560, indicating that there was no multicollinearity present. Since victim gender was dichotomous, it did not need to be coded into dummy variables. For victim age and HIS, one indicator variable was created for each category minus one (the reference category). For example, victim age was split into four indicator variables, since there were a total of five categories.

The results of the Model 1.1a (reference category = strangers) multinomial logistic regression indicated that the overall model was statistically significant, $\chi^2(18) = 69.452$, $p = 0.000$. All three independent variables were statistically significant: victim age, $\chi^2(8) = 19.091$, p

= 0.014, victim gender, $\chi^2(2) = 17.755$, $p = 0.000$, and HISCon, $\chi^2(8) = 35.923$, $p = 0.000$. Male victims were less likely than female victims to be in a close or intimate relationship with the offender than to be strangers to the offender. The relative risk ratio of being in a close or intimate relationship with the offender versus being a stranger to the offender decreased by 0.191 (0.083-0.439) if the victim's gender changed from female to male, Wald = 15.241, *df* = 1, $p = 0.000$. Adult victims were more likely than older adult victims to be in a close or intimate relationship with the offender than to be strangers to the offender. The relative risk ratio of being in a close or intimate relationship with the offender versus being a stranger to the offender increased by 6.059 (1.438-25.528) if the victim's age changed from older adult to adult, Wald = 6.027, *df* = 1, $p = 0.014$.

Lastly, victims with single causes of death and overkill injuries were more likely than victims with multiple causes of death and overkill injuries to be in a close or intimate relationship with the offender than to be strangers to the offender. The relative risk ratio of being in a close or intimate relationship with the offender versus being a stranger to the offender increased by 6.411 (1.792-22.935) if the victim's HISCon changed from multiple causes of death and overkill injuries to a single cause of death and overkill, Wald = 8.161, *df* = 1, $p = 0.004$. The Model 1.1 results are presented in Table 9.

Table 9.
Multinomial Logistic Regression Parameter Estimates with Victim Offender Relationship as the Dependent Variable, Victim Gender and Age as Moderator Variables and Homicide Injury Scale (HISCon)-Strangers as Reference Category

								95% Confidence Interval for Exp(B)	
Victim Offender Relationship		B	Std. Error	Wald	df	Sig.	Exp (B)	Lower Bound	Upper Bound
	Intercept	1.468	.545	7.262	1	.007			
Acquaintance	Male	-.497	.380	1.718	1	.190	.608	.289	1.279

	Female	0[b]			0				
	Juvenile	-.204	.989	.043	1	.836	.815	.117	5.665
	Young Adult	-.876	.530	2.729	1	.099	.416	.147	1.178
	Adult	-.253	.564	.201	1	.654	.777	.257	2.343
	Middle-Age Adult	-.754	.662	1.298	1	.255	.470	.129	1.722
	Older Adult	0[b]			0				
	1 COD, None/Min Injury	-.537	.534	1.010	1	.315	.585	.205	1.665
	1 COD, Mod Injury	-.376	.495	.576	1	.448	.687	.260	1.813
	2 COD, Not Overkill	-.571	.536	1.135	1	.287	.565	.198	1.615
	1 COD, Overkill	-.221	.673	.108	1	.743	.802	.214	2.997
	2 COD, Overkill	0[b]			0				
	Intercept	-.431	.740	.339	1	.561			
	Male	-1.653	.423	15.241	1	.000	.191	.083	.439
	Female	0[b]			0				
	Juvenile	.331	1.290	.066	1	.797	1.393	.111	17.450
	Young Adult	.777	.714	1.185	1	.276	2.175	.537	8.809
	Adult	1.802	.734	6.027	1	.014	6.059	1.438	25.528
	Middle Age Adult	.999	.824	1.471	1	.225	2.716	.540	13.650
	Older Adult	0[b]			0				
	1 COD, None/Min Injury	-.972	.643	2.281	1	.131	.378	.107	1.336
	1 COD, Mod Injury	.784	.528	2.205	1	.138	2.191	.778	6.171
	2 COD, Not Overkill	-.356	.609	.342	1	.558	.700	.212	2.310
	1 COD, Overkill	1.858	.650	8.161	1	.004	6.411	1.792	22.935
Close/Intimate	2 COD, Overkill	0[b]			0				

Note. a. The reference category is: Strangers. b. Reference category.

The results of the Model 1.1b (reference category = acquaintances) multinomial logistic regression were the same as Model 1.1a, as the variables were entered in the regression were the

same. Thus the overall model was statistically significant, $\chi^2(18) = 69.452$, $p = 0.000$ and all three independent variables were statistically significant: victim age, $\chi^2(8) = 19.091$, $p = 0.014$, victim gender, $\chi^2(2) = 17.755$, $p = 0.000$, and HISCon, $\chi^2(8) = 35.923$, $p = 0.000$. Male victims were less likely than female victims to be in a close or intimate relationship with the offender than to be acquaintances to the offender. The relative risk ratio of being in a close or intimate relationship with the offender versus being an acquaintance to the offender decreased by 0.315 (0.147-0.674) if the victim's gender changed from female to male, Wald = 8.843, *df* = 1, *p* = 0.003. Young adult victims, adult victims and middle-age adult victims were more likely than older adult victims to be in a close or intimate relationship with the offender than to be acquaintances with the offender. The relative risk ratio of being in a close or intimate relationship with the offender versus being an acquaintance of the offender increased by 5.224 (1.501-18.178) if the victim's age changed from older adult to young adult, Wald = 6.753, *df* = 1, *p* = 0.009, by 7.803 (2.252-27.036) if the victim's age changed from older adult to adult, Wald = 10.499, *df* = 1, *p* = 0.001, and by 5.774 (1.356-24.581) if the victim's age changed from older adult to middle-age adult, Wald = 5.627, *df* = 1, *p* = 0.018.

Lastly, victims with single causes of death and moderate injuries, and victims with single causes of death and overkill injuries were more likely than victims with multiple causes of death and overkill injuries to be in a close or intimate relationship with the offender than to be acquaintances with the offender. The relative risk ratio of being in a close or intimate relationship with the offender versus being an acquaintance with the offender increased by 3.191 (1.304-7.811) if the victim's HISCon changed from multiple causes of death and moderate injuries to a single cause of death and overkill, Wald = 6.453, *df* = 1, *p* = 0.011, and by 7.996 (2.731-23.414) if the victim's HISCon changed from multiple causes of death and overkill

injuries to a single cause of death and overkill, Wald = 14.382, *df* = 1, *p* = 0.000. The model could not differentiate between strangers and acquaintances. The Model 1.1b results are presented in Table 10.

Table 10.
Multinomial Logistic Regression Parameter Estimates with Victim Offender Relationship as the Dependent Variable and Acquaintance as the Reference Category, Victim Gender and Age as Moderator Variables and Homicide Injury Scale Combined with the Number of Causes of Death (HISCON)-Acquaintance as Reference Category

							95% Confidence Interval for Exp(B)	
Victim Offender Relationship		B	Std. Error	Wald	df	Sig.	Exp(B)	Lower Bound	Upper Bound
	Intercept	-1.468	.545	7.262	1	.007			
	Male	.497	.38	1.718	1	.190	1.644	.782	3.46
	Female	0			0				
	Juvenile	.204	.989	.043	1	.836	1.227	.177	8.524
	Young Adult	.876	.53	2.729	1	.099	2.402	.849	6.794
	Adult	.253	.564	.201	1	.654	1.288	.427	3.886
	Middle Age Adult	.754	.662	1.298	1	.255	2.126	.581	7.779
	Older Adult	0			0				
	1 COD, None/Min Injury	.537	.534	1.010	1	.315	1.71	.601	4.869
	1 COD, Mod Injury	.376	.495	.576	1	.448	1.456	.552	3.844
	2 COD, Not Overkill	.571	.536	1.135	1	.287	1.77	.619	5.058
	1 COD, Overkill	.221	.673	.108	1	.743	1.247	.334	4.663
	2 COD, Overkill	0			0				
Strangers	Intercept	-1.899	.642	8.757	1	.003			

Close/ Intimate	Male	-1.156	.389	8.843	1	.003	.315	.147	.674
	Female	0			0				
	Juvenile	.536	1.113	.232	1	.63	1.709	.193	15.127
	Young Adult	1.653	.636	6.753	1	.009	5.224	1.501	18.178
	Adult	2.054	.634	1.499	1	.001	7.803	2.252	27.036
	Middle Age Adult	1.753	.739	5.627	1	.018	5.774	1.356	24.581
	Older Adult	0			0				
	1 COD, None/Min Injury	-.435	.584	.555	1	.456	.647	.206	2.034
	1 COD, Mod Injury	1.160	.457	6.453	1	.011	3.191	1.304	7.811
	2 COD, Not Overkill	.215	.551	.152	1	.697	1.239	.421	3.648
	1 COD, Overkill	2.079	.548	14.382	1	0	7.996	2.731	23.414
	2 COD, Overkill	0			0				

Note. a. The reference category is: Acquaintance. b. Reference category.

Moderator variables – type of homicide models. Before running type of homicide models, any moderator demographic characteristics were identified and the multinomial logistic regression assumptions were tested. To identify the moderator variables, multiple Chi-Square tests of independence were applied. Based on the Chi-Square test results, there was a statistically significant relationship between type of homicide and victim gender ($\chi^2 = 74.90$, d.f. = 2, p = 0.000, Cramer's V = 0.556), offender gender ($\chi^2 = 11.14$, d.f. = 2, p = 0.004, Cramer's V = 0.216), victim age ($\chi^2 = 38.82$, d.f. = 8, p = 0.000, Cramer's V = 0.283), and offender age ($\chi^2 = 36.54$, d.f. = 8, p = 0.000, Cramer's V = 0.275). There was no relationship between type of

homicide and victim race (χ^2 = 11.90, d.f. = 8, p = 0.156, Cramer's V = 0.157) or offender race (χ^2 = 11.82, d.f. = 8, p = 0.160, Cramer's V = 0.156). The results are presented in Table 11.

Table 11.
Relationship Between Type of Homicide and Victim and Offender Demographic Characteristics

Type of Homicide		χ^2	df	p-value	Effect Size (Cramer's V)
Victim					
	Gender	74.90	2	0.000*	0.556
	Age	38.82	8	0.000*	0.283
	Race	11.90	8	0.156	0.157
Offender					
	Gender	11.14	2	0.004*	0.216
	Age	36.54	8	0.000*	0.275
	Race	11.82	8	0.160	0.156

Note. * Statistically significant at the 0.05 level

According to the strength of the relationships between the victim or offender demographics and the type of homicide variable, represented by Cramer's V statistic, victim gender, victim age, offender gender and offender age were possible moderator variables. Due to sample size limitations, as well as multicollinearity concerns, only victim gender and victim age were introduced in the multinomial logistic model as moderator variables. Furthermore, victim gender and offender age had a strong statistically significant relationship between them (χ^2 = 17.27, d.f. = 4, p = 0.000, Cramer's V = 0.267), as did victim and offender gender (χ^2 = 17.82, d.f. = 1, p = 0.000, Cramer's Phi = 0.273). As a result, the moderating effects from the offender gender and age variables were partially accounted for by the victim gender variable.

Multicollinearity for Models 1.2a and 1.2b (see Appendix A) was tested by running a linear regression with type of homicide as the dependent variable. Victim age and HIS (HISCon), as well as victim gender were the independent variables. The VIF values varied between 1.042

and 2.560, indicating that there was no multicollinearity present. Since victim gender was dichotomous, it did not need to be coded into dummy variables. For victim age and homicide injury scale combined with the number of causes of death, one indicator variable was created for each category minus one (the reference category). For example, victim age was split into four indicator variables, since there were a total of five categories.

The results of the Model 1.2a (reference category = sexual homicide) multinomial logistic regression indicated that the overall model was statistically significant, $\chi^2(18) = 182.453$, $p = 0.000$. All three independent variables were statistically significant: victim age, $\chi^2(8) = 44.088$, $p = 0.000$, victim gender, $\chi^2(2) = 83.950$, $p = 0.000$, and HISCon, $\chi^2(8) = 63.404$, $p = 0.000$. Adult victims and middle aged victims were more likely than older adult victims to be in a domestic homicide than to be in a sexual homicide. The relative risk ratio of being in domestic homicide versus being in a sexual homicide increased by 5.857 (1.005-34.133) if the victim's age changed from older adult to adult, Wald = 3.863, $df = 1$, $p = 0.049$, and by 16.639 (2.065-134.048) if the victim's age changed from older adult to middle age adult, Wald = 6.976, $df = 1$, $p = 0.008$.

Victims with one cause of death and moderate injuries, as well as victims with one cause of death and overkill injuries, were more likely than victims with multiple causes of death and overkill injuries to be in a domestic homicide compared to a sexual homicide. The relative risk ratio of being in a domestic homicide versus being in a sexual homicide increased by 17.646 (5.030-61.907) if the victim's HISCon changed from multiple causes of death and overkill injuries to one cause of death and moderate injuries, Wald = 20.092, $df = 1$, $p = 0.000$, and by 16.677 (4.583-60.685) if the victim's HISCon changed from multiple causes of death and overkill injuries to one cause of death and overkill injuries. Males were more likely than females

to be victims of a felony homicide than a sexual homicide. The relative risk of being a victim of a felony homicide versus being a victim of a sexual homicide increased by 25.290 (8.870-72.103) if the victim's gender changed from female to male, Wald = 36.521, *df* = 1, *p* = 0.000. Lastly, juveniles, young adults and adults were less likely than older adults to be in a felony homicide than a sexual homicide. The relative risk ratio of being in a felony homicide versus a sexual homicide decreased by 0.037 (0.004-0.345) if the victim's age changed from older adult to juvenile, Wald = 8.362, *df* = 1, *p* = 0.004, by 0.113 (0.035-0.364) if the victim's age changed from old adult to young adult, Wald = 13.411, *df* = 1, *p* = 0.000, and by 0.250 (0.076-0.830) if the victim's age changed from older adult to adult, Wald = 5.127, *df* = 1, *p* = 0.024. The Model 1.2a results are presented in Table 12.

Table 12.
Multinomial Logistic Regression Parameter Estimates with Type of Homicide as the Dependent Variable, Victim Gender and Age as Moderator Variables and Homicide Injury Scale (HISCon)-Sexual Homicide as Reference Category

Type of homicide[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
	Intercept	-2.774	.957	8.396	1	.004			
	Male	-.288	.614	0.221	1	.639	.750	.225	2.496
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	-1.148	1.433	.642	1	.423	.317	.019	5.263
	Young Adult	.637	.889	0.514	1	.473	1.891	.331	10.793
	Adult	1.768	.899	3.863	1	.049	5.857	1.005	34.133
	Middle Age Adult	2.812	1.065	6.976	1	.008	16.639	2.065	134.048
	Older Adult	0[b]	.	.	0	.	.	.	.
	1 COD, None/Min Injury	.678	.683	0.986	1	.321	1.970	.517	7.517
	1 COD, Mod Injury	2.870	.640	20.092	1	.000	17.646	5.030	61.907
Domestic	2 COD, Not Overkill	.652	.715	0.831	1	.362	1.919	.472	7.797

	1 COD, Overkill	2.814	.659	18.232	1	.000	16.677	4.583	60.685
	2 COD, Overkill	0[b]	.	.	0	.	.	.	.
	Intercept	.460	.534	.743	1	.389			
	Male	3.230	.535	36.521	1	.000	25.290	8.870	72.103
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	-3.306	1.143	8.362	1	.004	0.037	.004	0.345
	Young Adult	-2.176	.594	13.411	1	.000	0.113	.035	0.364
	Adult	-1.385	.612	5.127	1	.024	0.250	0.076	0.830
	Middle Age Adult	-.092	.790	0.014	1	.907	0.912	.194	4.287
	Older Adult	0[b]	.	.	0	.	.	.	.
	1 COD, None/Min Injury	-.631	.622	1.029	1	.310	.532	.157	1.800
	1 COD, Mod Injury	.882	.582	2.294	1	.130	2.416	.772	7.564
	2 COD, Not Overkill	.172	.602	.082	1	.775	1.188	.365	3.862
	1 COD, Overkill	-1.335	.775	2.968	1	.085	0.263	0.058	1.202
Felony	2 COD, Overkill	0[b]	.	.	0	.	.	.	.

Note. a. The reference category is: Sexual. b. Reference category.

The results of the Model 1.2b (reference category = felony homicide) multinomial logistic regression were similar to Model 1.2a, as the variables entered in the regression were the same. Thus the overall model was statistically significant, $\chi^2(18) = 182.453$, $p = 0.000$, and all three independent variables were statistically significant: victim age, $\chi^2(8) = 44.088$, $p = 0.000$, victim gender, $\chi^2(2) = 83.950$, $p = 0.000$, and HISCon, $\chi^2(8) = 63.404$, $p = 0.000$. Males were less likely than females to be in a domestic homicide than to be in a felony homicide. The relative risk ratio of being in domestic homicide versus being in a felony homicide decreased by 0.030 (0.010-0.087) if the victim's sex changed from female to male, Wald = 41.233, $df = 1$, $p = 0.000$. Young adult victims, adult victims and middle aged victims were more likely than older

adult victims to be in a domestic homicide than to be in a felony homicide. The relative risk ratio of being in domestic homicide versus being in a felony homicide increased by 16.663 (2.902-95.673) if the victim's age changed from older adult to young adult, Wald = 9.953, *df* = 1, *p* = 0.002, by 23.392 (4.165-131.367) if the victim's age changed from older adult to adult age, Wald = 12.820, *df* = 1, *p* = 0.000, and by 18.243 (2.708-122.897) if the victim's age changed from older adult to middle age adult, Wald = 8.901, *df* = 1, *p* = 0.003.

Victims with one cause of death and moderate injuries, as well as victims with one cause of death and overkill injuries, were more likely than victims with multiple causes of death and overkill injuries to be in a domestic homicide compared to a felony homicide. The relative risk ratio of being in a domestic homicide versus being in a felony homicide increased by 7.304 (2.006-26.598) if the victim's HISCon changed from multiple causes of death and overkill injuries to one cause of death and moderate injuries, Wald = 9.094, *df* = 1, *p* = 0.003, and by 63.395 (12.538-320.545) if the victim's HISCon changed from multiple causes of death and overkill injuries to one cause of death and overkill injuries. Males were less likely than females to be victims of a sexual homicide than a felony homicide. The relative risk of being in a sexual homicide versus being in a felony homicide decreased by 0.040 (0.014-0.113) if the victim's gender changed from female to male, Wald = 36.521, *df* = 1, *p* = 0.000. Lastly, juveniles, young adults and adults were more likely than older adults to be in a sexual homicide than a felony homicide. The relative risk ratio of being in a sexual homicide versus a felony homicide increased by 27.279 (2.902-256.440) if the victim's age changed from old adult to juvenile, Wald = 8.362, *df* = 1, *p* = 0.004, by 8.811 (2.749-28.234) if the victim's age changed from old adult to young adult, Wald = 13.411, *df* = 1, *p* = 0.000, and by 3.994 (1.205-13.243) if the victim's age

changed from old adult to adult, Wald = 5.127, *df* = 1, *p* = 0.024. The Model 1.2a results are presented in Table 13.

Table 13.

Multinomial Logistic Regression Parameter Estimates with Type of Homicide as the Dependent Variable, Victim Gender and Age as Moderator Variables, and Homicide Injury Scale Combined with the Number of Causes of Death (HISCon)-Felony Homicide as Reference Category

							95% Confidence Interval for Exp(B)	
Type of homicide[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	Lower Bound	Upper Bound
Domestic	Intercept	-3.234	0.94	11.831	1	0.001			
	Male	-3.519	0.548	41.233	1	0	0.03	0.01	0.087
	Female	0			0				
	Juvenile	2.158	1.686	1.639	1	0.2	8.658	0.318	235.774
	Young Adult	2.813	0.892	9.953	1	0.002	16.663	2.902	95.673
	Adult	3.152	0.88	12.82	1	0	23.392	4.165	131.367
	Middle Age Adult	2.904	0.973	8.901	1	0.003	18.243	2.708	122.897
	Older Adult	0			0				
	1 COD, None/Min Injury	1.309	0.811	2.608	1	0.106	3.702	0.756	18.13
	1 COD, Mod Injury	1.988	0.659	9.094	1	0.003	7.304	2.006	26.598
	2 COD, Not Overkill	0.48	0.759	0.4	1	0.527	1.616	0.365	7.149
	1 COD, Overkill	4.149	0.827	25.182	1	0	63.395	12.538	320.545
	2 COD, Overkill	0			0				
Sexual	Intercept	-0.46	0.534	0.743	1	0.389			
	Male	-3.23	0.535	36.521	1	0	0.04	0.014	0.113
	Female	0			0				

Juvenile	3.306	1.143	8.362	1	0.004	27.279	2.902	256.44
Young Adult	2.176	0.594	13.411	1	0	8.811	2.749	28.234
Adult	1.385	0.612	5.127	1	0.024	3.994	1.205	13.243
Middle Age Adult	0.092	0.79	0.014	1	0.907	1.096	0.233	5.154
Older Adult	0			0				
1 COD, None/Min Injury	0.631	0.622	1.029	1	0.31	1.879	0.555	6.356
1 COD, Mod Injury	-0.882	0.582	2.294	1	0.13	0.414	0.132	1.296
2 COD, Not Overkill	-0.172	0.602	0.082	1	0.775	0.842	0.259	2.738
1 COD, Overkill	1.335	0.775	2.968	1	0.085	3.801	0.832	17.369
2 COD, Overkill	0			0				

Note. a. The reference category is: Felony. b. Reference category.

Research Question 2

This section presents the results of the inferential statistics employed to answer the second research question, stated in the second hypothesis: Does the severity of facial injury differ between victim-offender relationships?

Hypothesis 2. Facial injury as an indicator of depersonalization, either as a symbol of destruction of the person or to thwart identification, is postulated throughout the literature. Extensive facial injury has been found to be associated with closer victim-offender relationships, thereby supporting the notion that depersonalization in the form of destruction of the person is

dominant. Therefore, it is hypothesized that more severe facial injury will be associated with closer victim-offender relationships.

To answer the second hypothesis two multinomial logistic regression models were applied (Model 2.1 & Model 2.2; see Appendix B). The first model had the victim-offender relationship (strangers, acquaintances, close/intimate) as the dependent variable with strangers as the reference category, and the independent variable was the AIS combined with the number of facial injuries (no facial injury, single non-life threatening facial injury, single life-threatening facial injury, multiple non-life threatening injuries, multiple life threatening injuries). The second model had the victim-offender relationship as the dependent variable with acquaintance as the reference category and the independent variable was the AIS combined with the number of facial injuries. The models also included the moderator variable/s identified using Chi-square tests of independence between the victim or offender demographics and the victim-offender relationship variable. These moderator variables were identified in the preceding section as the victim gender and age.

Multicollinearity was tested by running a linear regression with victim-offender relationship as the dependent variable and indicator variables for victim age and facial injury scale compressed combined with the number of facial injuries (AIS), as well as victim gender variable as the independent variables. The VIF values varied between 1.242 and 2.587, indicating that there was no multicollinearity present. Since victim gender was dichotomous, it did not need to be coded into dummy variables. For victim age and AIS combined with the number of facial injuries, one indicator variable was created for each category minus one (the reference category). For example, victim age was split into four indicator variables, since there were a total of five categories.

The results of the Model 2.1a (reference category = strangers) multinomial logistic regression indicated that the overall model was statistically significant, $\chi^2(18) = 162.726$, $p = 0.000$. All three independent variables were statistically significant: victim age, $\chi^2(8) = 19.103$, $p = 0.014$, victim gender, $\chi^2(2) = 12.860$, $p = 0.002$, and AIS, $\chi^2(8) = 20.134$, $p = 0.010$. Victim gender and victim age trends were the same as victim-offender models discussed above. Victims with single non-life threatening facial injury and multiple non-life threatening facial injuries were less likely than victims with multiple life-threatening facial injuries to be in a close or intimate relationship with the offender than to be strangers to the offender. The relative risk ratio of being in a close or intimate relationship with the offender versus being a stranger to the offender decreased by 0.137 (0.029-0.641) if the victim's AIS changed from multiple life-threatening facial injuries to single non-life threatening facial injury, Wald = 6.366, $df = 1$, $p = 0.012$ and by 0.185 (0.055-0.625) if the victim's AIS changed from multiple life-threatening facial injuries to multiple non-life threatening facial injury, Wald = 7.384, $df = 1$, $p = 0.007$. The Model 2.1a results are presented in Table 14.

Table 14.
Multinomial Logistic Regression Parameter Estimates with Victim Offender Relationship as the Dependent Variable, Victim Gender and Age as Moderator Variables and AIS Combined with the Number of Facial Injuries (AIS)-Strangers as Reference Category

								95% Confidence Interval for Exp(B)	
Victim-Offender Relationship[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	Lower Bound	Upper Bound
	Intercept	1.366	.774	3.113	1	.078			
	Male	-.401	.386	1.078	1	.299	.669	.314	1.428
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	-.262	.988	.070	1	.791	.770	.111	5.334
	Young Adult	-.870	.528	2.710	1	.100	.419	.149	1.180
	Adult	-.199	.569	.123	1	.726	.819	.269	2.498
Acquaintance	Middle Age	-.560	.667	0.703	1	.402	.571	.154	2.114

	Adult								
	Older Adult	0[b]	.	.	0	.	.	.	.
	No Injuries								
	None	-.116	.726	0.026	1	.873	.890	.215	3.694
	Single Injury Non-Life Threatening	-.875	.813	1.157	1	.282	.417	.085	2.053
	Single Injury Life Threatening	-1.353	.962	1.977	1	.160	.259	.039	1.704
	Multiple Injuries Non-Life Threatening	-.178	.669	.071	1	.790	.837	.226	3.105
	Multiple Injuries Life Threatening	0[b]	.	.	0	.	.	.	.
	Intercept	1.175	.853	1.898	1	.168			
	Male	-1.382	.416	11.051	1	.001	.251	.111	.567
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	.540	1.241	.189	1	.664	1.715	.151	19.511
	Young Adult	.665	.705	0.888	1	.346	1.944	.488	7.743
	Adult	1.819	.731	6.187	1	.013	6.165	1.471	25.842
	Middle Age Adult	1.032	.813	1.611	1	.204	2.808	.570	13.829
	Older Adult	0[b]	.	.	0	.	.	.	.
	No Injuries								
	None	-.937	.671	1.953	1	.162	.392	.105	1.458
	Single Injury Non-Life Threatening	-1.990	.789	6.366	1	.012	0.137	.029	0.641
	Single Injury Life Threatening	-1.466	.812	3.254	1	.071	.231	.047	1.135
	Multiple Injuries Non-Life Threatening	-1.687	.621	7.384	1	.007	0.185	0.055	0.625
	Multiple Injuries Life Threatening	0[b]	.	.	0	.	.	.	.
Close/Intimate									

Note. a. The reference category is: Strangers. b. Reference category.

The results of the Model 2.1b (reference category = acquaintance) multinomial logistic regression were similar to Model 2.1a, as the variables entered into the regression were the same. Thus, the overall model was statistically significant, $\chi^2(18) = 162.726$, $p = 0.000$, and all three independent variables were statistically significant: victim age, $\chi^2(8) = 19.103$, $p = 0.014$, victim gender, $\chi^2(2) = 12.860$, $p = 0.002$, and AIS, $\chi^2(8) = 20.134$, $p = 0.010$. Victim gender and victim age trends were similar to those identified in the previous victim-offender relationship model.

Victims with multiple non-life threatening facial injuries were less likely than victims with multiple life-threatening facial injuries to be in a close or intimate relationship with the offender than to be acquaintances to the offender. The relative risk ratio of being in a close or intimate relationship with the offender versus being an acquaintance to the offender decreased by 0.221 (0.085-0.575) if the victim's AIS changed from multiple life-threatening facial injuries to multiple non-life threatening facial injury, Wald = 9.591, $df = 1$, $p = 0.002$. The Model 2.1b results are presented in Table 15.

Table 15

Multinomial Logistic Regression Parameter Estimates with Victim Offender Relationship as the Dependent Variable, Victim Gender and Age as Moderator Variables and AIS Combined with the Number of Facial Injuries (AIS)-Acquaintances as Reference Category

								95% Confidence Interval for Exp(B)	
Victim-Offender Relationship[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	Lower Bound	Upper Bound
	Intercept	-1.366	0.774	3.113	1	0.078			
	Male	0.401	0.386	1.078	1	0.299	1.494	0.700	3.186
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	0.262	0.988	0.070	1	0.791	1.299	0.187	9.006
	Young Adult	0.870	0.528	2.710	1	0.100	2.387	0.847	6.723
	Adult	0.199	0.569	0.123	1	0.726	1.221	0.400	3.722
	Middle Age Adult	0.560	0.667	0.703	1	0.402	1.750	0.473	6.473
Stranger	Older Adult	0[b]	.	.	0	.	.	.	.

	No Injuries None	0.116	0.726	0.026	1	0.873	1.123	0.271	4.660
	Single Inj Non-Life Threatening	0.875	0.813	1.157	1	0.282	2.399	0.487	11.813
	Single Inj Life Threatening	1.353	0.962	1.977	1	0.160	3.868	0.587	25.491
	Multiple Injuries Non-Life Threatening	0.178	0.669	0.071	1	0.790	1.195	0.322	4431
	Multiple Injuries Life Threatening	0[b]	.	.	0	.	.	.	.
	Intercept	-0.191	0.695	0.076	1	0.783			
	Male	-0.981	0.381	6.633	1	0.010	0.375	0.178	0.791
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	0.802	1.078	0.553	1	0.457	2.229	0.270	18.421
	Young Adult	1.534	0.625	6.021	1	0.014	4.638	1.362	15.799
	Adult	2.018	0.627	10.376	1	0.001	7.525	2.204	25.695
	Middle Age Adult	1.592	0.722	4.865	1	0.027	4.913	1.194	20.220
	Older Adult	0[b]	.	.	0	.	.	.	.
	No Injuries None	-0.821	0.530	2.397	1	0.122	0.440	0.156	1.244
	Single Inj Non-Life Threatening	-1.115	0.714	2.436	1	0.119	0.328	0.081	1.330
	Single Inj Life Threatening	-.113	0.817	0.019	1	0.890	0.893	0.180	4.432
	Multiple Injuries Non-Life Threatening	-1.509	0.487	9.591	1	0.002	0.221	0.085	0.575
Close/Intimate	Multiple Injuries Life Threatening	0[b]	.	.	0	.	.	.	.

Note. a. The reference category is: Acquaintance. b. Reference category.

Research Question 3

This section presents the results of the inferential statistics employed to answer the third research question, stated in the third hypothesis: Do types of homicide and different victim-offender relationships differ in terms of cause of death and whether or not the weapon used was brought to the scene?

Hypothesis 3. Although a close-in, personal attack is said to be common in both domestic and sexual homicides, the extant literature suggests that the weapons and methods used to cause death may vary between these two samples as well as between different victim-offender relationships. Cooper and Smith (2011) found intimate partner homicides to follow U.S. national homicide trends where shootings and stabbings are the leading causes of death. Conversely, Langevin et al. (1988) state that firearms are rarely used in sexual homicides where the offenders are more likely to be strangers or acquaintances. Some authors contend that sexual homicide offenders prefer a "hands-on," close-in method of killing (Brittain, 1970; Chan & Heide, 2008; Douglas et al., 2006). It is additionally suggested by Trojan and Krull (2012) that the weapon used is more likely to be one of opportunity when the relationship between offender and victim is intimate. It is therefore hypothesized that firearms will be more prevalent in domestic and intimate/close homicides, whereas manual/ligature strangulation and more close-in methods will be more prevalent in sexual and stranger/acquaintance homicides.

To answer the third hypothesis eight multinomial logistic regressions models were applied (see Appendix C). The first multinomial logistic regression model, Model 3.1a, had the victim-offender relationship (strangers, acquaintances, close/intimate) as the dependent variable with strangers as the reference category and the independent variable was the cause of death (COD; blunt trauma, stabbing, shooting, beating with hands or feet, multiple causes of death,

other causes of death, and manual or ligature strangulation). The second multinomial logistic regression model, Model 3.1b, had the victim-offender relationship as the dependent variable with acquaintance as the reference category and COD as the independent variable. The third multinomial logistic regression model, Model 3.2a, had the type of homicide (domestic, sexual, felony) as the dependent variable with sexual homicide as the reference category and COD as the independent variable. The fourth multinomial logistic regression model, Model 3.2b, had the type of homicide as the dependent variable with felony homicide as the reference category and COD as the independent.

To explore the additional offense variable, weapon of opportunity (WeapOp), the fifth multinomial logistic regression model, Model 3.3a, had the victim-offender relationship as the dependent variable with strangers as the reference category and the independent variable was weapon of opportunity (yes, no). The sixth multinomial logistic regression model, Model 3.3b, had the victim-offender relationship as the dependent variable with acquaintance as the reference category and weapon of opportunity as the independent variable. The seventh multinomial logistic regression model, Model 3.4a, had the type of homicide as the dependent variable with sexual homicide as the reference category and weapon of opportunity as the independent variable. The eighth multinomial logistic regression model, Model 3.4b, had the type of homicide as the dependent variable with felony homicide as the reference category and weapon of opportunity as the independent variable. The models also included the moderator variable/s identified using Chi-square tests of independence between the victim or offender demographics and the victim-offender relationship variable and the type of homicide variable. In both models the moderator variables were identified as victim gender and age in the preceding section (Research Question 1).

Multicollinearity for Models 3.1a and 3.1b was tested by running a linear regression with victim-offender relationship as the dependent variable. Victim age and cause of death (CODCon), as well as victim gender were the independent variables. The VIF values varied between 1.120 and 2.593, indicating that there was no multicollinearity present. Since victim gender was dichotomous, it did not need to be coded into dummy variables. For victim age and COD, one indicator variable was created for each category minus one (the reference category). For example, victim age was split into four indicator variable, since there were a total of five categories.

The results of the Model 3.1a (reference category = strangers) multinomial logistic regression indicate that the overall model was statistically significant, $\chi^2(22) = 51.396$, $p = 0.000$. Despite moderator variables being statistically significant: victim age, $\chi^2(8) = 20.709$, $p = 0.008$, and victim gender, $\chi^2(2) = 16.539$, $p = 0.000$, the independent variable CODCon was not statistically significant, $\chi^2(12) = 17.867$, $p = 0.120$. The results of the Model 3.1b (reference category = acquaintance) multinomial logistic regression were similar to Model 3.1a, as the variables entered in the regression were the same. The overall model was statistically significant, $\chi^2(22) = 51.396$, $p = 0.000$, and the moderator variables were statistically significant: victim age, $\chi^2(8) = 20.709$, $p = 0.008$, and victim gender, $\chi^2(2) = 16.539$, $p = 0.000$, but the independent variable, CODCon, was not statistically significant, $\chi^2(12) = 17.867$, $p = 0.120$. Victim gender and victim age trends in both models were the same as in previous victim-offender relationship models. In sum, Models 3.1a and 3.1b could not sufficiently distinguish between stranger, acquaintance, or close/intimate victim-offender relationships in regards to cause of death. The Model 3.1a and 3.1b results are presented in Table 16 and Table 17.

Table 16.

Multinomial Logistic Regression Parameter Estimates with Victim Offender Relationship as the Dependent Variable, Victim Gender and Age as Moderator Variables, and Cause of Death (CODCon) as Independent Variable – Strangers as Reference Category

Victim Offender Relationship[a]		B	Std. Error	Wald	df	Sig.	Exp (B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
	Intercept	.879	.591	2.212	1	.137			
	Male	-.362	.402	0.809	1	.368	.696	.317	1.532
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	-.085	.990	.007	1	.932	.919	.132	6.392
	Young Adult	-.829	.541	2.352	1	.125	.436	.151	1.259
	Adult	-.220	.571	.148	1	.700	.803	.262	2.458
	Middle Age Adult	-.725	.668	1.178	1	.278	.484	.131	1.793
	Older Adult	0[b]	.	.	0	.	.	.	.
	Blunt Trauma	.771	.704	1.198	1	.274	2.161	.544	8.586
	Stabbing	-.067	.538	.015	1	.902	.936	.326	2.685
	Shooting	-.057	.574	0.010	1	.921	.945	.307	2.911
	Beating (Hands/Feet)	.444	1.313	.114	1	.735	1.559	.119	20.449
	Multiple CODs	.808	.667	1.469	1	.226	2.244	0.607	8.293
	Other	0.37	.971	0.145	1	.704	1.447	0.216	9.704
Acquaintance	Strangulation	0[b]	.	.	0	.	.	.	.
	Intercept	-1.36	.788	3	1	.083			
	Male	-1.55	.427	13.265	1	0	0.211	0.091	0.488
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	.577	1.23	0.221	1	.639	1.781	0.16	19.789
	Young Adult	.959	.708	1.834	1	.176	2.608	0.651	10.447
	Adult	1.916	.728	6.935	1	.008	6.796	1.633	28.294
	Middle Age Adult	0.945	.808	1.368	1	.242	2.573	0.528	12.545
	Older Adult	0[b]	.	.	0	.	.	.	.
	Blunt Trauma	1.372	.758	3.278	1	.07	3.942	0.893	17.406
	Stabbing	1.19	.583	4.166	1	.041	3.288	1.048	10.311
	Shooting	1.568	.604	6.742	1	.009	4.799	1.469	15.679
	Beating (Hands/Feet)	1.374	1.37	1.007	1	.316	3.95	0.27	57.803
	Multiple CODs	1.818	.706	6.622	1	.01	6.16	1.542	24.599
Close/Intimate									

	Other	-.214	1.35	0.025	1	.874	0.807	0.057	11.511
	Strangulation	0[b]	.	.	0	.	.	.	.

Note. a. The reference category is: Strangers. b. Reference category.

Table 17.

Multinomial Logistic Regression Parameter Estimates with Victim Offender Relationship as the Dependent Variable, Victim Gender and Age as Moderator Variables and Cause of Death (CODCon) as Independent Variable – Acquaintances as Reference Category

								95% Confidence Interval for Exp(B)	
Victim Relationship[a]	Offender	B	Std. Error	Wald	df	Sig.	Exp(B)	Lower Bound	Upper Bound
Stranger	Intercept	-0.879	0.591	2.212	1	.137			
	Male	0.362	0.402	0.809	1	.368	1.436	0.653	3.158
	Female	0	.	.	0	.	.	.	.
	Juvenile	0.085	0.99	0.007	1	.932	1.089	0.156	7.576
	Young Adult	0.829	0.541	2.352	1	.125	2.291	0.794	6.612
	Adult	0.22	0.571	0.148	1	.7	1.246	0.407	3.816
	Middle Age Adult	0.725	0.668	1.178	1	.278	2.064	0.558	7.639
	Older Adult	0[b]	.	.	0	.	.	.	.
	Blunt Trauma	-0.771	0.704	1.198	1	.274	0.463	0.116	1.839
	Stabbing	0.067	0.538	0.015	1	.902	1.069	0.372	3.067
	Shooting	0.057	0.574	0.01	1	.921	1.058	0.344	3.261
	Beating (Hands/Feet)	-0.444	1.313	0.114	1	.735	0.641	0.049	8.414
	Multiple CODs	-0.808	0.667	1.469	1	.226	0.446	0.121	1.647
	Other	-0.37	0.971	0.145	1	.704	0.691	0.103	4.634
	Strangulation	0[b]	.	.	0	.	.	.	.
	Intercept	-2.243	0.709	10.017	1	.002			
	Male	-1.194	0.393	9.205	1	.002	0.303	0.14	0.655
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	0.662	1.073	0.38	1	.537	1.939	0.237	15.89
	Young Adult	1.788	0.627	8.143	1	.004	5.977	1.75	20.409
	Adult	2.136	0.626	11.644	1	.001	8.468	2.482	28.883
Close/Intimate	Middle Age Adult	1.67	0.719	5.401	1	.02	5.312	1.299	21.72

Older Adult	0[b]	.	.	0	.	.	.	.
Blunt Trauma	0.601	0.623	0.93	1	.335	1.824	0.538	6.192
Stabbing	1.257	0.546	5.291	1	.021	3.514	1.204	10.255
Shooting	1.625	0.565	8.269	1	.004	5.079	1.678	15.377
Beating (Hands/Feet)	0.93	1.155	0.648	1	.421	2.534	0.263	24.372
Multiple CODs	1.01	0.58	3.028	1	.082	2.745	0.88	8.56
Other	-0.584	1.24	0.222	1	.638	0.558	0.049	6.341
Strangulation	0[b]	.	.	0	.	.	.	.

Note. a. The reference category is: Acquaintance. b. Reference category.

Cause of death across homicide types was analyzed in Models 3.2a and 3.2b. Multicollinearity was tested by running a linear regression with type of homicide as the dependent variable. Victim age and cause of death (CODCon), as well as victim gender were the independent variables. The VIF values varied between 1.120 and 2.593, indicating that there was no multicollinearity present. Since victim gender was dichotomous, it did not need to be coded into dummy variables. For victim age and causes of death combined, one indicator variable was created for each category minus one (the reference category). For example, victim age was split into four indicator variable, since there were a total of five categories.

The results of the Model 3.2a multinomial logistic regression indicate that the overall model was statistically significant, $\chi^2(22) = 169.182$, $p = 0.000$, and all three independent variables were statistically significant: victim age, $\chi^2(8) = 47.696$, $p = 0.000$, victim gender, $\chi^2(2) = 56.839$, $p = 0.000$, and CODCon, $\chi^2(12) = 50.132$, $p = 0.000$. Trends pertaining to victim gender and age were the same as previous type of homicide models. When victim's cause of death was shooting, they were more likely than victims that were strangled (manual or ligature) to be in a domestic homicide compared to a sexual homicide. The relative risk ratio of being in a domestic homicide versus being in a sexual homicide increased by 66.172 (7.318-598.338) if the

victim's CODCon changed from strangulation (manual or ligature) to shooting, Wald = 13.925, *df* = 1, *p* = 0.000. Similarly, when a victim's cause of death was shooting, they were more likely than victims that were strangled (manual or ligature) to be in a felony homicide compared to a sexual homicide. The relative risk ratio of being in a felony homicide versus being in a sexual homicide increased by 113.132 (10.956-1168.177) if the victim's CODCon changed from strangulation (manual or ligature) to shooting, Wald = 15.758, *df* = 1, *p* = 0.000. Model 3.2a results are presented in Table 18.

Table 18.
Multinomial Logistic Regression Parameter Estimates with Type of Homicide as the Dependent Variable, Victim Gender and Age as Moderator Variables and Causes of Death (CODCon) as Independent Variable – Sexual as Reference Category

								95% Confidence Interval for Exp(B)	
Type of Homicide[a]		B	Std. Error	Wald	df	Sig.	Exp (B)	Lower Bound	Upper Bound
	Intercept	-1.952	.887	4.840	1	.028			
	Male	-.067	.594	0.013	1	.910	.935	.292	2.994
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	-1.091	1.521	.514	1	.473	.336	.017	6.623
	Young Adult	.639	.847	0.569	1	.450	1.895	.360	9.966
	Adult	1.688	.858	3.871	1	.049	5.411	1.006	29.095
	Middle Age Adult	2.375	.997	5.674	1	.017	10.755	1.523	75.944
	Older Adult	0[b]	.	.	0	.	.	.	.
	Blunt Trauma	1.037	.632	2.697	1	.101	2.822	.818	9.736
	Stabbing	.668	.539	1.539	1	.215	1.950	.679	5.605
	Shooting	4.192	1.123	13.925	1	.000	66.172	7.318	598.338
	Beating (Hands/Feet)	1.013	1.123	.812	1	.367	2.753	.304	24.885
	Multiple CODs	0.397	0.573	0.478	1	.489	1.487	0.483	4.574
	Other	-0.228	1.251	0.033	1	.855	0.796	0.069	9.25
Domestic	Strangulation	0[b]	.	.	0	.	.	.	.
	Intercept	-0.078	0.677	0.013	1	.909			
Felony	Male	2.644	0.553	22.893	1	0	14.075	4.764	41.582

Female	0[b]	.	.	0	.	.	.	.
Juvenile	-3.816	1.292	8.72	1	.003	0.022	0.002	0.277
Young Adult	-2.697	0.639	17.813	1	0	0.067	0.019	0.236
Adult	-1.822	0.639	8.118	1	.004	0.162	0.046	0.566
Middle Age Adult	-0.262	0.815	0.103	1	.748	0.77	0.156	3.806
Older Adult	0[b]	.	.	0	.	.	.	.
Blunt Trauma	0.841	0.805	1.091	1	.296	2.319	0.479	11.236
Stabbing	0.842	0.668	1.585	1	.208	2.320	0.626	8.598
Shooting	4.729	1.191	15.758	1	.000	113.13	10.95	1168.17
Beating (Hands/Feet)	-0.332	1.592	0.043	1	.835	0.718	0.032	16.271
Multiple CODs	-0.199	0.795	0.063	1	.802	0.819	0.173	3.892
Other	1.024	1.172	0.763	1	.382	2.784	0.28	27.663
Strangulation	0[b]	.	.	0	.	.	.	.

Note. a. The reference category is: Sexual. b. Reference category.

The results of the Model 3.2b (reference category = felony) multinomial logistic regression were similar to Model 3.2a, as the variables entered in the regression were the same. Hence the overall model was statistically significant, $\chi^2(22) = 169.182$, $p = 0.000$ and all three independent variables were statistically significant: victim age, $\chi^2(8) = 47.696$, $p = 0.000$, victim gender, $\chi^2(2) = 56.839$, $p = 0.000$, and CODCon, $\chi^2(12) = 50.132$, $p = 0.000$. Trends pertaining to victim gender and age were the same as the previous type of homicide model (see Model 1.2b). When the victim's cause of death was shooting, they were less likely than victims that were strangled (manual or ligature) to be in a sexual homicide compared to a felony homicide. The relative risk ratio of being a sexual homicide victim versus being a felony homicide victim decreased by 0.009 (0.001-0.091) if the victim's CODCon changed from strangulation (manual or ligature) to shooting, Wald = 15.758, $df = 1$, $p = 0.000$. No significant differences between domestic and felony homicide causes of death were found. Model 3.2b results are presented in Table 19.

Table 19.
Multinomial Logistic Regression Parameter Estimates with Type of Homicide as the Dependent Variable, Victim Gender and Age as Moderator Variables and Causes of Death Combined (CODCon) as Independent Variable – Felony as Reference Category

Type of Homicide[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
	Intercept	-1.875	0.959	3.825	1	.05			
	Male	-2.711	0.444	37.252	1	0	0.066	0.028	0.159
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	2.726	1.593	2.928	1	.087	15.271	0.673	346.676
	Young Adult	3.336	0.882	14.323	1	0	28.119	4.996	158.276
	Adult	3.511	0.86	16.651	1	0	33.466	6.199	180.675
	Middle Age Adult	2.637	0.914	8.322	1	.004	13.972	2.329	83.822
	Older Adult	0[b]	.	.	0	.	.	.	.
	Blunt Trauma	0.196	0.846	0.054	1	.816	1.217	0.232	6.388
	Stabbing	-0.173	0.731	0.056	1	.812	0.841	0.201	3.52
	Shooting	-0.536	0.714	0.563	1	.453	0.585	0.144	2.373
	Beating (Hands/Feet)	1.344	1.59	0.715	1	.398	3.835	0.17	86.508
	Multiple CODs	0.596	0.856	0.484	1	.487	1.814	0.339	9.715
	Other	-1.252	1.491	0.705	1	.401	0.286	0.015	5.318
Domestic	Manual/Ligature Strangulation	0[b]	.	.	0	.	.	.	.
	Intercept	0.078	0.677	0.013	1	.909			
	Male	-2.644	0.553	22.893	1	0	0.071	0.024	0.21
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	3.816	1.292	8.72	1	.003	45.443	3.609	572.24
	Young Adult	2.697	0.639	17.813	1	0	14.84	4.241	51.934
	Adult	1.822	0.639	8.118	1	.004	6.184	1.766	21.658
	Middle Age Adult	0.262	0.815	0.103	1	.748	1.299	0.263	6.424
	Older Adult	0[b]	.	.	0	.	.	.	.
	Blunt Trauma	-0.841	0.805	1.091	1	.296	0.431	0.089	2.09
	Stabbing	-0.842	0.668	1.585	1	.208	0.431	0.116	1.598
	Shooting	-4.729	1.191	15.758	1	0	0.009	0.001	0.091
	Beating (Hands/Feet)	0.332	1.592	0.043	1	.835	1.393	0.061	31.587
Sexual									

Multiple CODs	0.199	0.795	0.063	1	.802	1.22	0.257	5.796
Other	-1.024	1.172	0.763	1	.382	0.359	0.036	3.57
Manual/Ligature Strangulation	0[b]	.	.	0	.	.	.	.

Note. a. The reference category is: Felony. b. Reference category.

Multicollinearity for Models 3.3a and 3.3b was tested by running a linear regression with victim-offender relationship as the dependent variable, and victim age, victim gender, and weapon of opportunity (WeapOp) as the independent variables. The VIF values varied between 1.062 and 2.447, indicating that there was no multicollinearity present. Since victim gender and weapon of opportunity were dichotomous, they did not need to be coded into dummy variables. For victim age, one indicator variable was created for each category minus one (the reference category). Victim age was split into four indicator variables, since there was a total of five categories.

The results of the Model 3.3a (reference category = strangers) multinomial logistic regression indicated that the overall model was statistically significant, $\chi^2(12) = 35.519$, $p = 0.000$. However, while the moderator variables were statistically significant: victim age, $\chi^2(8) = 20.139$, $p = 0.010$, and victim gender, $\chi^2(2) = 10.451$, $p = 0.005$, the independent variable WeapOp was not statistically significant, $\chi^2(2) = 4.089$, $p = 0.129$. The results of Model 3.3b (reference category = acquaintances) were essentially the same, whereby the moderator variables (listed above) were statistically significant and the independent variable, WeapOp, was not. Victim gender and victim age trends were the same as previous victim-offender relationship models. Model 3.3a and Model 3.3b results are presented in Table 20 and Table 21.

Table 20.
Multinomial Logistic Regression Parameter Estimates with Victim Offender Relationship as the Dependent Variable, Victim Gender and Age as Moderator Variables and Weapon of Opportunity (WeapOp) as the Independent Variable – Strangers as Reference Category

Victim Offender Relationship[a]		B	Std. Error	Wald	d	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
	Intercept	0.547	0.562	0.944	1	.331			
	Male	-0.241	0.388	0.387	1	.534	0.785	0.367	1.681
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	0.822	1.229	0.447	1	.504	2.276	0.204	25.327
	Young Adult	-0.557	0.555	1.007	1	.316	0.573	0.193	1.7
	Adult	-0.214	0.577	0.138	1	.71	0.807	0.26	2.503
	Middle Age Adult	-0.412	0.695	0.351	1	.554	0.662	0.169	2.589
	Older Adult	0[b]	.	.	0	.	.	.	.
	Weapon of Op	0.669	0.397	2.84	1	.092	1.952	0.897	4.248
	No Weapon of Op	0[b]	.	.	0	.	.	.	.
Acquaintance	Intercept	-0.805	0.718	1.259	1	.262			
	Male	-1.19	0.411	8.372	1	.004	0.304	0.136	0.681
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	1.703	1.411	1.457	1	.227	5.493	0.346	87.312
	Young Adult	1.197	0.713	2.82	1	.093	3.31	0.819	13.381
	Adult	2.006	0.727	7.618	1	.006	7.435	1.789	30.9
	Middle Age Adult	1.42	0.829	2.936	1	.087	4.139	0.815	21.008
	Older Adult	0[b]	.	.	0	.	.	.	.
	Weapon of Op	0.745	0.393	3.585	1	.058	2.106	0.974	4.554
	No Weapon of Op	0[b]	.	.	0	.	.	.	.
Close/Intimate									

Note. a. The reference category is: Strangers. b. Reference category.

Table 21.

Multinomial Logistic Regression Parameter Estimates with Victim Offender Relationship as the Dependent Variable, Victim Gender and Age as Moderator Variables and Weapon of Opportunity (WeapOp) as the Independent Variable – Acquaintance as Reference Category

Victim Offender Relationship		B	Std. Error	Wald	d	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
	Intercept	-0.547	0.562	0.944	1	.331			
	Male	0.241	0.388	0.387	1	.534	1.273	0.595	2.725
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	-0.822	1.229	0.447	1	.504	0.439	0.039	4.891
	Young Adult	0.557	0.555	1.007	1	.316	1.746	0.588	5.183
	Adult	0.214	0.577	0.138	1	.71	1.239	0.4	3.843
	Middle Age Adult	0.412	0.695	0.351	1	.554	1.51	0.386	5.9
	Older Adult	0[b]	.	.	0	.	.	.	.
	Weapon of Op	-0.669	0.397	2.84	1	.092	0.512	0.235	1.115
Strangers	No Weapon of Op	0[b]	.	.	0	.	.	.	.
	Intercept	-1.352	0.631	4.585	1	.032			
	Male	-0.948	0.375	6.383	1	.012	0.387	0.186	0.808
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	0.881	1.066	0.684	1	.408	2.414	0.299	19.488
	Young Adult	1.754	0.626	7.845	1	.005	5.778	1.693	19.718
	Adult	2.221	0.627	12.543	1	0	9.212	2.696	31.482
	Middle Age Adult	1.832	0.728	6.332	1	.012	6.248	1.5	26.03
	Older Adult	0[b]	.	.	0	.	.	.	.
	Weapon of Opportunity	0.076	0.341	0.05	1	.823	1.079	0.553	2.105
Close/Intimate	No Weapon of Op	0[b]	.	.	0	.	.	.	.

Note. a. The reference category is: Acquaintance. b. Reference category.

Multicollinearity for Models 3.4a and 3.4b was tested by running a linear regression with type of homicide as the dependent variable, and victim age, victim gender, and weapon of opportunity (WeapOp) as the independent variables. The VIF values varied between 1.062 and 2.468, indicating that there was no multicollinearity present. Since victim gender and weapon of opportunity (WeapOp) were dichotomous, they did not need to be coded into dummy variables. For victim age one indicator variable was created for each category minus one (the reference category). Victim age was split into four indicator variable, since there were a total of five categories.

The results of the Model 3.4a (reference category = sexual) multinomial logistic regression indicated that the overall model was statistically significant, $\chi^2(12) = 135.902$, $p = 0.000$, and all three independent variables were statistically significant: victim age, $\chi^2(8) = 51.376$, $p = 0.000$, victim gender, $\chi^2(2) = 68.264$, $p = 0.000$, and WeapOp, $\chi^2(2) = 19.805$, $p = 0.000$. Findings pertaining to victim gender and victim age followed the same trends as previous type of homicide models. The model indicates that the victim was less likely to be a victim of felony homicide compared to a sexual homicide when the weapon was one of opportunity compared to when the weapon was brought to the scene. The relative risk ratio of being in a felony homicide versus being in a sexual homicide decreased by 0.131 (0.049-0.349) if the WeapOp changed from no to yes, Wald = 16.570, $df = 1$, $p = 0.000$. Model 3.4a results are presented in Table 22.

Table 22.

Multinomial Logistic Regression Parameter Estimates with Type of Homicide as the Dependent Variable, Victim Gender and Age as Moderator Variables and Weapon of Opportunity (WepOp)as the Independent Variable – Sexual as the Reference Category

								95% Confidence Interval for Exp(B)	
Type of Homicide[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	Lower Bound	Upper Bound
	Intercept	-0.927	0.868	1.14	1	0.286			
	Male	0.397	0.571	0.483	1	0.487	1.488	0.485	4.56
	Female	0	.	.	0	.	.	.	.
	Juvenile	-0.462	1.407	0.108	1	0.743	0.63	0.04	9.936
	Young Adult	0.732	0.848	0.745	1	0.388	2.08	0.394	10.969
	Adult	1.959	0.858	5.215	1	0.022	7.091	1.32	38.094
	Middle Age Adult	2.616	1.027	6.493	1	0.011	13.679	1.829	102.295
	Older Adult	0	.	.	0	.	.	.	.
	Weapon of Opportunity	-0.513	0.387	1.752	1	0.186	0.599	0.28	1.28
Domestic	No Weapon of Op	0	.	.	0	.	.	.	.
	Intercept	1.986	0.656	9.164	1	0.002			
	Male	3.282	0.561	34.18	1	0	26.618	8.859	79.976
	Female	0	.	.	0	.	.	.	.
	Juvenile	-3.447	1.183	8.494	1	0.004	0.032	0.003	0.323
	Young Adult	-3.111	0.722	18.544	1	0	0.045	0.011	0.184
	Adult	-1.838	0.682	7.264	1	0.007	0.159	0.042	0.606
	Middle Age Adult	-0.528	0.945	0.312	1	0.576	0.59	0.093	3.758
	Older Adult	0	.	.	0	.	.	.	.
	Weapon of Opportunity	-2.032	0.499	16.57	1	0	0.131	0.049	0.349
Felony	No Weapon of Opportunity	0	.	.	0	.	.	.	.

Note. a. The reference category is: Sexual. b. Reference category.

The results of the Model 3.4b (reference category = felony) multinomial logistic regression were similar to Model 3.4a, as the variables entered in the regression were the same. Consequently, the overall model was statistically significant, $\chi^2(12) = 135.902$, $p = 0.000$ and all three independent variables were statistically significant: victim age, $\chi^2(8) = 51.376$, $p = 0.000$, victim gender, $\chi^2(2) = 68.264$, $p = 0.000$, and WeapOp, $\chi^2(2) = 19.805$, $p = 0.000$. Findings pertaining to victim gender and age were the same as previous models. Victims that were killed with a weapon of opportunity were more likely compared to victims killed with a weapon brought to the scene to be involved in a domestic homicide than a felony homicide. The relative risk of being in a domestic homicide versus being in a felony homicide increased by 4.571 (1.849-11.297) if the WeapOp changed from no to yes, Wald = 10.836, $df = 1$, $p = 0.001$. Lastly, when the victim was killed by a weapon of opportunity, they were more likely than victims that were killed by a weapon brought to the scene to be in a sexual homicide compared to a felony homicide. The relative risk ratio of being in a sexual homicide versus being in a felony homicide increased by 7.633 (2.869-20.310) if the WeapOp changed from planned to opportunity, Wald = 16.570, $df = 1$, $p = 0.000$. Model 3.4b results are presented in Table 23.

Table 23.

Multinomial Logistic Regression Parameter Estimates with Type of Homicide as the Dependent Variable, Victim Gender and Age as Moderator Variables and Weapon of Opportunity (WeapOp)as the Independent Variable – Felony as the Reference Category

								95% Confidence Interval for Exp(B)	
Type of Homicide[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	Lower Bound	Upper Bound
Domestic	Intercept	-2.913	0.871	11.177	1	.001			
	Male	-2.884	0.473	37.126	1	0	0.056	0.022	0.141
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	2.985	1.573	3.601	1	.058	19.79	0.907	431.888

	Young Adult	3.843	0.937	16.819	1	0	46.687	7.438	293.028
	Adult	3.797	0.888	18.298	1	0	44.547	7.822	253.685
	Middle Age Adult	3.144	0.995	9.987	1	.002	23.186	3.3	162.897
	Older Adult	0[b]	.	.	0	.	.	.	.
	Weapon of Op	1.52	0.462	10.836	1	.001	4.571	1.849	11.297
	No Weapon of Op	0[b]	.	.	0	.	.	.	.
	Intercept	-1.986	0.656	9.164	1	.002			
	Male	-3.282	0.561	34.18	1	0	0.038	0.013	0.113
	Female	0[b]	.	.	0	.	.	.	.
	Juvenile	3.447	1.183	8.494	1	.004	31.408	3.092	318.993
	Young Adult	3.111	0.722	18.544	1	0	22.444	5.447	92.479
	Adult	1.838	0.682	7.264	1	.007	6.282	1.651	23.906
	Middle Age Adult	0.528	0.945	0.312	1	.576	1.695	0.266	10.797
	Older Adult	0[b]	.	.	0	.	.	.	.
	Weapon of Opportunity	2.032	0.499	16.57	1	0	7.633	2.869	20.31
Sexual	No Weapon of Op	0[b]	.	.	0	.	.	.	.

Note. a. The reference category is: Felony. b. Reference category.

Interrater Reliability

Cohen's kappa was calculated for 10% of the sample to determine two independent raters' agreement on condensed versions of HIS and AIS scores, as these variables were used in analyses. As shown in Tables 24 and 25, the two raters agreed on 21 out of 25 HIS ratings and on 24 out of 25 AIS ratings. It appears that differentiating between overkill and not overkill underscored disagreement among HIS ratings, which is not surprising considering the difficulties outlined in the literature with respect to operationalizing this construct (Trojan & Krull, 2012). Regardless, Cohen's kappa or HIS ratings indicated good agreement between the raters, κ =

.790, $p < .001$. Distinguishing between life threatening and non-life threatening injuries appeared not problematic, with a very good level of agreement among raters, $\kappa = .935$, $p < .001$. However, a closer look at how agreement would have looked if the AIS had not been condensed indicates that while still determined to be good agreement ($\kappa = .744$, $p < .001$), there was less agreement when distinguishing between minimal and moderate ratings, as well as between serious and severe ratings. Thus suggesting that raters' ability to make more nuanced assessments of injuries was less consistent. This result is presented in Table 26.

Table 24.

*HISRater1 * HISRater2 Crosstabulation*

		HISRater2					
		Single/Min	Single/ Mod	2+/Not OK	Single/OK	2+/OK	Total
HISRater 1	Single/Min	3	0	0	0	0	3
	Single/Mod	0	5	0	0	0	5
	2+ /NotOK	0	0	5	0	0	5
	Single/OK	1	0	0	1	0	2
	2+/OK	0	0	3	0	7	10
Total		4	5	8	1	7	25

Table 25.

*AISadj1 * AISadj2 Crosstabulation*

		AISadj2			
		None	Non-Life Threatening	Life Threatening	Total
AISadj1	None	8	0	0	8
	Non-Life Threatening	0	12	0	12
	Life Threatening	0	1	4	5
Total		8	13	4	25

Table 26.
*AISRater1 * AISRater2 Crosstabulation*

		AISRater2					
		None	Min	Mod	Serious	Unsurvivable	Total
AISRater1	None	7	0	0	0	0	7
	Minimal	0	6	4	0	0	10
	Moderate	0	0	1	0	0	1
	Serious	0	0	0	2	0	2
	Severe	0	0	0	1	0	1
	Unsurvivable	0	0	0	0	4	4
Total		7	6	5	3	4	25

Chapter 5

Discussion

Historical analyses of homicide have identified consistent trends in the nature of these heinous events. Specifically, that homicide is a predominately male-on-male crime between individuals who are familiar with one another, is usually as a result of an argument or confrontation, and, in the U.S., most often involves the use of a firearm (U.S. Department of Justice, 2016). However, extensive scientific inquiry into the phenomenon of homicide has suggested that victim, offender, and offense characteristics vary across victim-offender relationships and subtypes of homicide; thereby highlighting the importance of more in-depth empirical examination differentiating between these variables (Douglas et al., 2006; Salfati & Canter, 1999; Safarik & Jarvis, 2005; Thomas et al., 2011; Trojan & Krull, 2012). The nature and extent of injury sustained during a homicide event is one area of study that is in its relative infancy and suggested to hold significance in the understanding of crime scene dynamics and the apprehension of offenders. The current study aimed to expand upon previous research implying the significance of injury severity in the study of homicide and associated demographic and crime scene characteristics. If injury severity, cause of death, and impulsivity (as measured by weapon of opportunity) is found to vary across victim-offender relationships and subtypes of homicide, then assessment of these characteristics could be useful in the psychological understanding, assessment, and apprehension of offenders.

Victim and Offender Characteristics

Most of the demographic characteristics of the victims and perpetrators in this sample were consistent with those noted in the extant literature. Similar to national statistics provided by the UCR (United States Department of Justice, 2016), this sample consisted of homicide events

that were racially homogeneous (e.g., Whites killed Whites, Blacks killed Blacks, etc.); a pattern that persisted regardless of victim-offender relationship or type of homicide. Despite Blacks outnumbering Whites as both victims (52.3% vs. 43.5%) and offenders in national homicide trends (55.5% vs 45.9%; United States Department of Justice, 2016), race trends in this study diverged from national trends in that the vast majority of offenders and victims were White across all homicide types and relationships. This was expected, as Whites are found to be both victims and offenders in the majority of domestic and sexual homicides (Flowers, 2013; United States Department of Justice, 2005).

The representativeness of felony homicides in terms of race is less clear. Available statistics appear not to break down demographic and offense characteristics across specific types of homicide. As such, felony homicide is a much less researched area in the homicide literature. Statistics on felony crimes associated with a homicide may be underrepresented, as the homicide takes precedence, and associated data are not consistently recorded. However, it can be surmised from existing felony arrest statistics – not involving murder – that the prevalence of White offenders and victims in this study closely resembles national trends (United States Department of Justice, 2016). While national trends indicate that most male offenders also have male victims, most victims in this study were female due to the selection of domestic and sexual homicide cases, which tend to be largely male-on-female crimes (Meloy, 2000). Similar to rates found in the UCR, male victims made up the majority of felony homicides (64%); though 17% less than the national average of (United States Department of Justice, 2016).

Victim and offender age was also consistent with national trends. The majority of victims and offenders in this study fell in the young adult and adult categories (71.9%), ranging in age from 18-49 (M = 38.64; M = 30.97 respectively). When age was examined more closely, some

variations in age emerged across homicide types and relationships. The majority of domestic homicide offenders and victims tended to fall within the adult and middle age adult categories (62.1% and 63.3% respectively). The mean age of DH offenders and victims was 37 and 35 respectively. Close/intimate offenders and victims were also close in age (M = 35 for both), with adults and middle age adults collectively making up 57.5% of offenders and 58.6% of victims. Age differences between offenders and victims were more pronounced amongst all other homicide types and relationships. Victim mean age tended to be higher than offender mean age, with the largest discrepancies emerging within the felony (M = 46 vs M = 28), stranger (M = 37 vs M = 28), and acquaintance groups (M = 43 vs M = 28). Sexual homicides demonstrated the smallest discrepancy with victims having a mean age of 33 and age 28 for offenders.

One explanation for mean age discrepancies among the felony homicides, stranger relationships, and acquaintance relationships, pertains to the prevalence of victims over 50; and particularly those over 65. In the current study, elderly victims surged to almost a quarter of all felony homicides and a fifth of acquaintance homicides despite only accounting for 5% of all homicide victims in the U.S. (United States Department of Justice, 2016). Indeed, there is less risk involved in targeting an individual who may be perceived as weak and less likely to resist. Age may make this group appear vulnerable and easy targets for felony crimes such as robbery and burglary. Previous research also suggests that elderly female homicide victims are less likely than younger age groups to have a current or former intimate relationship with the offender (Jordan et al., 2010). Consistent with previous research, older adults in this study were significantly less likely to be in a close/intimate relationship with the offender than an acquaintance or stranger. In turn, older adults were significantly less likely than other age groups to be victims of a domestic or sexual homicide than a felony homicide.

Injury Severity Findings

Whether to the body in general or the face in particular, how and to what extent wounding is inflicted has been proclaimed a potential indicator of the nature of a victim's relationship to his or her killer (Douglas et al., 2006; Ressler et al., 1992; Trojan & Krull, 2012). In fact, the nature of injuries sustained can provide valuable investigative information. At the risk of over-simplifying, a single shot paints a different investigative picture than 67 stab wounds. However, seemingly intuitive assumptions based on injury severity can also lead less experienced homicide investigators astray, and the findings of this study with respect to injury severity demonstrate how seemingly subtle differences in wounding behavior may point to a completely different offender than what would logically be assumed. In an effort to build upon existing research and provide additional empirical data elucidating the degree to which wounding may vary between homicides and relationships, the first aim of this study was to examine the ability of injury severity to predict victim-offender relationship and/or type of homicide. This study additionally aimed to take the examination of injury severity a step further than previous research by utilizing an injury assessment tool with proven validity rather than raters' subjective assessment.

Analysis of body injury severity in the current study – as measured by the HIS – suggests that single causes of death with moderate to excessive wounding are predictive of intimate relationships and domestic homicides. Additional analyses were unable to distinguish between stranger and acquaintance relationships or felony and sexual homicides from a predictive standpoint. Interestingly, excessive wounding beyond that which is necessary to cause death (i.e., overkill) was observed more than expected in both acquaintance and intimate homicides, and multiple causes of death with excessive injuries occurred more frequently in sexual and felony

homicides than domestic homicides. When examined in the context of victim-offender relationship, multiple causes of death with excessive injuries was observed to occur more than expected in acquaintance relationships. Such nuanced differences highlight the need to avoid intuitive assumptions beyond: 1) when overkill is present, the offender is less likely to be a stranger and more likely to be known to the offender; and 2) regardless of injury severity, intimate and domestic homicides are more likely to involve a single COD.

Another interesting finding pertained to the tendency for sexual homicides to almost equally be as likely to involve minimal or no injuries (27.3%) as they were to demonstrate overkill with multiple CODs (31.2%). While this finding may appear to be contradictory, it may also be a reflection of sexual homicide offender typologies, whereby lower HIS scores reflect more organized or compulsive offenders and higher HIS scores reflect more disorganized or acute catathymic offenders. Additional research examining wounding patterns between sexual offender typologies may further clarify this assertion.

Facial Injury Severity Findings

To date, empirical examination of the association between facial wounding during a homicide event and victim-offender relationship has been negligible. Interest in this link stems from the IPV literature and the offender profiling literature. The majority of injuries sustained during domestic assaults are to the head, face, and neck; a finding that is well documented in the IPV literature (Arosarena et al., 2009; Curca et al., 2012; Sheridan & Nash, 2007). Facial injury is discussed in the offender profiling literature as an expressive behavior, possibly reflecting depersonalization of the victim (Salfati & Canter, 1999; Trojan & Krull, 2012). In an effort to empirically examine differences in facial wounding across victim-offender relationship, Trojan and Krull (2012) found that facial wounding was significantly more prevalent as the intimacy of

the victim-offender relationship increased. However, the severity of facial wounding in their study was unclear and they were limited by a small sample of intimate relationship homicides. The current study aimed to provide more specificity in regard to the severity of facial wounding, as well as examine the frequency of wounding.

Facial injury in the current study was absent in approximately one quarter of all cases in the sample (n = 62), and approximately one quarter of each of the victim-offender relationship categories. However, when facial injury was present, victims with multiple facial injuries – where at least one facial wound may have contributed to death – were significantly more likely to be in a close/intimate relationship with the offender than a stranger or an acquaintance. This finding supports the hypothesis that closer relationships are associated with more severe facial injury, and appears to support the contentions of previous researchers (Trojan & Krull, 2012).

Moreover, the nature of facial injury in this study also holds implications for the concept of depersonalization, which is characterized as being the destruction of the person through destruction of the face. According to the profiling literature, the presence of extreme facial injury in homicide is "not only a manifestation of deep-seated and often long-standing anger by the offender against the victim, but also an attempt to depersonalize him or her . . . the facial battery indicates an attempt to strip the victim of actual identity" (Douglas & Olshaker, 2000, p. 127). Facial injury as a method to depersonalize the victim, either because of who they are or who they represent, appears to be reflected in the finding that multiple, and potentially life-ending facial injuries were uniquely characteristic of intimate relationship homicides.

In addition to the findings for intimate relationships, acquaintance homicides demonstrated higher frequencies of multiple, non-life threatening facial injuries. This finding underscores the importance of attention to nuanced differences in injury severity between

relationships, suggesting that the quantity of wounds is not necessarily as important as the quality (i.e., severity) when attempting to differentiate between victim-offender relationships. Furthermore, multiple non-life threatening wounds to the face may indicate efforts to control victims who are resisting. Indeed, hitting someone in the face is a more efficient method of incapacitation than hitting them elsewhere. It should be noted that acquaintance relationships dominated both the sexual and felony homicide groups – events whereby victims often resist the perpetrator. It would be interesting to explore this dynamic in future research under the auspices of homicide type and with the added assessment of defensive wounds to better address whether or not facial wounding can be attributed to resistance in these homicides.

Cause of Death (COD) and Weapon of Opportunity

Finally, this study aimed to expand upon current knowledge regarding the method used to carry out violence in homicide events and whether there are methodological differences in how the violence is inflicted between different relationships and different types of homicide. In addition to method used to cause death, the study was interested in exploring the impulsivity of the violence as evidenced by whether the weapon was one of opportunity or not. The body of research underlying this final research question appears to be highly mixed. The IPV literature states that the presence of firearms significantly increases the risk of intimate partner (i.e., domestic) homicide, and national statistics report firearms being the cause of over half of all domestic homicides (Campbell et al., 2007; Campbell et al., 2016; Mercy & Saltzman, 1989). On the other hand, Trojan and Krull (2012) substantiated the findings of Thomas et al., (2011) in identifying manual violence and stabbing as more prevalent than shootings in their study when the relationship was intimate. They additionally found that – similar to the expressive/instrumental literature – intimate relationship homicides appeared to be more

impulsive, as evidenced by a weapon being taken from the scene as opposed to being brought to the scene.

Contrary to expectations, COD and weapon of opportunity did not contribute to the predictive ability of the victim-offender relationship models. In fact, an examination of frequencies indicated that stabbings and shootings occurred at an almost equal rate amongst stranger and close/intimate homicides, whereby each made up approximately a third of COD. Unequal victim-offender relationship group sizes and small cell sizes within some COD categories likely contributed to poor modeling. On the other hand, looking at COD by type of homicide also shed some light on these findings, or lack thereof. Results from the homicide type models support the ability of shooting as the COD to differentiate domestic and felony homicides from sexual homicides, which are indicated here to be more likely than either domestic or felony homicides to be characterized by a COD of strangulation. However, shooting as COD was not found to be more or less likely among felony or domestic homicides; a finding that makes sense in light of national statistics and the extant literature stating that firearms are the leading COD for both. Contradictory findings such as those found in Trojan and Krull (2012) and Thomas et al. (2011) may be due to the location of research. Locations whereby firearms are more difficult to procure are more likely to have fewer firearm-related deaths. It is important to note here that any differences in COD between relationship categories were likely rendered moot because the domestic and felony samples were comprised of all three relationship categories.

Similar to COD, weapon of opportunity was found to significantly contribute to associations within type of homicide but not victim-offender relationship. Inferential statistics indicate that an offender is more likely to have brought a weapon to the scene in felony homicides than in either domestic or sexual homicides. This was an expected finding, as the

homicide is secondary to the commission of another crime whereby a weapon is brought to control victims and decrease resistance. Interestingly, a closer look at residuals suggests that a weapon of opportunity was observed significantly more than expected in sexual homicides, but not in domestic homicides. In contrast, a weapon of opportunity was observed in approximately half of domestic homicides. One explanation that could be inflating the sexual homicide results is the higher rate of strangulation deaths observed in sexual homicides whereby strangulation is done manually, or the offender simply plans to use a cord or rope handy at the scene. Again, this highlights the need for caution in investigative interpretation due to motivational factors that vary between types of homicide.

Limitations and Future Directions

Due to the difficulties inherent in conducting research on homicide in general, any single study can be expected to have various limitations in design and scope (e.g., limited sample sizes, selection bias, inconsistent operational definitions, etc.). While the use of a large, archival dataset for the current study provided a large volume of information regarding demographic and offense characteristics, the non-random nature of the sample limits the extent to which these results can be generalized to the populations of domestic, felony, and sexual homicides. Although this is a national sample representing a variety of jurisdictions from across the United States, there is no universal standard for collecting the data contained in the case files. Therefore, there may be inconsistencies across cases as to the extent and nature of the data contained therein. Additionally, it is possible that there are selection effects regarding the type of homicide cases that were included in the archive. Selection bias by investigators might have led to case contributions reflecting more extraordinary or unique crimes in the jurisdictions from which cases came. Due to the unsystematic nature of this limitation, little could be done to address it.

The way cases were classified into homicide type is also potentially problematic. For instance, 1) in the cases where offenders are documented to have committed only one sexual homicide, but who may have actually been responsible for a series of homicides; 2) in the cases where a homicide is classified as sexual, but is actually a homicide to cover up a rape; or 3) in the cases where an intimate or former intimate partner is killed secondary to the commission of a felony. The possibility of inaccurate classification has implications for all comparative analyses and predictive models investigated with logistic regression procedures. Measures were taken to minimize this possible confound by deliberately implementing strict inclusion criteria for all three homicide groups in this study, and cases that remained unclear were excluded. Despite these attempts to overcome this limitation, it cannot be declared with certainty that none of the cases herein were misclassified in these ways.

In addition to the limitation of potentially inaccurate classification of cases, the selection of cases based on their classification could be limiting. The logic behind selecting cases for study in this way was based on the fact that as a whole, the sample would represent a variety of victim-offender relationships while also representing a variety of motivations. As seen in the COD and weapon of opportunity models, homicide type may have confounded the effects of independent variables when examined in the context of victim-offender relationship and vice versa. Moreover, despite relatively equal sample sizes across types of homicide, selecting cases based on homicide type led to unequal sample sizes across victim-offender relationship.

Minimizing potential confounds in sample selection present additional limitations in the generalizability of this study. For instance, the selection of only intimate/former intimate partner homicides is not representative of all domestic homicides, nor does it take into account potential differences between intimates and former intimates. It would be interesting to explore variations

in wounding between a variety of domestic relationships, including immediate and extended family members, and between intimates and former intimates. Similarly, single sexual homicides were selected while serial sexual homicides were excluded due to differences suggested in the extant literature to exist between these two groups. Empirical examination of variations in wounding between these two groups would be an invaluable addition to the offender profiling literature.

Finally, the way that injury severity was coded could present another limitation in this study. The assessment and operationalization of injury in the homicide literature lacks consistency, and the use of the AIS provided a more standardized approach to coding injury severity than that which has been demonstrated in related research. However, it required coders to extract information from autopsy reports. Although coders were guided by the AIS manual, maintained continuous contact throughout the coding process, and had medical resources at their disposal, none were medically trained professionals. Despite good interrater reliability demonstrated by Cohen's kappa analyses, there maintains the potential that this high agreement among raters might reflect consistency in poor medical coding ability. Additional research is needed to examine the utility and validity of standardized methods of injury assessment. Moreover, having a standardized assessment could lead to a larger body of empirical data on this topic and may further pave the way for the development of a tool to be utilized by investigators and/or forensic examiners.

Conclusions

The current study aimed to contribute to the existing body of knowledge on variations in wounding in homicides. Results found here were consistent with many of those in previous studies regarding victim-offender relationship, and additionally highlight the importance of

disaggregating homicide events based not only on the relationship between offender and victim, but also based on type of homicide. Generally speaking, offenders and victims tended to be young adults or adults, and homicides tended to be racially homogenous. Demographic differences emerged when examined by type of homicide, whereby younger offenders were found to target older victims in felony homicides. In fact, elderly victims were overrepresented in this group when compared to national statistics. Additionally, adult and middle age adult victims and offenders dominated domestic homicides.

The importance of examining events across homicide type and relationship extended to the study's hypotheses. Events with a single COD and moderate to severe violence were predictive of intimate relationships and domestic homicides. However, excessive violence was also observed more than expected in acquaintance relationships and sexual homicides. So, while victims are more likely to suffer excessive injury when the offender is known to the victim, investigators should take caution if sexual elements are present. Findings pertaining to cause of death and impulsivity were also informative. While these elements did not differentiate between relationships as was expected based on the extant literature, they did differentiate between homicide types. Findings indicated that sexual offenders were more likely to kill their victims via manual or ligature strangulation, felony and domestic offenders were more likely to use firearms, and felony offenders were more likely to bring a weapon to the scene. Finally, the severity of facial injury in this study significantly differentiated between intimate relationships and other relationships, thereby highlighting the importance of "quality over quantity". This finding additionally provides support for the notion that severe facial injury could hold meaning for the offender whereby the injuries themselves are symbolic of destroying the victim psychologically as well as physically.

The potential impact of the current study spans multiple disciplines. Researchers may wish to incorporate many of this study's data collection and coding procedures into future empirical work on injury severity in homicides. One recommendation for future studies is to employ a medical professional to ensure proper utilization of standardized injury assessment measures such as the AIS. Researchers may also build upon these findings and suggestions for further studies that utilize a variety of offender samples and comparison groups.

Results of the analyses performed here – particularly regarding domestic homicide – may be of use to clinical practitioners in conducting risk assessments of those suspected to be at increased likelihood of committing intimate partner homicide. Previous domestic violence and the availability of a firearm have long been identified as significant risk factors for intimate partner homicide (Campbell et al., 2007). Although this study did not assess previous domestic incidents, the prevalence of firearms in COD suggests that, even if a history of IPV existed, these offenders somehow maintained access to firearms. In addition to clinical practitioners, the results here may be of use to law makers and community supervisors, such as probation and parole. Gun restrictions vary by state, and some states may be easier than others to gain access to firearms despite criminal history. IPV offenders on probation or parole may warrant additional searches to ensure that they are not in possession of legally or illegally obtained firearms.

Finally, there are numerous implications of the results of this research for law enforcement agencies in general, and for homicide investigators in particular. According to Safarik and Jarvis (2005), the assessment of injury within the victim-offender dynamic is said to hold implications for identifying the nature of the victim-offender relationship. Moreover, "this (implied) relationship, or lack thereof, has been used by law enforcement to provide investigative direction in many violent crime investigations" (p. 3). However, very little empirical data exists

supporting assertions that have thus far been anecdotally based. To this end, the current study provides some empirical support for wounding patterns unique to certain relationships and types of homicide. Therefore, results from this study may be used to assist investigators' decision-making about inclusion or exclusion of potential suspects. More than anything, however, the findings herein highlight the importance of erring on the side of caution when coming to investigative conclusions due to some of the more subtle differences in injury severity identified between homicide types and relationships. It is therefore suggested that investigators take multiple factors into account before making intuitive assumptions based on injury severity.

Appendix A

Multinomial Logistic Regression Models Exploring HIS Differences

Model 1.1a

The k-1 multiple linear regression functions, with victim-offender relationship = stranger as the reference category, are defined as:

1. Logit (victim-offender relationship = acquaintance) =

$$\log\left(\frac{p(\text{victim-offender relationship = acquaintance})}{1-p(\text{victim-offender relationship = acquaintance})}\right) = \beta 11_{01+} \beta 11_{11} * \text{VictimGender}_i + \beta 11_{21} * \text{VictimAge}_{i+} \beta 11_{31} * \text{HISCON}_i \text{ for i = 1 to 242}$$

2. Logit (victim-offender relationship = close/intimate) =

$$\log\left(\frac{p(\text{victim-offender relationship = close/intimate})}{1-p(\text{victim-offender relationship = close/intimate})}\right) = \beta 11_{02+} \beta 11_{12} * \text{VictimGender}_i + \beta 11_{22} * \text{VictimAge}_{i+} \beta 11_{32} * \text{HISCON}_i \text{ for i = 1 to 242}$$

Model 1.1b

The k-1 multiple linear regression functions, with victim-offender relationship = acquaintance as the reference category, are defined as:

1. Logit (victim-offender relationship = acquaintance) =

$$\log\left(\frac{p(\text{victim-offender relationship = acquaintance})}{1-p(\text{victim-offender relationship = acquaintance})}\right) = \beta 11b_{01+} \beta 11b_{11} * \text{VictimGender}_i + \beta 11b_{21} * \text{VictimAge}_{i+} \beta 11b_{31} * \text{HISCON}_i \text{ for i = 1 to 242}$$

2. Logit (victim-offender relationship = close/intimate) =

$$\log\left(\frac{p(\text{victim-offender relationship = close/intimate})}{1-p(\text{victim-offender relationship = close/intimate})}\right) = \beta 11b_{02+} \beta 11b_{12} * \text{VictimGender}_i + \beta 11b_{22} * \text{VictimAge}_{i+} \beta 11b_{32} * \text{HISCON}_i \text{ for i = 1 to 242}$$

Model 1.2a

The k-1 multiple linear regression functions, with type of homicide = sexual as the reference category, are defined as:

1. Logit (type of homocide = felony) = $\log\left(\frac{p(\text{type of homocide = felony})}{1-p(\text{type of homocide = felony})}\right) = \beta 12_{01} + \beta 12_{11} * \text{VictimGender}_i + \beta 12_{21} * \text{VictimAge}_i + \beta 12_{31} * \text{HISCON}_i$ for i = 1 to 242
2. Logit (type of homocide = domestic) = $\log\left(\frac{p(\text{type of homocide = domestic})}{1-p(\text{type of homocide = domestic})}\right) = \beta 12_{02} + \beta 12_{12} * \text{VictimGender}_i + \beta 12_{22} * \text{VictimAge}_i + \beta 12_{32} * \text{HISCON}_i$ for i = 1 to 242

Model 1.2b

The k-1 multiple linear regression functions, with type of homicide = felony as the reference category, are defined as:

1. Logit (type of homocide = sexual) = $\log\left(\frac{p(\text{type of homocide = sexual})}{1-p(\text{type of homocide = sexual})}\right) = \beta 12b_{01} + \beta 12b_{11} * \text{VictimGender}_i + \beta 12b_{21} * \text{VictimAge}_i + \beta 12b_{31} * \text{HISCON}_i$ for i = 1 to 242
2. Logit (type of homocide = domestic) = $\log\left(\frac{p(\text{type of homocide = domestic})}{1-p(\text{type of homocide = domestic})}\right) = \beta 12b_{02} + \beta 12b_{12} * \text{VictimGender}_i + \beta 12b_{22} * \text{VictimAge}_i + \beta 12b_{32} * \text{HISCON}_i$ for i = 1 to 242

Appendix B

Multinomial Logistic Regression Models Exploring Facial Injury

Model 2.1a

The k-1 multiple linear regression functions, with victim-offender relationship = stranger as the reference category, are defined as:

1. Logit (victim-offender relationship = acquaintance) =

$$\log\left(\frac{p(\text{victim-offender relationship = acquaintance})}{1-p(\text{victim-offender relationship = acquaintance})}\right) = \beta21_{01} + \beta21_{11} * \text{VictimGender}_i + \beta21_{21} * \text{VictimAge}_i + \beta21_{31} * \text{AIS}_i \text{ for i = 1 to 242}$$

2. Logit (victim-offender relationship = close/intimate) =

$$\log\left(\frac{p(\text{victim-offender relationship = close/intimate})}{1-p(\text{victim-offender relationship = close/intimate})}\right) = \beta21_{02} + \beta21_{12} * \text{VictimGender}_i + \beta21_{22} * \text{VictimAge}_i + \beta21_{32} * \text{AIS}_i \text{ for i = 1 to 242}$$

Model 2.1b

The k-1 multiple linear regression functions, with victim-offender relationship = acquaintance as the reference category, are defined as:

1. Logit (victim-offender relationship = strangers) =

$$\log\left(\frac{p(\text{victim-offender relationship = strangers})}{1-p(\text{victim-offender relationship = strangers})}\right) = \beta21b_{01} + \beta21b_{11} * \text{VictimGender}_i + \beta21b_{21} * \text{VictimAge}_i + \beta21b_{31} * \text{AIS}_i \text{ for i = 1 to 242}$$

2. Logit (victim-offender relationship = close/intimate) =

$$\log\left(\frac{p(\text{victim-offender relationship = close/intimate})}{1-p(\text{victim-offender relationship = close/intimate})}\right) = \beta21b_{02} + \beta21b_{12} * \text{VictimGender}_i + \beta21b_{22} * \text{VictimAge}_i + \beta21b_{32} * \text{AIS}_i \text{ for i = 1 to 242}$$

Appendix C

Multinomial Logistic Regression Models Exploring COD and Weapon of Opportunity

Model 3.1a

The k-1 multiple linear regression functions, with victim-offender relationship = stranger as the reference category, are defined as:

1. Logit (victim-offender relationship = acquaintance) =

$$\log\left(\frac{p(\text{victim-offender relationship = acquaintance})}{1-p(\text{victim-offender relationship = acquaintance})}\right) = \beta31_{01} + \beta31_{11} * \text{VictimGender}_i + \beta31_{21} * \text{VictimAge}_i + 31_{31} * \text{CODCon}_i \text{ for i = 1 to 242}$$

2. Logit (victim-offender relationship = close/intimate) =

$$\log\left(\frac{p(\text{victim-offender relationship = close/intimate})}{1-p(\text{victim-offender relationship = close/intimate})}\right) = \beta31_{02} + \beta31_{12} * \text{VictimGender}_i + \beta31_{22} * \text{VictimAge}_i + \beta31_{32} * \text{CODCon}_i \text{ for i = 1 to 242}$$

Model 3.1b

The k-1 multiple linear regression functions, with victim-offender relationship = acquaintance as the reference category, are defined as:

1. Logit (victim-offender relationship = strangers) =

$$\log\left(\frac{p(\text{victim-offender relationship = strangers})}{1-p(\text{victim-offender relationship = strangers})}\right) = \beta31a_{01} + \beta31a_{11} * \text{VictimGender}_i + \beta31a_{21} * \text{VictimAge}_i + \beta31b_{31} * \text{CODCon}_i \text{ for i = 1 to 242}$$

2. Logit (victim-offender relationship = close/intimate) =

$$\log\left(\frac{p(\text{victim-offender relationship = close/intimate})}{1-p(\text{victim-offender relationship = close/intimate})}\right) = \beta31_{02} + \beta31_{12} * \text{VictimGender}_i + \beta31_{22} * \text{VictimAge}_i + \beta31_{32} * \text{CODCon}_i \text{ for i = 1 to 242}$$

Model 3.2a

The k-1 multiple linear regression functions, with type of homicide = sexual as the reference category, are defined as:

1. Logit (type of homocide = felony) = $\log\left(\frac{p(\text{type of homocide = felony})}{1-p(\text{type of homocide = felony})}\right) = \beta 32_{01} + \beta 32_{11} * \text{VictimGender}_i + \beta 32_{21} * \text{VictimAge}_i + \beta 32_{31} * \text{CODCon}_i$ for i = 1 to 242
2. Logit (type of homocide = domestic) = $\log\left(\frac{p(\text{type of homocide = domestic})}{1-p(\text{type of homocide = domestic})}\right) = \beta 32_{02} + \beta 32_{12} * \text{VictimGender}_i + \beta 32_{22} * \text{VictimAge}_i + \beta 32_{32} * \text{CODCon}_i$ for i = 1 to 242

Model 3.2b

The k-1 multiple linear regression functions, with type of homicide = felony as the reference category, are defined as:

1. Logit (type of homicide = sexual) = $\log\left(\frac{p(\text{type of homocide = sexual})}{1-p(\text{type of homocide = sexual})}\right) = \beta 32b_{01} + \beta 32b_{11} * \text{VictimGender}_i + \beta 32b_{21} * \text{VictimAge}_i + \beta 32b_{31} * \text{CODCon}_i$ for i = 1 to 242
2. Logit (type of homicide = domestic) = $\log\left(\frac{p(\text{type of homocide = domestic})}{1-p(\text{type of homocide = domestic})}\right) = \beta 32b_{02} + \beta 32b_{12} * \text{VictimGender}_i + \beta 32b_{22} * \text{VictimAge}_i + \beta 32b_{32} * \text{CODCon}_i$ for i = 1 to 24

Model 3.3a

The k-1 multiple linear regression functions, with victim-offender relationship = stranger as the reference category, are defined as:

1. Logit (victim-offender relationship = acquaintance) = $\log\left(\frac{p(\text{victim-offender relationship = acquaintance})}{1-p(\text{victim-offender relationship = acquaintance})}\right) = \beta 33a_{01} + \beta 33a_{11} * \text{VictimGender}_i + \beta 33a_{21} * \text{VictimAge}_i + \beta 33a_{31} * \text{WepOp}_i$ for i = 1 to 218

2. Logit (victim-offender relationship = close/intimate) =

$$\log\left(\frac{p(\text{victim-offender relationship = close/intimate})}{1-p(\text{victim-offender relationship = close/intimate})}\right) = \beta 33a_{02} + \beta 33a_{12} * \text{VictimGender}_i + \beta 33a_{22} * \text{VictimAge}_i + \beta 33a_{32} * \text{WepOp}_i \text{ for i = 1 to 218}$$

Model 3.3b

The k-1 multiple linear regression functions, with victim-offender relationship = acquaintance as the reference category, are defined as:

1. Logit (victim-offender relationship = strangers) =

$$\log\left(\frac{p(\text{victim-offender relationship = strangers})}{1-p(\text{victim-offender relationship = strangers})}\right) = \beta 33a_{01} + \beta 33a_{11} * \text{VictimGender}_i + \beta 33a_{21} * \text{VictimAge}_i + \beta 33b_{31} * \text{WepOp}_i \text{ for i = 1 to 218}$$

2. Logit (victim-offender relationship = close/intimate) =

$$\log\left(\frac{p(\text{victim-offender relationship = close/intimate})}{1-p(\text{victim-offender relationship = close/intimate})}\right) = \beta 33_{02} + \beta 33_{12} * \text{VictimGender}_i + \beta 33_{22} * \text{VictimAge}_i + \beta 33_{32} * \text{WepOp}_i \text{ for i = 1 to 218}$$

Model 3.4a

The k-1 multiple linear regression functions, with type of homicide = sexual as the reference category, are defined as:

1. Logit (type of homicide = felony) = $\log\left(\frac{p(\text{type of homocide = felony})}{1-p(\text{type of homocide = felony})}\right) = \beta 34a_{01} + \beta 34a_{11} * \text{VictimGender}_i + \beta 34a_{21} * \text{VictimAge}_i + \beta 34a_{31} * \text{WeapOp}_i \text{ for i = 1 to 218}$

2. Logit (type of homicide = domestic) = $\log\left(\frac{p(\text{type of homocide = domestic})}{1-p(\text{type of homocide = domestic})}\right) = \beta 34a_{02} + \beta 34a_{12} * \text{VictimGender}_i + \beta 34a_{22} * \text{VictimAge}_i + \beta 34a_{32} * \text{WeapOp}_i \text{ for i = 1 to 218}$

Model 3.4b

The k-1 multiple linear regression functions, with type of homicide = felony as the reference category, are defined as:

1. Logit (type of homicide = sexual) = $\log(\frac{p(\text{type of homocide = sexual})}{1-p(\text{type of homocide = sexual})} = \beta 34b_{01} + \beta 34b_{11} * \text{VictimGender}_i + \beta 34b_{21} * \text{VictimAge}_i + \beta 34b_{31} * \text{WeapOp}_i$ for i = 1 to 218

2. Logit (type of homicide = domestic) = $\log(\frac{p(\text{type of homocide = domestic})}{1-p(\text{type of homocide = domestic})} = \beta 34b_{02} + \beta 34b_{12} * \text{VictimGender}_i + \beta 34b_{22} * \text{VictimAge}_i + \beta 34b_{32} * \text{WeapOp}_i$ for i = 1 to 218

Appendix D

Demographic Crosstabulations and Chi-Squares

*Victim-Offender Relationship * Vic Gender Crosstabulations*

			Victim Gender		
			Male	Female	Total
Vic/Off Rel	Strangers	Count	24	32	56
		Exp Count	16.7	39.3	56.0
		%	42.9%	57.1%	100.0%
		Adj Residual	2.4	-2.4	
	Acquaintance	Count	29	58	87
		Exp Count	25.9	61.1	87.0
		%	33.3%	66.7%	100.0%
		Adj Residual	.9	-.9	
	Close/Intimate	Count	19	80	99
		Exp Count	29.5	69.5	99.0
		%	19.2%	80.8%	100.0%
		Adj Residual	-3.0	3.0	

*Victim-Offender Relationship * Vic Gender Chi-Square*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.418[a]	2	.005
Likelihood Ratio	10.575	2	.005
Linear-by-Linear Association	10.237	1	.001
N of Valid Cases	242		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.66.

*Victim-Offender Relationship * Victim Age Category Crosstabulation*

			AgeVicCat					
			Juvenile	Young Adult	Adult	Middle Age	Older Adult	Total
Vic/Off Rel	Strangers	Count	2	25	14	8	7	56
		Exp Count	1.9	20.4	19.9	6.9	6.9	56.0
		%	3.6%	44.6%	25%	14.3%	12.5%	100%
		Adj Residual	.1	1.5	-1.9	.5	.0	
	Acquaintance	Count	4	28	26	10	19	87
		Exp Count	2.9	31.6	30.9	10.8	10.8	87.0
		%	4.6%	32.2%	29.9%	11.5%	21.8%	100%
		Adj Residual	.8	-1.0	-1.4	-.3	3.3	
	Close/Int	Count	2	35	46	12	4	99
		Exp Count	3.3	36.0	35.2	12.3	12.3	99.0
		%	2.0%	35.4%	46.5%	12.1%	4.0%	100%
		Adj Residual	-.9	-.3	3.0	-.1	-3.3	

*Victim-Offender Relationship * Victim Age Category Chi-Square*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.364[a]	8	.009
Likelihood Ratio	21.120	8	.007
Linear-by-Linear Association	.550	1	.458
N of Valid Cases	242		

a. 3 cells (20.0%) have expected count less than 5. The minimum expected count is 1.85.

*Type of Homicide * Victim Gender Crosstabulation*

			Victim Gender		
			Male	Female	Total
Type of Homicide	Domestic	Count	10	69	79
		Exp Count	23.5	55.5	79.0
		%	12.7%	87.3%	100.0%
		Adj Residual	-4.0	4.0	
	Felony	Count	55	31	86
		Exp Count	25.6	60.4	86.0
		%	64.0%	36.0%	100.0%
		Adj Residual	8.6	-8.6	
	Sexual	Count	7	70	77
		Exp Count	22.9	54.1	77.0
		%	9.1%	90.9%	100.0%
		Adj Residual	-4.8	4.8	

*Type of Homicide * Victim Gender Chi-Square*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	74.904[a]	2	.000
Likelihood Ratio	75.272	2	.000
Linear-by-Linear Association	.177	1	.674
N of Valid Cases	242		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 22.91.

*Type of Homcide * Victim Age Category Crosstabulation*

			AgeVicCat					
			Juvenile	Young Adult	Adult	Middle Age	Older Adult	Total
Type of Homicide	Domestic	Count	1	26	38	12	2	79
		Exp Count	2.6	28.7	28.1	9.8	9.8	79.0
		%	1.3%	32.9%	48.1%	15.2%	2.5%	100.0%
		Adj Residual	-1.2	-.8	2.8	.9	-3.2	
	Felony	Count	2	21	29	14	20	86
		Exp Count	2.8	31.3	30.6	10.7	10.7	86.0
		%	2.3%	24.4%	33.7%	16.3%	23.3%	100.0%
		Adj Residual	-.6	-2.9	-.4	1.4	3.8	
	Sexual	Count	5	41	19	4	8	77
		Exp Count	2.5	28.0	27.4	9.5	9.5	77.0
		%	6.5%	53.2%	24.7%	5.2%	10.4%	100.0%
		Adj Residual	1.9	3.7	-2.4	-2.3	-.6	

*Type of Homicide * Victim Age Category Chi-Square*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	38.823[a]	8	.000
Likelihood Ratio	40.419	8	.000
Linear-by-Linear Association	2.097	1	.148
N of Valid Cases	242		

a. 3 cells (20.0%) have expected count less than 5. The minimum expected count is 2.55.

Appendix E

Offense Characteristics Crosstabulations and Chi-Squares

*Victim Offender Relationship * HISCon Crosstabulation*

			HISCon					
			1 COD, No/Min Injury	1 COD, Mod Injury	2 COD, not OK	1 COD, OK	2 COD, OK	Total
Vic/Off Rel	Strangers	Count	12	15	11	5	13	56
		Exp Count	8.1	16.7	8.1	10.2	13.0	56
		%	21.4%	26.8%	19.6%	8.9%	23.2%	100%
		Adj Residual	1.7	-.6	1.3	-2.0	.0	
	Acq	Count	16	21	14	8	28	87
		Exp Count	12.6	25.9	12.6	15.8	20.1	87.0
		%	18.4%	24.1%	16.1%	9.2%	32.2%	100%
		Adj Residual	1.3	-1.4	5	-2.7	2.5	
	Close/Int	Count	7	36	10	31	15	99
		Exp Count	14.3	29.5	14.3	18.0	22.9	99.0
		Total %	7.1%	36.4%	10.1%	31.3%	15.2%	100%
		Adj Residual	-2.7	1.9	-1.6	4.4	-2.5	

*Victim Offender Relationship * HISCon Chi-Square*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	33.286[a]	8	.000
Likelihood Ratio	33.701	8	.000
Linear-by-Linear Association	.931	1	.335
N of Valid Cases	242		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.10.

*Type of Homicide * HISCon Crosstabulations*

			HISCon					
			1 COD, No/Min Injury	1 COD, Mod Injury	2 COD, not OK	1 COD, OK	2 COD, OK	Total
Type of Homicide	Domestic	Count	7	32	6	28	6	79
		Exp Count	11.4	23.5	11.4	14.4	18.3	79.0
		%	8.9%	40.5%	7.6%	35.4%	7.6%	100%
		Adj Residual	-1.7	2.5	-2.1	4.8	-4.0	
	Felony	Count	7	29	17	7	26	86
		Exp Count	12.4	25.6	12.4	15.6	19.9	86.0
		%	8.1%	33.7%	19.8%	8.1%	30.2%	100%
		Adj Residual	-2.1	1.0	1.7	-3.0	1.9	
	Sexual	Count	21	11	12	9	24	77
		Exp Count	11.1	22.9	11.1	14.0	17.8	77.0
		%	27.3%	14.3%	15.6%	11.7%	31.2%	100%
		Adj Residual	3.9	-3.6	.3	-1.8	2.0	

*Type of Homicide * HISCon Chi-Square*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	58.628[a]	8	.000
Likelihood Ratio	60.295	8	.000
Linear-by-Linear Association	.330	1	.566
N of Valid Cases	242		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.14.

*Victim-Offender Relationship * AIS Crosstabulation*

			AIS					
			No Injuries	Single Inj Non Life Threat	Single Inj Life Threat	Multiple Inj Non Life Threat	Multiple Inj Life Threat	Total
Vic/Off Rel	Strangers	Count	13	8	6	25	4	56
		Expected Count	14.3	4.9	4.2	24.1	8.6	56.0
		%	23.2%	14.3%	10.7%	44.6%	7.1%	100%
		Adj Residual	-.5	1.7	1.1	.3	-1.9	
	Acq	Count	22	7	3	47	8	87
		Expected Count	22.3	7.5	6.5	37.4	13.3	87.0
		%	25.3%	8.0%	3.4%	54.0%	9.2%	100%
		Adj Residual	-.1	-.3	-1.8	2.6	-2.0	
	Close/Int	Count	27	6	9	32	25	99
		Expected Count	25.4	8.6	7.4	42.5	15.1	99.0
		%	27.3%	6.1%	9.1%	32.3%	25.3%	100%
		Adj Residual	.5	-1.2	.8	-2.8	3.6	

*Victim-Offender Relationship * AIS Chi-Square Tests*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	22.213[a]	8	.005
Likelihood Ratio	22.273	8	.004
Linear-by-Linear Association	.930	1	.335
N of Valid Cases	242		

a. 2 cells (13.3%) have expected count less than 5. The minimum expected count is 4.17.

*Victim-Offender Relationship * CODCon Crosstabulation*

			CODCon							
			Blunt Trauma	Stab	Shoot	Beating	Mltpl CODs	Other	Man/Lig Strang	Total
Vic/Off Rel	Stran	Count	4	16	16	1	5	2	12	56
		Exp Count	6.0	14.8	15.0	1.2	8.8	1.6	8.6	56.0
		%	7.1%	28.6%	28.6%	1.8%	8.9%	3.6%	21.4%	100%
		Adj Residual	-1.0	.4	.3	-.2	-1.6	.3	1.5	
	Acq	Count	12	21	17	2	15	4	16	87
		Exp Count	9.3	23.0	23.4	1.8	13.7	2.5	13.3	87.0
		%	13.8%	24.1%	19.5%	2.3%	17.2%	4.6%	18.4%	100%
		Adj Residual	1.1	-.6	-1.9	.2	.5	1.2	1.0	
	Cl/Int	Count	10	27	32	2	18	1	9	99
		Exp Count	10.6	26.2	26.6	2.0	15.5	2.9	15.1	99.0
		%	10.1%	27.3%	32.3%	2.0%	18.2%	1%	9.1%	100%
		Adj Residual	-.3	.2	1.6	.0	.9	-1.5	-2.2	

*Victim-Offender Relationship * CODCon Chi-Square*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.453[a]	12	.337
Likelihood Ratio	14.390	12	.277
Linear-by-Linear Association	2.526	1	.112
N of Valid Cases	242		

a. 6 cells (28.6%) have expected count less than 5. The minimum expected count is 1.16.

*Type of Homicide * CODCon Crosstabulation*

			CODCon							
			Blunt Trauma	Stab	Shoot	Beating	Mltple COD	Other	Man/Lig Strang	Total
Type of Homicide	Dom	Count	10	18	26	2	13	1	9	79
		Exp Count	8.5	20.9	21.2	1.6	12.4	2.3	12.1	79.0
		%	12.7%	22.8%	32.9%	2.5%	16.5%	1.3%	11.4%	100%
		Adj Residual	.7	-.9	1.5	.4	.2	-1.1	-1.2	
	Fel	Count	7	24	38	1	8	3	5	86
		Exp Count	9.2	22.7	23.1	1.8	13.5	2.5	13.1	86.0
		%	8.1%	27.9%	44.2%	1.2%	9.3%	3.5%	5.8%	100%
		Adj Residual	-1.0	.4	4.5	-.7	-2.0	.4	-3.0	
	Sex	Count	9	22	1	2	17	3	23	77
		Exp Count	8.3	20.4	20.7	1.6	12.1	2.2	11.8	77.0
		%	11.7%	28.6%	1.3%	2.6%	22.1%	3.9%	29.9%	100%
		Adj Residual	.3	.5	-6.1	.4	1.9	.6	4.3	

*Type of Homicide * CODCon Chi-Square*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	53.328[a]	12	.000
Likelihood Ratio	65.972	12	.000
Linear-by-Linear Association	8.077	1	.004
N of Valid Cases	242		

a. 6 cells (28.6%) have expected count less than 5. The minimum expected count is 1.59.

*Victim-Offender Relationship * WeapOp Crosstabulation*

			WeapOp			
			Yes	No	Unk	Total
Vic/Off Rel	Strangers	Count	18	32	6	56
		Exp Count	25.7	25.0	5.3	56.0
		%	32.1%	57.1%	10.7%	100.0%
		Adj Residual	-2.4	2.1	.4	
	Acquaintance	Count	43	36	8	87
		Exp Count	39.9	38.8	8.3	87.0
		%	49.4%	41.4%	9.2%	100.0%
		Adj Residual	.8	-.8	-.1	
	Close/Intimate	Count	50	40	9	99
		Exp Count	45.4	44.2	9.4	99.0
		%	50.5%	40.4%	9.1%	100.0%
		Adj Residual	1.2	-1.1	-.2	

*Victim-Offender Relationship * WeapOp Chi-Square*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.684[a]	4	.224
Likelihood Ratio	5.788	4	.216
Linear-by-Linear Association	2.863	1	.091
N of Valid Cases	242		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.32.

*Type of Homicide * WeapOp Crosstabulation*

			WeapOp			
			Yes	No	Unk	Total
Type of Homicide	Domestic	Count	41	31	7	79
		Exp Count	36.2	35.3	7.5	79.0
		%	51.9%	39.2%	8.9%	100.0%
		Adj Residual	1.3	-1.2	-.2	
	Felony	Count	26	54	6	86
		Exp Count	39.4	38.4	8.2	86.0
		%	30.2%	62.8%	7.0%	100.0%
		Adj Residual	-3.6	4.2	-1.0	
	Sexual	Count	44	23	10	77
		Exp Count	35.3	34.4	7.3	77.0
		%	57.1%	29.9%	13.0%	100.0%
		Adj Residual	2.4	-3.2	1.3	

*Type of Homicide * WeapOp Chi-Square*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.568[a]	4	.001
Likelihood Ratio	19.779	4	.001
Linear-by-Linear Association	.008	1	.929
N of Valid Cases	242		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.32.

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