

## ABSTRACT

Title of Thesis: CHILD ABUSE HOMICIDE INFLICTED BY A CHILD'S CARETAKER: A POTENTIALLY PREVENTABLE TYPE OF CHILD MURDER

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Child abuse inflicted by caretakers has been reported the leading cause of morbidity and mortality in children. Although researchers have attempted to estimate the rate of child abuse homicide nationwide, its true scope is unknown. Quantifying child abuse homicide is important since this type of homicide is arguably preventable.

This study utilizes the National Violent Death Reporting System (NVDRS) to analyze child abuse homicides inflicted by the child's caretaker across 17 U.S. states during the years they participated from 2003 to 2005. The NVDRS reports violent death data from multiple official sources, providing this analysis with a more accurate number of child abuse homicides than previously available. In this thesis, I established if the NVDRS ascertains more abuse or non-abuse homicides than death certificates. I reviewed ascertained and misclassified deaths to assess whether a common set of victim or incident characteristics exist across these homicides. A logistic regression was also conducted to examine the probability of child abuse homicide given these characteristics.

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POTENTIALLY PREVENTABLE TYPE OF CHILD MURDER

by

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## INTRODUCTION

Homicide is a significant cause of childhood mortality in the U.S. and around the world. Child homicide, the result of one fatal incident or the extreme consequence of child abuse or neglect, is ubiquitous throughout history and across cultures. Child abuse (non-accidental injury) inflicted by the child's caretaker has been reported as the leading cause of morbidity and mortality in children (King, Kiesel, and Simon, 2006).

Unfortunately, the true incidence or prevalence of child homicide and child abuse homicide is unknown (Johnson, 2000). Accurate ascertainment (i.e. reporting) of intentional child abuse fatalities is critical to understanding how and why they occur, prerequisites for successful injury prevention. According to the Centers for Disease Control and Prevention (CDC), between 2003 and 2005 there were more than 3,600 fatalities nationwide of children aged 14 or younger with a cause of death reported as either a form of assault or an event of undetermined intent. One-third of these child fatalities were of infants less than one-year old (Centers for Disease Control and Prevention, 2008).

Although these 3,600 child fatalities included both homicides and deaths classified as undetermined intent, previous research has established that many child homicides—particularly child abuse homicides—go unreported as such. Overpeck, Brenner, Cosgrove, Trumble, Kochanek, and MacDorman (2002) report that underascertainment (i.e., underreporting) of fatal child abuse or neglect in young children as reported by medical examiners ranges from 60% to 100%. In addition, child deaths designated as of “undetermined intent” may likely prove to be intentional homicides after a more thorough investigation into the circumstances surrounding the death has been

performed and evidence has been gathered and reported by health, law enforcement, and social service officials (American Academy of Pediatrics, 2006; Bethea, 1999; Jason, Carpenter, and Tyler, 1983; McClain, Sacks, Froehlke, and Ewigman, 1993).

To date, the underascertainment of child abuse homicide has been established only in state public health data (i.e., death certificate data) (Crume, DiGuseppi, Byers, Sirotnak, and Garrett, 2002; Ewigman, Kivlahan, and Land, 1993; Herman-Giddens, Brown, Verbiest, Carlson, Hooten, Howell et al., 1999). Herman-Giddens and colleagues (1999) reported that death certificate records in North Carolina underascertained child homicides due to abuse by an estimated 62%. In Colorado between 1990 and 1998, half of maltreatment homicides were not coded as such on death certificates. Consequently, it is imperative that other sources of data be collected and utilized in order to more accurately identify the characteristics and circumstances of child homicides. Studies outlining the limitations in the World Health Organization's International Classification of Disease coding system ninth edition (ICD-9 codes and subsequent ICD-10 codes), used to define cause of death on death certificates, maintain that these coding systems allow significant underreporting of the number of child fatalities caused by child abuse or neglect (Crume et al., 2002; Hermann-Giddens et al., 1999).

This study expands the scope of previous analyses on child abuse homicide and non-abuse homicide by using a more recent sample of child deaths covering a larger geographical area. Using the National Violent Death Reporting System (NVDRS) as the preeminent violent death reporting system to date, this research provides a more precise estimate of the number of child abuse homicides and non-abuse homicides inflicted by the child's caretaker reported from 2003 to 2005 across 17 U.S. states. To the author's



knowledge, this study is the first of its kind to utilize a data monitoring surveillance system comprising multiple official data sources to expose the inherent bias in ascertainment of child abuse homicides inflicted by the child's caretaker using death certificate data alone. In addition, this study compares and contrasts misclassified and ascertained child abuse homicides and non-child abuse homicides inflicted by the child's caretaker, and explores the factors associated with increased or decreased risk of child abuse homicide inflicted by the child's caretaker. With a more accurate number of child abuse homicides by caretaker across a larger geographical area, a multivariate logistic regression is modeled in an attempt to explore how these three years of data compare to the results of data used in previous studies reporting risk and protective factors of child abuse homicide. The NVDRS has been utilized to explore all of these issues.

The NVDRS began out of an agreement between the Institute of Medicine and the CDC. In 1999, the CDC was charged with developing a fatal intentional injury surveillance system modeled after the Fatality Analysis Reporting System (FARS) – the nationwide motor vehicle crash surveillance system capable of capturing critical details of motor vehicle crashes from multiple sources. That same year, the National Violent Injury Statistics System (NVISS), the first attempt at a violent injury surveillance system was established through a collaboration of private organizations. Thanks to the successes of the NVISS, the NVDRS was created with federal funding the following year. State health departments participating in the NVDRS are responsible for submitting their state public health data to the CDC. To fully characterize violent death incidents, states are responsible for collecting information about each incident from three primary data sources: death certificates, coroner/medical examiners, and police records. Additional

sources including crime lab reports, child fatality review teams, and the Supplementary Homicide Report (SHR) are not required to be submitted to the CDC, but can be submitted if the state has the capacity to collect violent death data from these sources as well.<sup>1</sup>

The NVDRS links data at the individual level from these sources. The NVDRS coders use a rigorous and standardized procedure to link data from multiple sources sometimes resulting in a revision of the manner of death (e.g., undetermined intent changed to homicide). Individual datasets alone may lack sufficient information to classify a child death as a child homicide. Before the NVDRS, single data sources provided limited information from which to understand patterns and the circumstances surrounding violent deaths. When individual datasets (such as medical examiner records, death certificates, police records, or toxicology reports, etc) are combined and linked with one another, as in the NVDRS, the possibility for error in the ascertainment of child homicide may be reduced.

This study addresses the inconsistencies in child homicide ascertainment by ICD-10 code, while also examining child abuse homicide and non-abuse homicide inflicted by the child's caretaker (both ascertained and misclassified deaths) to learn more about how they differ from one another. Similarities and differences found between child abuse homicide and non-abuse homicide inflicted by the child's caretaker ascertained in the NVDRS are presented. Specific attention is paid to victim and incident characteristics, including the relationship of the caretaker to the child and the weapon used in the homicide. Although child abuse homicide inflicted by a child's caretaker is the main

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<sup>1</sup> A description of data sources submitted to the NVDRS and the primacy level of each variable from these sources can be found in Appendix A.

focus of this research, when applicable and where information is limited in the review of the literature, child homicide or child maltreatment homicide inflicted by any known perpetrator will be examined.

In addition, there are many sociological, criminological, psychological, and psychiatric theories and hypotheses regarding why child abuse and child abuse homicides by caretaker occur. Since I am unable to test any individual theories, these theories will not be discussed. Instead, this study focuses on the measurement issues surrounding the ascertainment of child abuse homicide inflicted by the child's caretaker and the substantive difference between these child homicides and other caretaker inflicted child homicides. The following literature review largely, but not exclusively, concentrates on child abuse homicide research by addressing the following topics: definitions, incidence, misclassification, victim risk factors, offender risk factors, and incident characteristics.

## LITERATURE REVIEW

### DEFINITIONS

#### CHILD ABUSE

There is no agreed upon definition of child abuse or child abuse homicide. The relationship between child homicide and child abuse is complex. Homicide is a well-defined act, while child abuse is usually defined as a process, which if left unchecked, can sometimes end in death (Browne and Lynch, 1995). Varying definitions of child abuse have been developed for various legal, social service, and research objectives depending on the agency, state, or nation involved (Garbarino, 1989; Lawrence, 2004). In 1962, C. Henry Kempe coined the phrase “battered child syndrome” and increased awareness in the medical community that infants and children were being physically abused and killed (Kempe, Silverman, Steele, Droegemueller, and Silver, 1962). Child abuse was later defined by Gil (1975) as any intentional use of force aimed at hurting, injuring, or destroying the child. Garbarino (1989) insists that four elements—intentionality, effect, evaluation, and standards—are fundamental issues that need to be present in a definition of child abuse. Garbarino contends that “social meanings of events flow from analyses of the intention of actors, the consequences of acts, the value judgment of observers, and the source of the standard for that judgment (p. 219).” Most definitions, however, are quite vague and address only intentionality and effect, defining child abuse solely as intentional injury to a child. Many include additional reference to the abusers being the child’s caretakers, while even others consider the absence of protection from such abuse as an act of abuse itself (Garbarino, 1989). Additionally,

recent definitions have not only included the physical element of child abuse, but have also incorporated sexual and psychological elements as well (Leeb, Paulozzi, Melanson, Simon, and Arias, 2008).

In 2008, the CDC identified child abuse as an act of commission and specified three definitive types of child abuse: physical abuse, sexual abuse, and psychological abuse. Physical child abuse is defined as the “intentional use of physical force against a child that results in, or has the potential to result in, physical injury (Leeb et al., 2008, p. 14).” Such physical acts may or may not leave a mark on the child’s body or cause physical injury and may result from discipline or punishment. Physical acts include hitting, kicking, punching, beating, stabbing, biting, pushing, shoving, throwing, pulling, dragging, shaking, strangling/choking, smothering, burning, scalding, and poisoning. These acts do not include injuries to the anal or genital area or surrounding area as this is considered sexual abuse. Sexual abuse involves “any completed or attempted (non-completed) sexual act, sexual contact with, or exploitation (i.e., non-contact sexual interaction) of a child by a caregiver (Leeb et al., 2008, p. 14).” Psychological abuse is defined as “intentional caregiver behavior that conveys to a child that he/she is worthless, flawed, unloved, unwanted, endangered, or valued only in meeting another’s needs (Leeb et al., 2008, p. 16).” Psychological abuse can be continual or episodic.

## CHILD HOMICIDE

Child homicide definitions vary, depending on who the perpetrator is and how old the child is at the time of death. Three such types of child homicide include neonaticide, infanticide, and filicide. Neonaticide refers to the killing of an infant during the first 24

hours of life (Jenny and Isaac, 2005). Infanticide—the intentional killing of a child greater than one day and less than or equal to 12 months of age caused by their parent, guardian, or caretaker (Brewster, Nelson, Hymel, Colby, Lucas, McClain et al., 1993; Browne and Lynch, 1995)—had been previously defined by the United Kingdom’s Infanticide Act of 1939 as a willful act or omission by a mother, when “at the time of the act or omission the balance of her mind was disturbed by reason of her not having fully recovered from the effect of her having given birth to the child or by reasons of the effect of lactation consequent on the birth of the child” (Craig, 2004, p. 57; see also Browne and Lynch, 1995; Harris, Hilton, Rice, and Eke, 2007). Such elaborate definitions have faded as time has passed and broader definitions have taken their place. Filicide is defined as the killing of one’s own child (Harris et al., 2007; Koenen and Thompson, 2008; Mugavin, 2005). Thus, the terms neonaticide, infanticide, and filicide are not independent of one another (e.g., a filicide victim may also be a neonaticide victim).

## CHILD ABUSE HOMICIDE

As with child abuse, varying definitions of child abuse homicide have been developed by agencies, states, or nations for various legal, social service, and research objectives (Garbarino, 1989; Lawrence, 2004). Fatal child abuse has been defined as “...the killing of a child by one or a series of assaults by a parent or a person with the status of a parent to eliminate a disturbing behavior of a child without the intention to kill (Somander and Rammer, 1991, p. 47).” Lawrence (2004) defines fatal child assault, synonymous with child abuse homicide, as the death of a child from acts of violence

perpetrated upon him or her by another person. Thus, the intention of the offender and the relationship of that offender to the child are not relevant factors.

Child abuse is the necessary precursor of a child abuse homicide. Most child abuse homicides were merely child abuse until the offender went too far. Physical child abuse occurs as a recurrent event with escalating severity of injury, and with death as the most severe form (Lawrence, 2004). For this reason, both child abuse homicide and the broad spectrum of child abuse are explored in this analysis.

This study utilizes a part of Somander and Rammer's (1991) definition of fatal child abuse—the killing of a child by one or a series of assaults by a parent or a person with the status of a parent—without taking into account whether the caretaker meant to kill the child or not. This analysis concentrates on child abuse homicide inflicted by the child's caretaker and compares the characteristics and circumstances of child abuse homicide inflicted by the child's caretaker to non-abuse homicide inflicted by the child's caretaker.<sup>2</sup> Non-abuse child homicides inflicted by the child's caretaker may include premeditated shooting and subsequent death of a child (characteristic of a parental homicide/suicide or other single isolated incidents), or a child homicide as a result of child maltreatment where no evidence of ongoing abuse of the child by their caretaker had been documented by authorities.

In actuality, child maltreatment homicides may comprise numerous child abuse homicides inflicted by the child's caretaker. Child maltreatment is a much broader term than child abuse in that it includes four types of abuse: neglect, physical abuse, sexual

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<sup>2</sup> A history of substantiated or unsubstantiated abuse by the victim's caretaker who was also the suspect in the homicide of that child must have been established for a child homicide to be deemed a child abuse homicide. Non-abuse homicides inflicted by the child's caretaker include child homicides where no history of substantiated or unsubstantiated abuse by the caretaker was present, but the caretaker was the suspect in the homicide.

abuse, and emotional abuse (Federal Interagency on Child and Family Statistics, 2007). Confirmed incidents of physical abuse are second to incidents of neglect, constituting approximately 18% of the total number of child maltreatment incidents (Kellogg, 2007). The 1989 National Institute of Child Health and Human Development Conference of Standard Definitions for Childhood Injury Research maintained that a maltreatment homicide includes any death of a child, perpetrated by a caregiver, as a result of physical abuse, violence, shaking, battering, neglect, and negligence (Crume et al., 2002; Ewigman et al., 1993). The CDC defines child neglect as an act of omission: the failure to provide a child's basic physical, emotional, medical/dental, or educational needs and the failure to supervise the child to ensure child safety within and outside the home (Leeb et al., 2008). Since child maltreatment homicide can include both child abuse and non-abuse homicides, I have assumed that unless evidence of ongoing abuse (substantiated or unsubstantiated) of the child by their caretaker had been documented by state authorities, a homicide inflicted by the child's caretaker is classified as a non-abuse homicide.<sup>3</sup>

## INCIDENCE

### CHILD ABUSE

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<sup>3</sup> A child abuse homicide by caretaker has been defined in this study as a homicide to a child under the age 14 by their caretaker where there was a history of substantiated or unsubstantiated abuse by their caretaker previously reported and available in the NVDRS. Thus, it is assumed that all homicidal deaths to children were not child abuse homicides inflicted by their caretaker unless evidence of ongoing abuse of the child by their caretaker had been previously documented. I am aware of the limitations of this assumption in the accurate estimation of the scope of child abuse homicide and in the further analysis of these cases. However, given the nature of this assumption, a more conservative estimate of child abuse homicide inflicted by the child's caretaker is likely. Although it may be possible that a history of abuse was falsely reported and a true non-abuse child homicide by caretaker is deemed a child abuse homicide by caretaker in this analysis, this is highly unlikely. I maintain it is more likely that a child who had been previously abused by his or her caretaker was killed by this caretaker, while unfortunately a history of abuse had not been recorded. The latter scenario is more likely, and consequently, the definition and measurement of child abuse homicide by caretaker in this report is likely conservative.



Between 1985 and 1993 there was a 50% increase in reported cases of child abuse (Bethea, 1999). The Federal Interagency Forum on Child and Family Statistics (2007) reports that among substantiated case reports to child protective services for children age zero to three in 2005, 12% involved physical abuse. According to the U.S. Department of Health and Human Services (2003), of some 2,672,000 substantiated or unsubstantiated reports of possible maltreatment, approximately one in five children (19%) experienced physical abuse. Even with exact counts like those above, many researchers estimate that only about one-third of all instances of child abuse are officially recorded in the U. S. even though mandatory child abuse reporting laws exist nationwide. Physical child abuse remains an underreported (and often undetected) problem for numerous reasons including individual and community variations in what is considered "abuse," inadequate knowledge and training among professionals in the recognition of abusive injuries, unwillingness to report suspected physical abuse, and professional bias (Kellogg, 2007).

## CHILD HOMICIDE

As previously stated, the true rate (or incidence) of child homicide is unknown (Johnson, 2000). Homicide is, however, the fourth leading cause of death in children age four and younger, and third among children age 10 to 14 (Committee on Child Abuse and Neglect, 1999). Studies dating back to the 1980's estimate that child homicides are underreported in the U.S. by at least 20% (Schloesser, Pierpont, and Poertner, 1992). There are many documented causes of child homicide. This thesis focuses on both child homicides committed by the child's caretaker without a reported history of substantiated or unsubstantiated abuse by their caretaker (termed non-abuse homicides), and those

committed by the child's caretaker with a reported history of substantiated or unsubstantiated abuse by their caretaker (termed child abuse homicides).

## CHILD ABUSE HOMICIDE

Conservative estimates indicate that almost 2,000 infants and young children die from child abuse or neglect by parents or caretakers each year—approximately five children every day. The vast majority of these children are under age four (U.S. Advisory Board on Child Abuse and Neglect, 1995). Intentional injury is the leading cause of injury death in a child's first year of life (Jenny and Isaac, 2006). In addition, it has been noted that children under one year of age have fallen victim to child abuse homicide more frequently than children of other age groups. According to death certificate data in the U.S. from 1979 to 1988, McClain and colleagues (1993) reported that 90% of fatal child abuse and neglect occurred among children under five years, and 41% occurred among infants under one year. The U.S. Department of Health and Human Services (2008) reports that children younger than four are at the greatest risk for severe injury and death from abuse. In fact, numbers may be significantly higher than reported as many deaths to children may be erroneously classified or in some cases missed altogether (American Academy of Pediatrics, 2006; Jason et al., 1983; McClain et al., 1993; see also Crume et al., 2002).

The true incidence of child abuse homicide in the U.S. is also unknown and by all accounts most proposed estimates underestimate its scope. Recent estimates suggest that child abuse homicide within specific states is underreported by more than half (Herman-Giddens et al., 1999). Considering that child abuse homicide might be prevented if we

knew more about the factors associated with serious child abuse, we must first understand its magnitude. Ascertaining the true scope of child abuse homicide may help divert resources and attention to the factors that could be most effective in addressing this crime. Since many child abuse homicides may in fact be preventable if someone intervenes and removes the child from the abusive caretaker, these violent child deaths should be considered and analyzed separately and distinctly from other types of child homicide.

## MISCLASSIFICATION

Only recently have researchers, public health officials, and law enforcement officers begun to question the documented counts of child abuse homicide across the nation. Despite intense media coverage given to select cases of child abuse homicide, the absence of accurate data continues to play a large role in fully characterizing its nature and extent. It has been estimated that 85% of childhood deaths from abuse and neglect are systematically misidentified as accidental, disease related, or due to other causes (McClain et al., 1993; Ewigman et al., 1993). Mistakes often arise in the classification, reporting, and subsequent analysis of ICD-10 codes. In their tenth revision, ICD-10 codes—used to define cause of death in death certificates—allow for significant underascertainment of child abuse homicides (Jason et al., 1983; Sorenson, Shen, and Kraus, 1997). As reported earlier, varying definitions of child homicide further account for considerable error in estimates (Jenny and Isaac, 2006).

The most frustrating obstacle to preventing child abuse homicide is the reality that officials are not aware of how frequently they occur, and how many have been

mistakenly classified as non-homicide. Van Court and Trent (2004) argue that official released records usually lack the depth and accuracy needed to disentangle a mysterious homicide alone. The authors found that of those deaths in California that could not be linked in both the Federal Bureau of Investigation's Uniform Crime Report's SHR and death certificate records, the majority were cases of child abuse homicide. Likewise, the authors found that most child abuse homicide cases were specified as such by law enforcement records but failed to be recorded as such by the coroner or medical examiner. By linking the two data sources together in a probabilistic fashion, the authors ascertained 399 (7.1%) more cases of child abuse homicide in California over a ten year period (1990–1999). As the number of false positive child abuse homicides may conceivably increase due to error in probabilistic linkage, it is worthwhile to consider a way to sort through data and gather more information about misclassified child abuse homicides. Van Court and Trent's (2004) discovery is consistent with findings from numerous studies documenting the limitations of using death certificate records and ICD-9 or ICD-10 codes to ascertain the incidence of child abuse homicide.

Herman-Giddens and colleagues (1999) reported similar findings in North Carolina. By deterministically linking data across the North Carolina Medical Examiner Information System and the vital records system, the authors found that the vital records system of North Carolina underrecorded child abuse homicide cases by more than 60%. Used alone, both law enforcement and public health official data systems miss significant numbers of child abuse homicides. A genuine concern with the ICD-9 (and subsequent ICD-10) coding being the universally recognized and international standard diagnostic classification system led the authors to argue that other states and nations almost certainly

have similar problems of underascertainment in their child abuse homicide counts (Herman-Giddens et al. 1999; Jenny and Isaac, 2006).

Other researchers focus on multiple, more substantive reasons for underascertainment of child abuse homicide. Four primary reasons that child abuse homicide incidence is underestimated include: the legal difficulty of proof; events when an abused child dies of “natural causes” including accidents; misdiagnosed Sudden Infant Death Syndrome (SIDS); and a missing child report or finding of an unidentified deceased child’s body (Creighton, 1995; McClain et al., 1993). The legal difficulty of proof may lead to the failure of law enforcement or prosecutors to act when there is insufficient physical evidence or eyewitness corroboration. Deaths due to natural causes and SIDS can be obstacles to determining the incidence of child abuse homicide, which numerous researchers have attempted to tackle in the last few decades. A missing or unidentifiable/decomposing child’s body may leave law enforcement and medical officials without sufficient evidence to ascertain the cause of death.

One of the most commonly believed misclassifications of child abuse homicide is the misdiagnosis of SIDS. SIDS is defined as the “sudden and unexpected death of an infant between the 8<sup>th</sup> and the 365<sup>th</sup> day of life, the cause of which remains unclear in spite of postmortem, histological, microbiological and toxicological investigations, evaluation of the death scene and the infant’s medical history (Bohnert, Perdekamp, and Pollak, 2004, p. 31).” Thus, the diagnosis of SIDS is a diagnosis by exclusion of all else. These sudden, unexplained deaths are quite common diagnoses when a physician, coroner, or medical examiner fails to carefully and thoroughly examine the body postmortem. SIDS is especially difficult and sometimes impossible to distinguish from

infant homicide by suffocation. A thorough and complete postmortem autopsy is essential in order to rule out foul-play (Bohnert et al., 2004; Carpenter, Waite, Coombs, Daman-Willems, McKenzie, Huber et al., 2005; Reece, 1993; Sorenson et al., 1997).

Given a limited time to perform a complete autopsy, many palpable signs of child abuse homicide may be overlooked. The diagnosis of abuse usually entails injuries to multiple areas, injuries in various stages of healing, and/or suspicious injury patterns. Bruises, bites, burns, fractures, abdominal trauma, and head trauma, including optic nerve damage or subdural hemorrhages are the most common physical findings (Gleckman, Evans, Bell, and Smith, 2000; McDonald, 2007). Findings that should make professionals suspicious include posterior rib fractures; retinal hemorrhages; complex skull fractures in infants; long bone fractures; scapular, spinous process, or sternal fractures; and cigarette burns (McDonald, 2007).

Thus, postmortem findings in cases of fatal child abuse most often reveal cranial injuries, abdominal trauma, burns, or drowning as the cause of death. In contrast, postmortem findings in SIDS cases should be unlikely to reveal physical injury to the child. The American Academy of Pediatrics (2006) also posits that parents of children diagnosed with SIDS are typically anxious to provide as much information as possible to doctors, researchers, and police. The differentiation between SIDS and fatal child abuse can be a critical decision made by medical examiners that may lead to severe consequences for the deceased child's living family members. There have been several studies that attempt and to determine whether homicide should be expected if multiple SIDS cases have occurred in the same family. These studies have not come to a consensus, although most maintain that repeat, unexpected infant deaths in the same

family may be natural in many situations due to likely genetic abnormalities (Carpenter et al., 2005). Unfortunately, the etiology of SIDS remains unclear despite its being the most common cause of death for children in the post-neonatal period (aged one week to one year) (American Academy of Pediatrics, 2006; Creighton, 1995; O'Halloran, Ferratta, Harris, Ilbeigi, and Rom, 1998; Reece, 1993). The American Academy of Pediatrics reports, however, that SIDS is likely more common than infanticide.

Emery (1993) has argued that as many as 10% to 20% of SIDS cases are, in actuality, misdiagnosed child homicides. Notwithstanding salient evidence to argue otherwise, some researchers argue that child abuse homicides comprise only a small fraction of SIDS cases (American Academy of Pediatrics, 2006; Pollack, 2006). The American Academy of Pediatrics cites varying prevalence estimates, ranging from <1% to 5% of reported SIDS cases. Including child maltreatment, studies estimate that as many as 2% to 10% of cases diagnosed as SIDS are actually homicides. Most U.S. experts claim the estimate is lower and probably between 1% and 3% (McClain et al., 1993). Infant deaths due to suffocation are those that worry professionals as being hard to diagnose, and therefore are likely ruled SIDS if sufficient evidence is not available to rule homicide.

SIDS cases, and especially those cases with a suspicious aura, are the largest group of likely child abuse homicides that child fatality review boards investigate. Jenny and Isaac (2006) argue that the most accurate incidence data of child abuse homicide deaths have been obtained by these multi-agency, multi-disciplinary child fatality review teams. Sparked by the fear that a significant number of child abuse homicide cases have been missed by the medical or criminal justice systems, these child abuse fatality review

teams have become popularized and implemented in many states and in a few developed nations (De Silva and Oates, 1993; Johnson, 2000; O'Halloran et al., 1998; Rimsza, Schackner, Bowen, and Marshall, 2002). Functioning properly, these committees have the potential to gather and analyze multiple data sources that may uncover true characteristics and circumstances surrounding a child abuse homicide, similar to the process utilized in the NVDRS (Jenny and Isaac, 2006; Reder and Duncan, 1998). Forty-five states across the U.S. have implemented local and/or statewide child death review boards (Reder and Duncan, 1998). Through interagency collaboration, these child death review teams may consist of representatives from coroners, medical examiners, law enforcement, social services, public health and other local agencies. As with the abstractors in the NVDRS, members gather to review suspicious cases of child mortality and collate their data in order to build a more detailed file on each death (American Academy of Pediatrics, 2006). Although a review of state statutes indicates that these child fatality review boards are funded to produce more detailed and accurate counts of child abuse homicide, the multi-agency review teams vary in levels of successful functioning across states (Committee on Child Abuse and Neglect, 1999).

## VICTIM RISK FACTORS

### CHILD ABUSE

Child abuse affects children of all ages, genders, and ethnicities. Although the risk of physical abuse increases with age, male and female children experience similar rates of physical abuse (Kellogg, 2007). Young children are, however, particularly vulnerable to physical abuse because of their inherent developmental weaknesses and dependence on a



caretaker. The child's dependency, size, critical needs, and inability to defend himself/herself, hide, or run away are factors that increase the likelihood that a child will be a victim of physical abuse. Abused children may show signs of developmental and growth delays, and very likely are emotionally deprived (Taitz and King, 1988). The U.S. Department of Health and Human Services (1993) has indicated that the rate of physical abuse is 2.1 times higher among children with disabilities than children without disabilities (Kellogg, 2007).

## CHILD HOMICIDE

It has been argued that child homicide incidence follows a bimodal distribution by the age of the victim (Lord, Boudreaux, Jarvis, Waldvogel, and Weeks, 2002). Although homicidal deaths occur among children of all ages, risk and protective factors, as well as the circumstances surrounding homicides are not uniform. Children age four and younger and children age 13 to 17<sup>4</sup>, although quite different, both experience high victimization rates. As mentioned above, young children have developmental and physical weaknesses that make them extremely vulnerable to extreme injury or death after trauma. Older children (aged 13 to 17) experience a higher homicide rate than those age 5 to 12 because they are more independent, mobile, and may display more competition, aggression, or violence toward rival peers (acquaintances and strangers) (Boudreaux et al., 2001). Thus, male victims overwhelmingly outnumber female victims of homicide among older children. This teenage population has been kept out of this analysis because of the inherent differences in circumstances surrounding homicide victimization. This

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<sup>4</sup> Barbarino (1989) found higher homicide victimization to cluster among children aged birth to 5 and aged 15 to 17.

population has a relatively low risk of child abuse homicide, the focus of this analysis, and although they have a high homicide rate, they will likely not account for a significant number of child abuse homicides.

Boudreaux and colleagues (2001) reported that male children age zero to four were at slightly higher risk than female children age zero to four of child homicide, although gender was not a significant factor for children age 5 to 12. In cases of sexual abuse and subsequent homicide, the authors reported that females were more likely than males to be victimized; especially females age 5 to 12. The U.S. Department of Health and Human Services (2003) reported that girls are four times more likely than boys to be sexually abused. When addressing risk factors related to homicide, Boudreaux and colleagues contend that motive of the offense must be addressed, as males and females within specific age groups appear at risk for different types of homicides.

In a study by Bennett and colleagues (2006), the authors reported African-American infants to be 4.2 times more likely than white infants to be victims of homicide. Boudreaux et al. (2001) found that Caucasian children were victimized at significantly older ages than minority children, and that victimization of children was generally intraracial, consistent with most other criminological studies of violent crime. Bennett et al. (2006) also report that parents are most often the primary suspect in cases of child homicide. The greatest risk of being killed by a parent was found among African-American female infants. Other characteristics that have been associated with infanticide include frequent crying, low birth weight (De Silva and Oates, 1993), low gestational

age, and low Apgar<sup>5</sup> scores (Bennett et al., 2006). Bennett and colleagues (2006) also found that the vast majority of infanticides were perpetrated by the victim's parent or caregiver.

## CHILD ABUSE HOMICIDE

The bimodal age distribution of child homicide victims as described above is also discernible for victims of child abuse homicide. As children age, their risk of becoming child abuse homicide victims decreases. As skills develop, they become physically stronger and less dependent on others. As they enter school and spend more time outside the home, the rate of victimization by their caretaker seems to decrease. This age distribution adds another layer of difficulty to establishing accurate child abuse homicide incidence rates, as the circumstances and motives for child abuse homicide vary by the age of the victim. This creates confusion in analyzing and interpreting results, which makes it difficult to compare findings (Boudreaux et al., 2001; Ewigman et al., 1993; McClain et al., 1993).<sup>6</sup>

Research is limited and somewhat contradictory as to what typifies the profile of the average child abuse homicide victim. The most apparent victim risk factor of child abuse homicide is a history of abuse, as previous abuse likely predicts future abuse. Previous studies have also found that males were over-represented among child abuse

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<sup>5</sup> Apgar scores are a measurable way of assessing the health of a newborn immediately after birth. Apgar scores are based on an additive scale ranging from 0 to 10 (0 low; 10 high) and assess a child's skin color, pulse rate, reflex irritability, muscle tone, and breathing.

<sup>6</sup> This study lacks the ability to test this assumption since I cannot determine the age of the child victim. Unfortunately, the exact age of the victim cannot be ascertained or analyzed. This limitation is profound since I cannot tell an infant child abuse homicide by caretaker apart from a school-age child abuse homicide, and subsequently I cannot precisely capture victim risk factors of child abuse homicide depending on the age of the victim.

homicide victims (Bennett, Hall, Frazier, Patel, Barker, and Shaw, 2006; Boudreaux et al., 2001; Lucas, Wezner, Milner, McCanne, Harris, Monroe-Posey et al., 2002; Overpeck, Brenner, Cosgrove, Trumble, Kochanek, and MacDorman, 1998), while others reported that the victim's sex was not a significant factor (Boudreaux et al., 2001; Cavanagh, Dobash, and Dobash, 2007; Lord et al., 2002; Schloesser et al., 1992).

Research is also limited on the rate of child abuse homicide among Hispanics in the United States. One reason for this limitation may be that it is perhaps much harder for professionals to discern whether a victim or offender is Hispanic unless s/he or a relative tells them. Since the emigration of Hispanics to the U.S. is a more recent trend, ethnicity has only recently been captured in public health data. States may have, however, different methods for capturing Hispanics in public health data depending on the magnitude of the Hispanic population in the state. It is possible that it may be much harder for a professional to distinguish someone's ethnicity (Hispanic or non-Hispanic) than someone's race (White, Black, Asian, etc.), which may seem more apparent from visible physical features. Unfortunately, ethnicity has largely been ignored in child abuse homicide research. When Hispanics are captured in data, the Hispanic ethnicity is typically linked to the race category, combining both Black and White Hispanics and comparing them to White non-Hispanics and Black non-Hispanics (for example, see Crume et al., 2002).

As previously stated, child abuse homicides differ from child maltreatment homicides in that child maltreatment homicides also include deaths due to child neglect. Interestingly, Stiffman, Schnitzer, Adam, Kruse, and Ewigman (2002) found family configuration significantly linked to risk of fatal child maltreatment. The authors found

that children living in a household with an unrelated adult were 27 times more likely to die of inflicted injury than children living with one or two biological parents. Numerous studies have found that many child maltreatment homicides occurred when unrelated males, particularly “mother’s boyfriends,” lived in the home with the child, suggesting that young children who resided in households with unrelated adults are at an exceptionally high risk for maltreatment homicide (Bergman, Larsen, and Mueller, 1986; Schnitzer and Ewigman, 2005a; Stiffman et al., 2002). In addition, researchers have found evidence to support the argument that children who died of maltreatment were more likely to be male, Black, and in a home where abuse or neglect had been previously substantiated (Bergman et al., 1986).

## OFFENDER RISK FACTORS

### CHILD ABUSE

Previous research has not identified a consistent set or cluster of personality traits that can accurately predict which caretakers will become extremely abusive to cause severe injury or death to a child. Although very little is known about the perpetrators of child abuse homicide (many such homicides go unreported, and even if reported, there may not be enough evidence available to charge someone), some researchers have argued that there is a shared characteristic among most child abusers: the abuser is typically someone the child knows. More than likely the abuser is the child’s parent, caretaker, or other family member (Smithey, 1998). For this reason, this study focuses specifically on child homicides inflicted by the child’s caretaker, and will explore whether parental caretakers are more or less likely to be suspects in child abuse homicides.

The National Foundation for Abused and Neglected Children (2008) lists the following characteristics of abusive parents: they seem to be isolated from the community and have few or no close friends; when asked about a child's injury, they offer conflicting reasons or no explanation at all; they seem unwilling or unable to provide for a child's basic needs; they expect too much of their children; and they do not supervise or discipline their children in ways that teach them to correct their behavior. The U.S. Advisory Board on Child Abuse and Neglect (1995) also issued a generic profile indicating that parental abusers usually have behavioral, emotional, and cognitive difficulties, histories of other violence, involvement in substance abuse, and highly negative views of themselves and their children. Other researchers found parental abusers to be most likely to be in their mid-twenties, without a high school diploma, depressed, living in poverty, having difficulty coping with stress, and often having experienced abuse themselves. Many of these parents experienced physical child abuse as children, and perpetuate the cycle of violence as long-established in the intergenerational transmission of abuse hypothesis (Cavanagh, 2007). In addition, many parents also lack parenting skills and become frustrated at their inability to elicit a desired response from a child, thus turning to abuse to relieve stressors (Keonen and Thompson, 2008; Overpeck et al., 1998; see also Browne and Lynch, 1995; Cavanagh, 2007; DiScala, Sege, Li, and Reece, 2000; Harris et al., 2007; Herman-Giddens and Vitaglione, 2005; Lawrence, 2004; Lucas et al., 2002).

Sometimes a significant stress, such as divorce, moving, a change in the household or sudden unemployment can trigger uncharacteristic aggression against children simply because children are an easy target. Parents with substance abuse

problems are also susceptible to abusing their children while under the influence of drugs, and are more likely than the general population to abuse or neglect their children (Brewster et al., 1998; Browne and Lynch, 1995; Jaudes, Ekwo, and Voorhis, 1995; Kempe et al., 1962; U.S. Advisory Board on Child Abuse and Neglect, 1995).

Furthermore, a child who may have been unwanted may cause feelings of resentment in the parents, and much of the household stress will be blamed on that child, deservedly or not. Some parents have anger management and control issues (e.g., lack of self-control). In order to assert control over a child, a parent may become aggressive. Abusive parents also tend to show severe psychiatric illnesses, psychological disorders, or psychotic tendencies (Browne and Lynch, 1995; Cavanagh et al., 2007; Goldstein, Keller, and Erne, 1985). Maternal offenders of infanticide or filicide may suffer from postpartum depression, an illness that has been estimated to effect between 6 and 26% of women (Kauppi, Kumpulainen, Vanamo, Merikanto, and Karkola, 2008; Keonen and Thompson, 2008; Mugavin, 2005). In addition to many of the personality characteristics stated above, low self-esteem, isolation, low intelligence, fear of rejection, and frustration are very typical of a parental child abuser. A parent abuser may also show signs of sexual promiscuity, criminal activities, immaturity, impulsivity, or hypersensitivity (Brewster et al., 1998; Keonen and Thompson, 2008).<sup>7</sup>

## CHILD HOMICIDE

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<sup>7</sup> Unfortunately, aside from caretaker relationship to victim, none of the aforementioned child abuse offender (or prospective child homicide and child abuse homicide) offender risk factors are tested in this analysis. These descriptions are included solely to provide a review of offender characteristics as established in previous literature.

Contrary to parental fears, community hysteria, and intense media coverage, stranger abductions leading to child homicide are a rare phenomenon (Boudreaux et al., 2001; Browne and Lynch, 1995). Researchers have argued that children are more likely to be killed by members of their own family than by anyone else (Brewster et al., 1998; Brown and Lynch, 1995). Koenen and Thompson (2008) contend that mothers and fathers murder their children at almost the same rate, making it one of the few crimes that women commit as often as men. Traditionally, women who kill their children have been viewed by the legal system and the mental health profession as suffering from insanity or psychosis. On the other hand, men who kill their children are more likely to be viewed as evil (Wilczynski, 1997). Other maternal characteristics associated as risk factors for infanticide and child homicide include women under age 19, single marital status, 12 or fewer years of education, previous births, and late initiation of prenatal care (Bennett et al., 2006; Craig, 2004).

Daly and Wilson (1994, 1996) found that step-parental homicides differ from genetic parental homicides in that they are often motivated by hostile resentment of the victim. The authors found that stepchildren were twice as likely as biological children to be killed in families. They argued that stepchildren were at greater risk of homicide by stepfathers. The results of a study by Harris and colleagues (2007) also indicated a considerably greater risk for stepfathers than genetic fathers to commit child homicide. In contrast to Daly and Wilson (1994, 1996), Gelles and Harrop (1991) found that non-genetic male caretakers were less violent than genetic, foster, or adopted fathers in a self-report study. Gelles and Harrop (1991) argue that given these contradictions, it seems



appropriate to question the long-held belief by numerous others that non-related parents are more abusive than biological parents.

## CHILD ABUSE HOMICIDE

There is little agreement among scholars about whether there is a typical child abuse homicide offender. In the 1980's, Bergman and colleagues (1986) found that fatal child abuse occurred more frequently at the hands of men, an unexpected change in the sex distribution for known perpetrators of child abuse. Cavanagh and colleagues (2007) looked specifically at paternal perpetrators of child abuse homicide, and found that these men not only had the propensity to abuse their children, but also abused their wives or intimate partners. This gender shift contrasted with earlier research that women were the most likely offenders (Craig, 2004; Harris et al., 2007; Lord et al., 2002).<sup>8</sup>

Research has established higher rates of child abuse homicide perpetrated by the victim's parents. Dale (2002) concluded that in 87% of cases of physical injuries leading to serious injury and often filicide, the abuse was inflicted by either (or both) biological parents. In cases where it was possible to determine responsibility, the likelihood was evenly divided between mothers and fathers. Herman-Giddens and colleagues (1999) found that birth parents alone accounted for 63% of the perpetrators of child abuse homicide, with the child's mother more likely than the child's father to be the perpetrator. Schnitzer and Ewigman (2005a) found most perpetrators of child abuse homicide to be male and residents of the child's household at the time of the abuse. Numerous authors also note that there seems to be an increasingly prominent role of nonfamilial male

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<sup>8</sup> Women are, however, argued to be the most likely offenders if the child is under age 1.

“friends” (i.e., live-in boyfriends) perpetrating physical abuse and ultimate homicide (Bergman et al., 1986; Boudreaux et al., 2001; DiScala et al., 2000).

As stated earlier, a handful of studies have surfaced examining the special problem of child abuse and child abuse homicide in military families. Herman-Giddens and colleagues (2005) found that the child abuse homicide rate for children of military families in two densely populated military counties of North Carolina was twice that of the state. Many military servicemen and servicewomen are young people who are paid rather poorly, move around quite frequently, often feel a sense of isolation, and experience extreme stress. Significant numbers of men and women in the military possess one or more of the above risk factors for offenders of child abuse homicide.

#### INCIDENT CHARACTERISTICS

Studies have found that child abuse and child abuse homicide most often occur in the home, where no extra-familial members were there to witness the abuse (Boudreaux et al., 2001; Ewigman et al., 1993). Given that children are dependent on the care of an adult, it may be probable that if a child does not venture out of the home or interact with other adults, escalating abuse may lead to homicide. In addition, if a child is badly beaten to the point that someone calls 911 and the emergency medical services (EMS) arrive, it is likely that the child has less of a chance of sustaining fatal injury if given immediate medical attention (Harris, Thomas, Fisher, and Hirsch, 2002). By virtue of the fact that someone called the EMS or took the child to the hospital, whether that person is the child abuser or not, they must recognize the nature of the situation and the dire need of medical attention for the child. In cases where a child is brought to the hospital, it is probable that

the authorities will be notified if the injuries appear to be the result of abuse. In situations where authorities are notified, a child may be less likely to sustain fatal injury in the future. If the EMS was not called during or after a child abuse incident, the abuser may have attempted to hide the abuse, subsequently leaving the child without the medical attention s/he needs and increasing his/her chances of death.

Fatal child abuse can take on many forms. The most common cause reported involves forced trauma (physical beatings) to the head, neck, and body (Hicks and Gaughan, 1995; King et al., 2006; Smithey, 1998). Other causes of physical abuse that have lead to death include poisoning, suffocation, burning, and strangulation.

Boudreaux et al. (2001) posited that the method of death in homicides of younger children differs from that of older children. Smithey (1998) and others as well have maintained that levels of violence in child homicide escalate with victim age (Daly and Wilson, 1994, 1996). Utilizing data from the Federal Bureau of Investigation in 1994, Boudreaux and fellow authors reported that older children were more often killed by firearms, whereas younger children were more often killed by “personal weapons” such as hands, fists, and feet. Infant victims were those primarily killed with personal weapons (63% compared with 5% with firearms), whereas children age 12 or older were primarily killed with firearms (60% compared with 8% with personal weapons). In a study by King et al. (2006), the authors reported more than half of children age five or older died of gunshot wounds. Only one in ten children age four and younger died of a firearm. Physical beatings were found to be the most prevalent among children age four and younger (Boudreaux et al., 2001).

## SYNOPSIS

Ideally, I would examine all the abovementioned victim, suspect, and incident characteristics to examine how previous research findings on child abuse homicide characteristics compare to the findings of this study utilizing three sample years of data in the NVDRS. Unfortunately, the lack of sufficient data for many of these characteristics prevents this kind of analysis. I am also unable to produce an estimate of the incidence of child abuse homicide by caretaker in the United States, and do not plan on reporting the likelihood of risk and protective factors of child abuse homicide by caretaker in specific NVDRS states.<sup>9</sup> I can, however, address underascertainment and misclassification of these homicides, as well as assess the probability of child abuse homicide inflicted by the child's caretaker, given available victim and incident characteristics reported in the NVDRS during these sample years of data.

As established in previous research, I expect that the NVDRS will ascertain more—and a more precise estimate of—child abuse homicides by caretakers in these states than death certificates alone. Since research is somewhat contradictory as to what typifies the profile of an average child abuse homicide victim, I am unsure which victim characteristics (e.g., sex, race, and ethnicity) are more common of child abuse homicide victims. Research suggests that parents/guardians are more likely than any other person to physically abuse their children. Biologically related or unrelated, mother or father, a child's parent in the home is more likely to physically abuse to the point of murdering a child (Brewster et al., 1998; Brown and Lynch, 1995). Since my analysis will focus

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<sup>9</sup> In order to have a sufficient number of child homicides to attempt regression analyses, child homicides by caretaker are analyzed in aggregate and not by state. Since many of these states had only a handful of child homicides by caretaker reported during the years each reported to the NVDRS, separate analyses by state were not attempted.

solely on child homicides inflicted by the child's caretaker, I hypothesize that parents are more likely caretaker suspects in child abuse homicides and the child's injury is more likely to have occurred in the victim's home.

A review of incident characteristics suggests that the child abuse homicidal incident is more likely to occur in the victim's home. Harris and colleagues (2002) also proposed that if the EMS is called, the child has less of a chance of sustaining fatal injury. Therefore, I expect each of these factors to distinguish child abuse homicides inflicted by the child's caretaker. In addition, physical beatings in the form of forced trauma to the head, neck, or body of a child by an offender's hands, fists, feet or other personal weapon is likely the most common weapon used in child abuse homicides (Hicks and Gaughan, 1995; King et al., 2006; Smithey, 1998). Since a history of substantiated or unsubstantiated abuse had been reported to the authorities for all child abuse homicide victims, it is likely that this abuse takes the form of consistent physical beatings by the caretaker, representing the most frequently used weapon in these murders.

## METHODS

### DATA

Previous research has established that there is an underascertainment of child abuse homicide in specific state death certificate data (Herman-Giddens et al., 1999). By using the NVDRS, this study replicates previous child abuse homicide ascertainment findings with a more recent sample of deaths covering a larger geographic area. After an examination of misclassified child abuse homicides by caretaker, I examine whether victim or incident characteristics affect the likelihood that a death will be reassigned a homicidal manner of death, and how abuse or non-abuse homicides inflicted by the child's caretaker differ among these characteristics. Finally, the analysis shifts to focus specifically on child abuse homicide inflicted by the child's caretaker.

With a more accurate number of child abuse homicides by caretaker across a larger geographical area, a multivariate logistic regression is modeled to explore if these three years of data uncover risk and protective factors of child abuse homicide also found in previous studies. Although the NVDRS contains a population of deaths for these 17 states during the years they participated in the NVDRS, it is reasonable to assume that the data represent a sample of years—from which I am analyzing particular years. Thus, statistical tests such as tests of significance will be utilized.

I examine the probability of a child abuse homicide by caretaker occurring given specific victim and incident characteristics. These analyses demonstrate the importance of utilizing child abuse homicide by caretaker data from multiple sources, while also shedding some light on the difference between child abuse homicides by caretaker and

other caretaker homicides. With a more accurate number of child abuse homicides inflicted by the child's caretaker, this analysis provides a more precise assessment of victim and incident characteristics of child abuse homicide than established in previous child abuse homicide research.

The NVDRS contains all reported incident, death (deceased victims), and suspect (sustained or alleged/deceased or alive) data from 17 participating U.S. states<sup>10</sup> between the years they participated in the NVDRS from 2003 and 2005<sup>11</sup>. In 2005, these states combined accounted for 31.6% of the 2004 U.S. population and 27.3% of all homicides in the United States (U.S. Department of Health and Human Services, NVDRS Codebook, 2005). The NVDRS data consist of all violent deaths occurring in each state (therefore victims are not necessarily residents of that state). This analysis utilizes the public use NVDRS available through the University of Michigan's Inter-University Consortium for Political and Social Research (U.S. Department of Health and Human Services, NVDRS Computer File, 2003, 2004, 2005). Data have been cleared of all identifying information in the public use NVDRS, restricting the breakdown of many variables.

This study explores all reported violent homicides of children aged 14 or younger in the 17 states that reported to the NVDRS during 2003 to 2005 (some states reported in 2005, some in both 2004 and 2005, and others in 2003, 2004, and 2005). For purposes of this analysis, each child homicide is considered an observation. Multiple child homicides pertaining to the same homicidal incident will be counted separately. For example, if a

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<sup>10</sup> Alaska, Colorado, Georgia, Kentucky, Maryland, Massachusetts, North Carolina, New Jersey, New Mexico, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Virginia, Wisconsin, and select counties in California.

<sup>11</sup> NVDRS 2005 data are provisional and reported as of February 2007.

parent murders his/her two young children one right after another, even though this is considered one homicidal incident in the NVDRS, there are two victims. Both victims would appear separately in this analysis.

Child homicides by caretaker where a history of substantiated or unsubstantiated ongoing abuse by the alleged caretaker suspect was reported and coded as such in the NVDRS are defined as child abuse homicides inflicted by the child's caretaker. Child homicides by caretaker where no evidence of ongoing abuse of the child by their caretaker was documented in the NVDRS are defined as non-abuse child homicides inflicted by the child's caretaker. By connecting the abuse to the actual homicide, this study assumes that all cases where the child victim had a history of abuse by their caretaker and whose death was classified as a homicide at the hands of their caretaker were child abuse homicides. Although the abuse may or may not have been substantiated, I have assumed that preceding the child's death someone had noticed socially unacceptable or likely violent behavior in the child's household. For this reason, I believe that the majority of unsubstantiated child abuse reports may have been substantiated had the authorities thoroughly investigated the charge, or more evidence been available when the authorities did respond to the allegation. It is likely, however, that this definition of child abuse homicide by caretaker will produce a more conservative estimate of child abuse homicide by caretaker than the true number in these states across these years.

This study first examines the impact of using the NVDRS—a data system whose processes link data from multiple sources—on the ascertainment of child abuse homicides that may have been missed if using ICD-10 codes alone. The linkage process utilized by the NVDRS abstractors has the ability to generate a more complete picture of



the scope of child abuse homicide by caretaker in participating NVDRS states.

Minimally, the NVDRS data are linked at the individual level from death certificates, coroners and medical examiners, law enforcement records, and crime laboratories. Using a rigorous and standardized procedure to link data from these sources, data on deaths belonging to the same incident are combined in the database by NVDRS coders (Centers for Disease Control and Prevention, 2003). It is through this process that a revised manner of death is sometimes ascertained.<sup>12</sup>

## ASCERTAINMENT ANALYSIS

### ASCERTAINMENT BY MANNER OF DEATH

As shown in Table 1, the NVDRS ascertained 634 child homicides while an analysis of ICD-10 manner of death from death certificates ascertained 516—a difference of 118 (23%) child homicides that were not classified as such by ICD-10 code. The NVDRS abstractor classified more deaths with a tangible manner of death than ICD-10 classifications. All deaths classified as missing an ICD-10 code, other manners of death, and the majority of unknown deaths were revised into a more exact manner of death. More deaths were classified, however, as deaths of undetermined intent. Due to potential uncertainty surrounding an offender's intent (if never revealed) in a child's death, it is very likely that a review of multiple sources of data on these deaths would shed more light on some cases with an unknown or vague manner of death.

A breakdown of ascertained homicides by ICD-10 code in Table 2 reveals that 493 of 634 (78%) ascertained homicides were also classified as homicides by ICD-10 code. Of the 22% that were reclassified, half had been missing an ICD-10 code. Of those

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<sup>12</sup> See Appendix B for a description of ICD-10 and NVDRS manner of death categories.

111 ascertained child homicides with documented evidence of ongoing abuse (substantiated or unsubstantiated) of the child by their caretaker in the participating states, 19 (17%) were reclassified from missing ICD-10 code, other manners of death, or an unknown ICD-10 classification to homicide. There were no cases that went from a homicide classification by ICD-10 code to a non-homicide by NVDRS abstractor. Of the 523 ascertained child homicides without documented evidence of abuse of the child by their caretaker, 122 (23%) were reclassified from a vague manner of death or other manner of death to homicide. Besides the 401 homicides classified by ICD-10 code that make up the 523 ascertained non-abuse homicide, there were an additional 23 deaths that were homicides by ICD-10 code, but were reclassified by the NVDRS abstractor into some other manner of death (consequently these deaths are not shown in the table).<sup>13</sup>

#### ASCERTAINMENT BY MANNER OF DEATH AND HISTORY OF ABUSE

Looking at death ascertainment by whether a history of abuse was reported, there were 113 violent child deaths with a documented history of allege of sustained abuse of the child by their caretaker, and 1,262 without documented evidence of ongoing abuse of the child by their caretaker (Table 3). ICD-10 manner of death classified 92 of these 113 deaths as homicides. In contrast, the NVDRS abstractor classified 111 of these 113 deaths as homicides (an additional 19 homicides ascertained by NVDRS abstractor).

When evidence of ongoing abuse (substantiated or unsubstantiated) of the child by their caretaker had been documented by state authorities, 19 of 20 violent deaths were

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<sup>13</sup> The percentage of reclassified non-abuse child homicides reported here does not represent the reported ascertainment of non-abuse child homicide since this percentage is not the net difference of NVDRS ascertainment compared to ICD-10 ascertainment. That difference can be found in Table 3.

reclassified from an unknown or vague ICD-10 classification (missing ICD-10 code, other manners of death, or unknown) to homicide by the NVDRS abstractor.

Of the 1,262 violent child deaths without a documented evidence of ongoing abuse of the child by their caretaker, ICD-10 manner of death classified 424 as child homicides.<sup>14</sup> In contrast, the NVDRS abstractor classified 523 as homicides (an additional 99 child homicides ascertained by NVDRS abstractor). As with child abuse violent deaths, many ascertained non-abuse violent deaths were reclassified from an unknown or vague ICD-10 classification (missing ICD-10 code, other manners of death, or unknown) to a more exact manner of death by the NVDRS abstractor. When a case lacked sufficient information about the violent death, including the circumstances surrounding it or the intent of the offender, a reclassification to a more exact manner of death may have been impossible. Many of these deaths were reclassified to deaths of undetermined intent.

Of the 634 NVDRS ascertained homicides, 111 (18%) met the definition of a child abuse homicide while 523 (82%) met the definition of a non-abuse child homicide. Thus, the NVDRS ascertained 17% more child abuse homicides and 19% more non-abuse child homicides across these states during the years they reported to the NVDRS (for a total child homicide ascertainment of 18.6%). Using this definition, 19% of all ascertained child homicides were child abuse homicides.

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<sup>14</sup> In comparing ICD-10 classified homicides from Table 2 with Table 3, we observe 23 violent deaths without a history of abuse had been reclassified from ICD-10 homicide to another manner of death by NVDRS abstractors. These deaths are considered in the ascertainment figure because had the NVDRS not been available, these deaths would be considered non-abuse child homicides by ICD-10 codes.

## CHILD HOMICIDE BY CARETAKER ASCERTAINMENT

Fifteen of the 111 child abuse homicides and 329 of the 523 non-abuse child homicides, however, were deaths where the child's caretaker was not reported as the suspect in the murder (Table 4). Consequently, there were 96 child abuse homicides by caretaker and 194 non-abuse child homicides by caretaker classified in the NVDRS. Breaking down NVDRS homicide ascertainment by whether the caretaker was the suspect in the homicide reveals an additional 17 child abuse homicides inflicted by the child's caretaker and 52 non-abuse homicides inflicted by the child's caretaker ascertained by the NVDRS abstractor. Nearly 90% of all reclassified child abuse homicides were inflicted by the child's caretaker. Half of all reclassified non-abuse homicides were inflicted by the child's caretaker. Since, this analysis focuses on those homicides inflicted by the child's caretaker, the primary data analyzed include the 96 abuse homicides inflicted by the child's caretaker (with a history of substantiated or unsubstantiated abuse by caretaker) and the 194 non-abuse homicides inflicted by the child's caretaker (without a history of abuse by caretaker).

## CHILD HOMICIDE BY CARETAKER ASCERTAINMENT BY STATE

As shown in Tables 5 & 6, the number of NVDRS ascertained child abuse homicides by caretaker in each state during the years each reported to the NVDRS ranged from 0 to 21 (with North Carolina accounting for 22% of all cases), while the number of non-abuse child homicides by caretaker ranged from 1 to 29 (no one state accounted for a

significant percentage of deaths).<sup>15</sup> The median number of ascertained child abuse homicides by caretaker in the 15 states reporting child abuse homicides was 5. The median number of ascertained non-abuse homicides by caretaker in the 17 states reporting non-abuse homicides was 10.

Oklahoma and Wisconsin accounted for the vast majority of misclassified child abuse homicides by caretaker (representing more than 70% of all misclassified child abuse homicides). After further review of these two states NVDRS data collection processes, no specific reason became clear as to why these two states made up such a significant number of misclassified child abuse homicides. Although I am unsure if both state's health departments submitted child fatality review data to the NVDRS (or if those data are of good quality), I am sure that both states have a child fatality review board (as do all other states reporting to the NVDRS). Both states (or at a minimum select counties in these states) also submit SHRs. However, I am unsure if the state's health departments submitted these data to the NVDRS.

There does not appear to be any states that significantly accounted for a substantial number of misclassified non-abuse child homicides by caretaker. Of the 17 NVDRS reporting states, 6 had zero misclassifications across ICD-10 codes and NVDRS abstractor classification. The remaining 11 states had non-abuse child homicide by caretaker misclassifications (with Alaska being the only state to have a death ascertained by ICD-10 code, but not duplicated by the NVDRS abstractor).

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<sup>15</sup> Since North Carolina accounted for so many child abuse homicides by caretaker in this analysis, a separate analysis was run to see if victim and incident characteristics were any different in North Carolina, which may create results driven by the effects of only that state. No significant differences were found among victim and incident characteristics for child abuse homicide by caretaker and non-abuse child homicide by caretaker with and without North Carolina in the analysis (Table 7). Therefore, North Carolina was kept in the analysis.

## ANALYSIS OF ASCERTAINED AND MISCLASSIFIED CHILD HOMICIDES BY CARETAKER

Ninety-six (86%) abuse homicides occurred at the hands of the child's caretaker. One-hundred ninety-four (37%) non-abuse homicides were inflicted by the child's caretaker. Overall, 33% of all 290 child homicides by caretaker were child abuse homicides, while 67% were non-abuse homicides.

These 290 child homicides inflicted by the child's caretaker comprise the data analyzed in the remainder of this analysis. Misclassified child abuse and non-abuse deaths inflicted by the child's caretaker are further analyzed by victim and incident characteristics by examining how they compare to those ascertained by ICD-10 code. With arguably a more accurate number of child abuse homicides ascertained than in previous studies, the first and second parts of the analysis explore common victim and incident characteristics of both misclassified and ascertained abuse and non-abuse child homicides by caretaker. Nonparametric tests of significance using Cochran's Q test are utilized to show differences by victim and incident characteristic and also between abuse and non-abuse child homicide by caretaker for these characteristics.

Cochran's Q statistic tests for equality of proportions in matched samples. The Q statistic was used to test for significance instead of a simple t-test or a Chi Square due to the dichotomous nature of all variables in this analysis. Nonparametric tests, such as the Cochran's Q test, do not assume the normal distribution. The values of each variable in this analysis are not normally distributed. Rather, variables were originally either binary or nominal. Many of the variables that were binary to begin with had distributions that were somewhat lopsided. Thus, when dichotomizing all nominal variables, only minor

information was lost. Many of these variables had vague “other” categories that were collapsed during the dichotomization, as a result losing vague details which would not have added any additional insight into the analysis.

Cochran’s Q statistic is used to test similar distributions among several dependent samples when variables are dichotomous. The Cochran’s Q test tests the null hypothesis that the dependent samples have the same mean on the dichotomous variable.

## MODELS

The third part of the analysis uses multivariate logistic regression to assess the probability of child abuse homicide, given specific victim or incident characteristics. Results utilizing these three years worth of data are then compared with results from previous studies. Questions to be considered include: are parents or non-parents more apt to be caretaker suspects in child abuse homicides than in non-abuse homicides? Is the probability of child abuse homicide by caretaker greater for boys than girls, Whites than Blacks, non-Hispanics than Hispanics, or vice versa? What is the probability of a child abuse homicide inflicted by the child’s caretaker when an incident occurs in the home, compared to outside of the home, or when the EMS is or is not called?

Two logistic regressions are conducted to address these and other questions. Now that a more accurate number of child abuse and non-abuse homicides by caretakers are available for analysis, how do the results compare to risk and protective factors of child abuse homicide established using death certificate data in previous research?

Both multivariate logistic regression models contain victim and incident variables suggested by previous research. Both models look at the effect of each victim and

incident variable separately on the probability of child abuse homicide by caretaker controlling for all other variables in the model.

Model I and Model differ in how each treats cases with missing characteristics. If missing characteristics are not handled properly, we may end up drawing inaccurate inferences about the data. Due to improper handling of missing values, results may differ from ones where the missing values are present. Both models use complete case analysis (i.e. listwise deletion) as the technique for dealing with missing values.

Model I is a more conservative complete case analysis of the data and includes variables to capture unknown victim and incident characteristics for all characteristics where more than 5% of cases had an unknown characteristic.<sup>16</sup> Complete case analysis is the standard treatment of missing data in the social sciences. When this technique is applied, entire cases with any missing data are simply discarded (Allison, 2001; Little, 1992; Riedel & Regoeczi, 2004). Since deaths that have missing characteristics may in fact be missing not at random, I have modeled “missingness” and accounted for the missing data in Model I. This will allow me to compare my findings with Model II where I have dropped all cases with at least one unknown (missing) characteristic.

After reviewing the frequency of distribution across victim and incident characteristics, and being conservative in our complete case analysis, it seemed appropriate to include dummy variables for caretaker relationship to victim (11% of homicides had missing relationship), incident occurred at victim’s home (5% had missing information about incident place), EMS at scene (9% of homicides had missing EMS

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<sup>16</sup> It is standard according to Statistics Solutions Inc. (see citation) to drop the missing values if the number of cases of missing values is less than 5% of the sample. All other statistical studies refrained from providing a percentage of missing values from which to justify dropping cases. Since the number of deaths dropped when utilizing this criteria was only 3% of the total sample, this method of dealing with the missing data seems reasonable.



information), and weapon used (8% of homicides had missing weapon type). Model I includes 281 of the 290 NVDRS classified child homicides inflicted by caretaker.<sup>17</sup> All independent variables have been dichotomized. Model I can be written as:

$$\begin{aligned} \Lambda^{-1}[AbuseHomicide] = & \beta_0 + \beta_1 Sex + \beta_2 Race + \beta_3 Ethnicity + \beta_4 Parent \\ & + \beta_5 RelationUnknown + \beta_6 IncidentHome + \beta_7 IncidentPlaceUnknown + \beta_8 EMS \\ & + \beta_9 EMSUnknown + \beta_{10} DeathHospital + \beta_{11} PersonalWeapons \\ & + \beta_{12} WeaponUnknown + \varepsilon, \end{aligned}$$

where the reference group for each characteristic is the “not” group. All dichotomized variables are compared to their respective reference group and reported in odds ratios. By leaving deaths with unknown values in the model, the number of deaths is greater in the analysis and I can gauge whether homicides with unknown values are any different from homicides with no unknown values.

Model II is a more liberal use of complete case analysis and drops all deaths with any missing data. All cases that had at least one unknown victim or incident characteristic have been dropped from Model II. Missing information dropped the number of cases in Model II from 290 to 212. Model II can be written as:

$$\begin{aligned} \Lambda^{-1}[AbuseHomicide] = & \beta_0 + \beta_1 Sex + \beta_2 Race + \beta_3 Ethnicity + \beta_4 Parent \\ & + \beta_5 IncidentHome + \beta_5 EMS + \beta_6 DeathHospital + \beta_8 PersonalWeapon + \varepsilon. \end{aligned}$$

Two logistic regression models were run in order to determine whether or not deaths with missing victim or incident characteristics (if at least 5% of all deaths had an unknown value for a characteristic) have any effect on the modeling of child abuse homicide by caretaker.

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<sup>17</sup> These nine deaths (unknown ethnicity and unknown death place) would have been dropped from Model I anyway because they were perfectly correlated with the dependent variable.

## DEPENDENT VARIABLE

The dependent variable *AbuseHomicide* is a dichotomous variable valued at one if the child homicide was a child abuse homicide inflicted by the child's caretaker and zero if the child homicide was a non-abuse homicide inflicted by the child's caretaker. A non-abuse homicide inflicted by the child's caretaker includes all child homicides with no evidence of ongoing abuse of the child by their caretaker documented by authorities or if it was unknown if a history of abuse by the child's caretaker existed. Thus, all child abuse homicides inflicted by the child's caretaker had a substantiated or unsubstantiated history of abuse reported prior to the child's death and recorded on the child's death certificate.

## INDEPENDENT VARIABLES

Common independent variables examined in both multivariate logistic regression models include *Sex*, *Race*, *Ethnicity*, *Parent*, *IncidentHome*, *EMS*, *DeathHospital*, and *PersonalWeapons*. All independent variables have been dichotomized. In both models, *Sex* refers to victim's sex: one if male, zero if female. *Race* is coded one if the victim was White, zero if the victim was non-White. *Ethnicity* is coded one if the victim was Hispanic, zero if the victim was non-Hispanic. *Parent* is a dichotomous variable valued at one if the suspect was the parent of the victim and zero if the suspect was not the parent of the victim. Suspects are limited to caretakers of the child victim by virtue of the coding of the dependent variable. *IncidentHome* refers to whether the incident occurred at the victim's home: one if yes, zero if no. *EMS* refers to whether the EMS was called to the scene: one if yes, zero if no. *DeathHospital* refers to where the child died: one if at the hospital as a patient or in the emergency room, zero if not in the hospital.

*PersonalWeapons* refers to the weapon type used to inflict fatal injury in the homicide: one if personal weapons (including one's hands, fists, feet, legs, etc.) were used, zero if any other type of weapon (besides personal weapons) was used.

In Model I, four additional variables were added to the model to examine whether or not deaths with missing information (that met the justification criteria of less than 5% missing) in any of the victim or incident characteristics have any effect on the model. The following variables met the unknown justification criteria and were added to Model I: *RelationUnknown*, *IncidentPlaceUnknown*, *EMSUnknown*, and *WeaponUnknown*. All unknown variables are also dichotomized.

## HYPOTHESES

Since previous research is inconsistent regarding victim characteristics predictive of future child abuse homicide victims, I am uncertain how a victim's sex, race, or ethnicity is related to child abuse homicide. By virtue of how easy it may be to hide the suspected abuse in the home, I would expect the relationship of the caretaker to the victim in a child abuse homicide to likely be a parent/child relationship (than in a non-abuse homicide inflicted by the child's caretaker).

In addition, based on previous research, I would expect the weapons used in child abuse homicides by caretaker to differ greatly from the weapons used in non-abuse homicides by caretaker. Past research has established that weapon type varies depending on the age of the victim and the circumstances surrounding the child homicide incident. Unfortunately, these data do not allow a breakdown of victim age beyond the 0 to 14

grouping, so instead I focused more on the differences between the weapons used in abuse homicides by caretaker compared with non-abuse homicides by caretaker.

Regarding the anticipated results for incident characteristics, it is hypothesized that incidents that occur in the home are more likely to be child abuse homicides than those that occur out of the home. Calling the EMS is hypothesized as being associated with a lower risk of child abuse homicide than if the EMS is not called. If a child is taken to the hospital, it is expected that those who died at the hospital might be less likely to be victims of child abuse homicide than those who died elsewhere. As previously stated, it is also hypothesized that personal weapons are more likely to be the weapons used in a child abuse homicide. Hypothesized directions of the aforementioned relationships of common independent variables are found in Table 8.

## RESULTS

The results will be presented in the following way. First, I offer a descriptive account of misclassified deaths in the NVDRS as described above. Misclassified deaths are examined to see if they differ from deaths actually ascertained by ICD-10 code. This comparison is done by both victim and incident characteristics for both child abuse homicides by caretaker and non-abuse homicides by caretaker. Second, a descriptive analysis illustrates substantive differences between child abuse homicide inflicted by the child's caretaker and non-abuse homicides inflicted by the child's caretaker. Cochran's Q test statistics are used to show whether the percentages (proportions) of a given variable are the same across multiple dependent samples, thus establishing statistically significant differences. Finally, the results of both multivariate logistic regressions describing the probability of a child abuse homicide inflicted by the child's caretaker given specific victim and incident characteristics of the homicide are reported.

### VICTIM CHARACTERISTICS OF MISCLASSIFIED DEATHS

As predicted and established in previous research, the abstractor revised manner of death in the NVDRS ascertained a greater number of child homicides and child abuse homicides than ICD-10 manner of death on death certificates alone (nearly 19% more child homicides, of which 19% were child abuse homicides). Is there a common set of victim or incident characteristics that distinguish these misclassified child abuse homicides inflicted by the child's caretaker from ascertained child abuse homicides inflicted by the child's caretaker? To address this question, I first looked at victim

characteristics of misclassified child abuse homicides by caretaker (Tables 9 & 10). Of the 17 misclassified child abuse homicides, roughly three-quarters of victims were male. A similar percentage (70%) were non-Hispanics. Nearly two-thirds were White. In addition, these misclassified cases seemed more apt to involve parents ( $Q=5.333$ ,  $Sig.=.021$ ). This pattern, however, appeared to parallel a similar overall distribution of ascertained child abuse homicides inflicted by the child's caretaker, except perhaps for victim sex where the misclassified cases appeared more apt to be males.

Second, I looked at victim characteristics of misclassified non-abuse homicides by caretaker. Of the 52 misclassified non-abuse homicides by caretaker, just over half of all victims were male. Half of misclassified non-abuse child homicides by caretaker were White. More than three-quarters were non-Hispanics. In addition, these misclassified cases were more likely to involve parents ( $Q=10.522$ ,  $Sig.=.001$ ). As with misclassified child abuse homicides by caretaker, the distribution of characteristics across misclassified non-abuse homicides by caretaker appeared to parallel a similar overall distribution of ascertained non-abuse homicides by caretaker.

Comparing child abuse homicide by caretaker ascertainment with non-abuse homicide by caretaker ascertainment (Table 11), misclassified child abuse homicides by caretaker revealed a greater percentage of deaths of males ( $Q=7.049$ ,  $Sig.=.008$ ) and Whites ( $Q=6.737$ ,  $Sig.=.009$ ) than misclassified non-abuse homicides by caretaker. There were, however, a greater percentage of non-Hispanic victims in non-abuse child homicides by caretaker than in child abuse homicides by caretaker ( $Q=14.519$ ,  $Sig.=.000$ ). In addition, parents were found to be the caretaker suspects for misclassified

non-abuse homicides inflicted by the child's caretaker more often than misclassified child abuse homicides (Q=13.091, Sig.=.000).

#### INCIDENT CHARACTERISTICS OF MISCLASSIFIED DEATHS

A comparison of incident characteristics of misclassified child homicides inflicted by the child's caretaker revealed that all misclassified child abuse homicides by caretaker occurred at the victim's home (Tables 12 & 13). It seems that homicidal incidents inflicted by the child's caretaker that occur at home were more likely to be misclassified as non-homicides by ICD-10 codes (abuse homicide, Q=17.000, Sig.=.000; non-abuse homicide, Q=7.078, Sig.=.008). In nearly three-quarters of all misclassified child abuse homicides by caretaker the EMS was at the scene. In 70% of all misclassified child abuse homicides by caretaker the child died at the hospital. There were no differences between the weapon type used (personal weapons or not personal weapons) in misclassified child abuse homicides by caretaker (Q=1.667, Sig.=.197).

A review of incident characteristics of misclassified non-abuse child homicides by caretaker reveals that in contrast to all misclassified child abuse homicide by caretaker occurring at the victim's home, only two-thirds of misclassified non-abuse child homicides by caretaker occurred at the victim's home (although still statistically significant, Q=7.078, Sig.=.008). Three-quarters of these misclassified deaths had the EMS at the scene. Nearly half had victims who died at the hospital in the emergency room or as a patient. Additionally, a greater percentage of misclassified non-abuse homicides by caretaker involved weapons other than personal weapons (Q=19.565, Sig.=.000).

As shown in Table 14, a greater percentage of misclassified child abuse homicides by caretaker had victims who died in the hospital (either inpatient or in the emergency room) compared to misclassified non-abuse homicides by caretaker ( $Q=4.568$ ,  $\text{Sig}=.033$ ). In addition, there were no differences between misclassified child abuse homicides by caretaker and misclassified non-abuse homicides by caretaker if personal weapons were used ( $Q=0.692$ ,  $\text{Sig}=.405$ ). Misclassified non-abuse homicides inflicted by the child's caretaker were, however, more likely to have had non personal weapons used to inflict injury than misclassified abuse homicides (these deaths involved firearms, poisoning, blunt instruments, hanging, sharp instruments, other weapons, or a combination of weapons) ( $Q=16.333$ ,  $\text{Sig}=.000$ ).

#### MISCLASSIFIED HOMICIDES VS. ICD-10 ASCERTAINED HOMICIDES

As shown in columns four and eight in Tables 9, 10, 12, & 13, misclassified child abuse homicides and non-abuse child homicides were statistically different from ICD-10 ascertained child abuse homicides and non-abuse homicides by all victim and incident characteristics tested for in this analysis. Misclassified child abuse homicides were more likely to be male ( $Q=20.763$ ,  $\text{Sig}=.000$ ) and White ( $Q=23.203$ ,  $\text{Sig}=.000$ ) than ICD-10 ascertained child abuse homicides. In addition, misclassified child abuse homicides were more likely to have occurred at the victim's home ( $Q=27.272$ ,  $\text{Sig}=.000$ ) and to have had weapons other than personal weapons used in the fatal injury ( $Q=17.163$ ,  $\text{Sig}=.000$ ) than ICD-10 ascertained child abuse homicides.

Misclassified non-abuse child homicides were more likely to be Non-White ( $Q=13.442$ ,  $\text{Sig}=.000$ ) and actually less likely to have a parent suspect ( $Q=33.252$ ,



Sig.=.000) than ICD-10 ascertained non-abuse homicides. In addition, misclassified non-abuse homicides were more likely to have not occurred at the victim's home (Q=5.333, Sig.=.021) or to have had a victim who did not die in the hospital (Q=9.228, Sig.=.002) than ICD-10 ascertained non-abuse homicides.

## DESCRIPTIVE ANALYSIS

Next, I compared NVDRS ascertained child abuse homicides inflicted by the child's caretaker to non-abuse homicides inflicted by the child's caretaker. As shown in Tables 9 & 10, overall, males were more likely to be victims of child abuse homicide (Q=5.042, Sig.=.025). Neither gender was any more likely than the other to be a victim of non-abuse homicide (Q=1.010, Sig.=.315). Child abuse homicides by caretaker were more likely to involve Whites (Q=5.042, Sig.=.025), and non-Hispanics (Q=26.042, Sig.=.000). Parents were the most likely suspects in both child abuse and non-abuse homicides by caretaker (child abuse, Q=13.444, Sig.=.000; non-abuse, Q=46.785, Sig.=.000). The descriptive data in Table 14 also suggests that the injurious incident leading to the child abuse homicide by caretaker is more likely than the injurious incident of a non-abuse homicide to occur in the privacy of the victim's home (Q=12.636, Sig.=.000). Nearly three in four child victims of child abuse homicide by their caretakers died at the hospital either as an inpatient or in the emergency department. Just more than half of all child victims of non-abuse homicide by their caretakers also died at the hospital. Of all ascertained child abuse homicide inflicted by the child's caretaker, 43% were reported to have involved personal weapons to inflict the injury of the child victim, while only 15% of all non-abuse child homicide by caretaker involved personal weapons

(statistically insignificant,  $Q=2.057$ ,  $Sig.=.151$ ). A more detailed description of all ascertained homicide characteristics can be found in Table 15. While no child abuse homicides by caretaker incidents involved firearms, more than 12% of non-abuse homicides by caretaker involved firearms or a combination of firearms and other weapons.

## LOGISTIC REGRESSION ANALYSIS

Model I looks at the effect of victim and incident characteristics on all ascertained child abuse homicides inflicted by a child's caretaker controlling for all other characteristics in the model. Model I contains 281 child homicides inflicted by the child's caretaker and includes deaths with missing or unknown values for each characteristic if the unknown variable met the justification criteria for inclusion in the model. Of those 281 homicides inflicted by the child's caretaker, 96 were abuse homicides and 185 were non-abuse homicides.

Model II looks at the effect of victim and incident characteristics on child abuse homicides inflicted by a child's caretaker for all cases where victim and incident characteristics were known. One-quarter of all documented child homicides inflicted by the child's caretaker were dropped after deleting cases with unknown characteristics in all independent variables. By all conservative estimates, this percentage of deaths dropped from the analysis far exceeds the percentage most social sciences researchers feel comfortable dropping. As shown in Table 16, there were 212 child homicides inflicted by the child's caretaker analyzed in Model II (74 were abuse homicides and 138 were non-abuse homicides). With the exception of parent suspect, the distribution of deaths for

both abuse and non-abuse homicides by caretaker across values of victim and incident characteristics in Model II virtually parallels the distribution in Model I.

Table 17 reports the odds ratio, p-value, and standard error of each variable in the models as well as each model's pseudo  $r^2$ . In both models, incidents occurring at the victim's home, having the EMS present at the scene, and personal weapons used to inflict injury were statistically significant. Controlling for the effects of all other characteristics, incidents that occurred at the victim's home were more than 2 times more likely to be child abuse homicides by victim's caretaker than incidents that did not occur at the victim's home (Model I odds ratio– 2.4, Model II odds ratio– 2.3). Incidents where the EMS was present at the scene of the injury were half as likely as those where the EMS was not present to be child abuse homicides by caretaker (Model I odds ratio – 0.53, Model II odds ratio - 0.48). Personal weapons such as an offender's fists, feet, or legs had 4 times greater odds than other types of known weapons to be used in a child abuse homicide inflicted by caretaker (Model I odds ratio – 3.8, Model II odds ratio – 4.2). All three of the above results were in the hypothesized directions.

In Model II, *Sex* and *Hospital* were also statistically significant. Controlling for the effects of all other characteristics, male victims were nearly twice as likely as female victims to have died of child abuse homicide inflicted by caretaker. In contrast to the hypothesized direction, child abuse homicide by caretaker victims were more likely to die at the hospital. Victims who died at the hospital were 1.8 times more likely than victims who did not die at the hospital to be victims of child abuse homicide by caretaker.

I also explored the victim to caretaker suspect relationship in both models and found that there was no difference in the likelihood that parents or non-parents were

suspects of child abuse homicides by caretaker in both Model I and Model II. Even though parents were identified as the primary caretakers in 66% of child homicides inflicted by caretaker, they were just as likely as non-parent caretakers to be suspects in child abuse homicides by caretaker.<sup>18</sup>

Of all the unknown variables that met the justification criteria and were included in Model I, only *EMSUnknown*, was statistically significant. Both EMS at scene and EMS unknown were significantly less likely to result in a child abuse homicide than when it was known that the EMS was not present at the scene.

While Model I explains 14.03% of the variance associated with child abuse homicides inflicted by caretaker, Model II explains 12.78%. The majority of the variance in both models was explained by adding the incident characteristics to the model (the pseudo  $r^2$  in Model I increases from .0261 to .1403 and in Model II from .0247 to .1278 with the addition of incident characteristics).

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<sup>18</sup> I also looked at parents of White child victims and parents of Hispanic child victims to see if they were any more or any less likely to be the caretakers in a child abuse homicide. The interaction terms in both Models I and II were insignificant.

## DISCUSSION

As established above, the NVDRS captures more abuse and non-abuse child homicides by caretaker than ICD-10 code classification. In this study, the NVDRS ascertained 17% more child abuse homicides and 19% more non-abuse child homicides across these states during the three sample years they reported to the NVDRS (for a total child homicide ascertainment of 18.6%). This percentage seems much lower than previous state ascertainment studies that reported underascertainment at more than 60%.<sup>19</sup> Despite the fact that this study's analysis of the NVDRS did not ascertain as great of a percentage of child homicides and child abuse homicides as previously reported in state ascertainment studies, it did ascertain more than ICD-10 codes and death certificates alone during these years in the states reporting to the NVDRS. As shown, misclassified child abuse homicides and non-abuse child homicides were statistically different from ICD-10 ascertained child abuse homicides and non-abuse homicides by all victim and incident characteristics tested for in this analysis. It seems there is something unique about the characteristics of these misclassified deaths that make these deaths more apt to be classified as non-homicides. Misclassified child abuse homicides were more likely to be male, White, and Non-Hispanic than ICD-10 ascertained child abuse homicides. In addition, misclassified child abuse homicides were more likely to have occurred at the victim's home and not had personal weapons used as the weapon inflicting injury on the child than ICD-10 ascertained child abuse homicides.

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<sup>19</sup> Herman-Giddens and colleagues (1999) reported that death certificate records in North Carolina underascertained child homicides due to abuse by an estimated 62%, while Overpeck et al., (2002) reported that underascertainment of fatal child abuse or neglect by medical examiners from 60% to 100%.

It had been estimated that 85% of childhood deaths from abuse and neglect are systematically misidentified as accidental, disease related, or due to other causes (McClain et al., 1993; Ewigman et al., 1993). I found 95% of misclassified child abuse homicides by caretaker went from an unknown or vague ICD-10 classification to a child abuse homicide when reclassified by the NVDRS abstractor. In contrast, 36% of all non-abuse violent child deaths reclassified to a more exact manner of death were reclassified to homicides by the NVDRS abstractor.

I further reviewed those misclassified deaths and found that misclassified child abuse homicides by caretaker revealed a greater percentage of deaths of males and Whites than misclassified non-abuse homicides by caretaker. Parents were also the most likely suspects in all misclassified child homicides inflicted by the child's caretaker. Misclassified child abuse homicides by caretaker were more likely to have occurred at the victim's home or to have had the victim die at the hospital than misclassified non-abuse homicides by caretaker. A greater percentage of weapons other than personal weapons were reported in misclassified non-abuse homicides compared to misclassified child abuse homicides. These findings were largely consistent with expectations.

It appears that the majority of the incident characteristics that led officials to misclassify a child abuse homicide were characteristics that converge around one main theme—the home. A child's home is where one would expect child abuse to regularly occur. In their home, children are out of the public eye, easily accessible, and vulnerable; parents are usually the child's caretaker at home; repeated abuse occurring without the pressing need for medical attention may obscure the issue of whether personal weapons were used more often than other, arguably more lethal weapons (e.g., a gun). Deaths due

to physical abuse tend to be more drawn out, allowing for repeated abuse to occur regularly and greater potential for someone to call the EMS if a child is obviously in need of medical attention. Since evidence of ongoing substantiated or unsubstantiated abuse of the child by their caretaker had been documented by authorities in these child abuse homicides, previous physical abuse may have been hidden in the home. Basic information relating to who may have witnessed the injury to the child, where the child's injury took place, where the child ultimately died, and especially patterns of previously reported abuse should be garnered and made available to authorities when manner of death is classified. Without such information, child abuse homicides inflicted by the child's caretaker may continue to be misclassified.

Of all the variables in both models, physical weapons used to inflict injury was the most significant variable and contributed the most to the variance in child abuse homicide by caretaker. This reinforces previous research that cites forced blunt trauma (physical beatings) to the head, neck, and body as the most common form of fatal child abuse.

Previous studies have also found that males are at a greater risk for child abuse. While *Sex* was significant in Model II, when the effects of deaths with unknown victim and incident characteristics were controlled for in Model I, *Sex* becomes insignificant. This suggests that the significance of *Sex* and *Hospital* is driven by the omission of deaths with unknown victim or incident characteristics and the apparent atypical distribution of each characteristic across these deaths.

*Hospital* was also marginally significant in Model II, but failed to be significant in Model I. I find it highly unlikely that by virtue of being in a hospital a child is more likely

to die of a child abuse homicide by caretaker. Many deaths occurred at the victim's residence, and a handful of unknown cases were actually coded "dead on arrival". Since it is difficult to ascertain what actually matters in the final minutes of life for a child injured to the point of death, dying at the hospital may or may not make a difference at all. Since *Hospital* is only marginally significant in Model II, I doubt it truly matters in cases of child abuse homicide inflicted by the child's caretaker.

Is the information we garner from the addition of these unknown victim and incident characteristic variables substantive enough to warrant keeping them in the model? As stated above, the addition of deaths with unknown victim and incident characteristics changed *Sex* and *Hospital* from statistically significant to statistically insignificant. Since *Sex* and *Hospital* were insignificant in Model I, we should question their actual impact in Model II. It is pretty clear that the significance of *Sex* and *Hospital* is driven by the omission of deaths with unknown victim or incident characteristics.

*EMSUnknown* was the only one of the three variables capturing an unknown characteristic that was significant in Model I.<sup>20</sup> Aside from better reporting of child homicide victim and incident data so as to decrease the number of deaths with unknown characteristics, I cannot make recommendations for preventing child abuse homicide using such vague, unknown characteristics. Unfortunately, the addition of these variables also does not explain much of the variance of child abuse homicide by caretaker. Model I and Model II both explain roughly 13-14% of the variance in child abuse homicides by caretaker. I have chosen, however, to report all findings from Model I due to the observed

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<sup>20</sup> *EMSUnknown* was the only unknown variable that held significance across multiple variations of Model I. Even by adding each variable capturing an unknown characteristic to the model separately, *EMSUnknown* was the only one to reach significance and stay significant across variations.



bias in Model II resulting from the deletion of variables with unknown characteristics. Had *Sex* and *Hospital* not become statistically significant in Model II, I may not be so quick to disregard the findings of Model II. It is, however, more likely that the regression results in Model I are less biased due to the inclusion of all homicides by caretaker and unknown characteristics.

The relatively low pseudo  $r^2$  of Models I and II suggests that key variables are missing from the analysis. For example, victim age, family income, and parent substance abuse have been shown in previous research to be likely risk factors of child abuse homicide. Moreover, if these models are misspecified, some of the variables that are currently predictive of child abuse homicide by caretaker may completely lose significance with the addition of other victim, offender, or incident characteristics.

## POLICY IMPLICATIONS

Child abuse homicides inflicted by the child's caretaker are a significant cause of preventable injury deaths among children. Essential to understanding the scope of child abuse homicides by caretaker, surveillance systems similar to the NVDRS should be functioning nationwide so as to reduce reporting bias inherent in official state data. It is likely that the current state of knowledge regarding the scope of child abuse homicide inflicted by a child's caretaker, risk and protective factors, as well as current preventative measures may have been established using inaccurate data. To identify the more subtle details of child deaths, I believe data systems similar to the NVDRS should be funded and utilized. Individual datasets appear to lack sufficient information to determine a child abuse homicide by caretaker. When individual datasets are combined with other datasets,

the possibility for error in the ascertainment of these homicides is reduced. Consequently, more reliable estimates will yield better informed prevention efforts (Herman-Giddens et al., 1999; Overpeck et al., 2002).

States may be able to ascertain more reliable estimates of child abuse homicide through state-funded child fatality review boards functioning properly in each state. Currently, nearly every U.S. state has implemented local and/or statewide child fatality review boards of some type. However, many are not operating as frequently as they should be (Reder & Duncan, 1998). All NVDRS states in this analysis have child fatality review boards. Child fatality review boards are intended to provide timely epidemiologic data on child abuse homicides in order to target prevention efforts and evaluate interventions. Standardizing data collection among states, as the NVDRS does, will better utilize child death review board data at the national level.

## PREVENTION STRATEGIES

### CHILD ABUSE & CHILD ABUSE HOMICIDE

To develop appropriately targeted child abuse prevention and intervention programs, it is vital to know the various risk factors associated with child abuse homicide inflicted by the child's caretaker. Only after an accurate number of child abuse homicides have been ascertained should an analysis of risk and protective factors of child abuse homicide by caretaker be conducted. This study attempted to uncover risk and protective factors of child abuse homicide by caretaker, but found only incident characteristics such as whether or not the EMS was called, whether or not the incident took place at the victim's home, and whether or not personal weapons were used to inflict injury to matter

statistically in a child abuse homicide inflicted by the child's caretaker. This study, however, utilized a more accurate estimate of child abuse homicide by caretaker than previously available. The presence of statistically significant child abuse homicide risk factors should be used only to provide guidance in prevention strategies.

Physical child abuse remains an underreported (and often undetected) problem for numerous reasons including individual and community variations in what is considered "abuse," inadequate knowledge and training among professionals in the recognition of abusive injuries, unwillingness to report suspected abuse, and professional bias (Kellogg, 2007). Since most child abuse homicides were merely child abuse cases until the offender went too far, and because the signs of physical abuse are usually visible, there is a wide consensus that many child abuse homicides are preventable (Bethea, 1999; Rimsza et al., 2002). In a recent study, Rimsza and colleagues (2002) found that 61% of child abuse deaths in the study population could have been preventable had authorities been contacted when the first signs of abuse were present. It is crucial that the public health community continue to develop and refine prevention and intervention strategies aimed at curtailing the incidence and prevalence of these homicides. Prevention should have primary, secondary, and tertiary components, aimed largely at the entire population of people—those who may not be at risk, may be at risk, and/or are already abusing their child. Bethea (1999) argues for primary prevention – intervening before child abuse occurs. Primary prevention of child abuse homicides incorporates increasing the value of the child to his or her parents; increasing the economic autonomy of the family; discouraging corporal punishment and other forms of violence; making health care more accessible and affordable; expanding and improving social service programs; improving

the identification and treatment of psychological problems, alcohol, and drug abuse; and preventing the birth of unwanted babies. Additional prevention on the family level includes helping parents to meet the child's basic needs; identifying problem of substance abuse and spousal abuse; and educating parents on child behavior, discipline, safety, and child development (Bethea, 1999).

Some researchers argue that preventing child abuse homicides is not an intelligible goal for social services. Creighton (1995) maintains that "child protection services can only reasonably be expected to prevent deaths among the children they are protecting. Given the small numbers of homicides in relation to the size of the protected population, the risk assessment procedures and protective resources available in individual cases would have to be considerably more advanced than at present (322)." In addition, while parents are responsible for the overwhelming majority of infant and young child homicides; friends, acquaintances, and strangers are more often suspected in homicides of those child aged five to seventeen. Thus, Creighton (1995) argues that the prevention of both intra- and extra-familial child deaths falls within a wider societal responsibility.

Findings from this paper indicate that parents are the most common suspects of fatal child abuse by caretaker, but are not any more likely than non-parental caretakers to be the suspect in a child abuse homicide by caretaker. Therefore, prevention efforts should not only target parents, but also the general public. These efforts could include teaching parenting skills to high school students as part of health class, and/or educating the general public through radio or TV advertisements about the consequences of child abuse. Efforts could also include targeted interventions and education for babysitters,

parent aides who act as mentors to parents who need assistance in providing support to their families, and also nurse/family partnerships where nurses make daily/weekly visits to first-time parents to monitor, educate, and assist them in transitioning to parenting. Once better data reporting has been established, efforts should focus on educating the general public about what common risk factors to look for and how to intervene and alert authorities in cases where they suspect abuse (Sorenson et al., 1997). Educating physicians on the symptoms and signs of physical abuse and improved documentation of physical abuse cases is also highly recommended.

## CHILD HOMICIDE

Homicide is the fourth leading cause of death in children age four and younger and third among children age 10 to 14. Understanding the circumstances behind how and why children become homicide victims is central to the development and implementation of effective prevention policies and programs. With the knowledge gathered from this analysis that both child abuse and non-abuse homicides by caretaker are underascertainment by ICD-10 classifications, researchers should be cautious of making any broad or generalizable statements about risk and protective factors of both types of child homicide using death certificate data alone.

Non-abuse child homicides inflicted by the child's caretaker were found to be just as likely as child abuse homicides by caretaker to involve the child's parents as suspected offenders in the homicide. However, unlike child abuse homicide inflicted by the child's caretaker, the broad spectrum of child homicides are not as easily preventable. It may be difficult to intervene before the homicide if there are no warning signs. Even with very

few warnings signs, what is arguably an important part of child homicide by caretaker prevention is the role education plays in teaching parents, guardians, and other caretakers how to cope with the responsibilities that come with having children. Primary prevention efforts as described above: increasing the value of the child to his or her parents; increasing the economic autonomy of the family; discouraging corporal punishment; making health care more accessible and affordable; expanding and improving social service programs; improving the identification and treatment of psychological problems, alcohol, and drug abuse; and preventing the birth of unwanted babies, are ways to easily address many of the issues relevant in previous research describing caretakers at risk for committing child homicide.

## CONCLUSION

The results of this study should not be taken lightly. This study showed that child abuse homicide underascertainment by ICD-10 codes exists when utilizing the more standardized and rigorous process that the NVDRS abstractors use to link multiple sources of public health and criminal justice data. Unfortunately, the results of the multivariate logistic regression are probably misleading due to the omission of other important variables that have not been modeled in the regression. This study does, however, provide many useful findings that should be considered in future research.

The inherent shortcomings of available data in the area of child abuse homicide requires a cognizant reader to refrain from making quick judgments about the effectiveness of current policies and prevention efforts made by states to combat child abuse homicide. Unlike child abuse which has been studied and treated as a serious social problem for decades, child abuse homicide is rarely discussed in the fields of public health and criminology. When it is, it is usually a result of a heavily exploited case sensationalized by the media. Since child abuse homicides were merely child abuse taken too far, this crime is in need of attention by all players responsible for the health and wellbeing of children.

Child abuse homicides are a public health concern. Many child abuse homicides may be preventable, and with all the right players in the field advocating for more accurate data collection and more refined evidence-based prevention strategies, maybe then the public health arena and the criminal justice system will begin to understand how each plays a role in preventing these child murders.

## SUGGESTIONS FOR FUTURE RESEARCH

Although only a few variables were statistically significant in this study, the importance of research of this type cannot be overstated. Bringing to light the measurement inconsistencies in the reporting of child abuse homicides is essential. Future research should focus heavily on analyzing risk and protective factors of child abuse homicides from data systems similar to the NVDRS. All attempts should be made to acquire more sophisticated circumstance and characteristic data, especially those data available in the NVDRS restricted access dataset. Had the restricted NVDRS data been available, more in-depth analyses would have been performed and more information may have been garnered from this analysis.

It is also of extreme importance that future research be able to breakdown child abuse homicide victims by age. Based on the bimodal age distribution, it is very important that analyses differentiate child abuse homicide victims and their victim and incident characteristics based on the age of the victim.

Future research can easily rectify some of the limitations described below as well as provide a better understanding of the current findings. Most importantly, gathering data from multiple sources is imperative to not only accurately measure the scope of child abuse homicide, but to then be more confident in proposed offender and victim risk and protective factors. In addition, adding additional victim, offender, or incident characteristics to the analysis, including those described in the literature review but not tested in this thesis, may provide better models of child abuse homicide, increasing our confidence that certain variables predict child abuse homicide.



## LIMITATIONS

The current study is subject to several limitations, many of which are direct results of having limited data in the public use NVDRS. First, as mentioned earlier, the definition of child abuse homicide inflicted by the child's caretaker utilized in this study is imperfect. A child abuse homicide inflicted by the child's caretaker has been defined as a homicide to a child under the age 14 where a history of substantiated or unsubstantiated abuse by the child's caretaker was reported to the appropriate authorities and that caretaker is now a suspect in that homicide. These data must all be reported in the NVDRS data. Thus, it is assumed that all homicidal deaths to children are not child abuse homicides by caretaker unless a history of substantiated or unsubstantiated abuse had been previously established. This is an obvious limitation in this study. It is, however, likely that this definition of child abuse homicide by caretaker will produce a more conservative estimate of child abuse homicide by caretaker than the true number of child abuse homicides by caretakers across these states. As established in previous research, the measurement of child abuse homicide across agencies, states, and years is faulty, so consequently, any child abuse homicide definition used to estimate its scope will be biased.

Arguably, some value lies in this definition because more ICD-10 misclassified homicides of undetermined intent or deaths with an unknown cause of death were revised by a NVDRS abstractor. These deaths were more appropriately classified as child abuse homicides inflicted by the child's caretaker by virtue of the thorough, standardized process an abstractor utilized in reviewing a file, linking data from multiple sources and

ultimately providing a more complete picture of the homicide. Since a history of substantiated or unsubstantiated abuse must be known in order for a child homicide to be classified as a child abuse homicide, the thorough process by which an abstractor reviews a file gives reassurance that if evidence of ongoing substantiated or unsubstantiated abuse of the child by their caretaker had been documented by authorities, it was likely reported in the NVDRS. As stated above, however, the estimate was likely a conservative estimate of the number of child abuse homicides in these 17 states when they participated in the NVDRS from 2003 to 2005.

In addition, the history of abuse variable in the NVDRS is limited even more because of how it is defined. This dichotomous variable is “yes” when there was evidence of ongoing abuse of the child by their caretaker documented by authorities, and “no” when there was not evidence of substantiated or unsubstantiated abuse by the child’s caretaker or it was unknown or not reported if previous abuse existed. I have already stated that I believe the estimate of child abuse homicide by caretaker in this analysis is conservative, and thus knowing that all non-abuse homicides by caretaker also included those where it was unknown if abuse existed or not reported makes me even more confident that my estimate of child abuse homicide by caretaker is a conservative one.

Second, the suspect recorded in the NVDRS may or may not still be a suspect in the child’s homicide. It was impossible in these data to know whether the suspect was released, acquitted, or convicted of the child homicide. Thus, suspects were used as a proxy for offenders in my analysis. I believe the use of suspect as a proxy for offender was warranted since all offenders until convicted are labeled suspects. In addition, in

these data, suspects of child abuse were limited to the caretakers of the deceased children since a history of child abuse could only be established if the child had a history of abuse by their caretaker.<sup>21</sup> Evidence of substantiated or unsubstantiated abuse reported prior to the homicide must have been perpetrated by the suspect. Thus, the suspect had already been under suspicion of abuse and was likely (though perhaps not always) the offender in the homicide.

Third, this study was unable to test any criminological, sociological, or psychological theories relating to child abuse homicide by caretaker. Unfortunately, the NVDRS public use data do not report the victim's age. Had an age breakdown been available, this study would have looked at how abuse and non-abuse homicides differed for infants, toddlers, and young children. Many theories not reported or tested in this thesis rest on the fact that victim and offender characteristics of these homicides vary depending on the age of the victim. Thus, it was a major limitation of this study that these theories could not be tested.

Fourth, the NVDRS is limited by the nature of the data reported by state officials on death certificates, medical examiner reports, and law enforcement records. For instance, the completeness and accuracy of reporting and coding by abstractors in the NVDRS may be limited by each state's individual reporting systems (Weiss, Gutierrez, Harrison, and Matzopoulos, 2006). State requirements and/or definitions of deaths classified as an intentional death (homicide or suicide), undetermined intent, natural death, etc, vary across states (Steenkamp, Frazier, Lipskiy, DeBerry, Thomas, Barker et al., 2006). In a study examining the frequency of state coroner/medical examiners

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<sup>21</sup> History of abuse is defined in the data as a history of substantiated or unsubstantiated abuse of the deceased victim by the caretaker. All child homicides in these data then only have suspects that were previous caretakers of the deceased victim.

reporting deaths of undetermined intent in the NVDRS, Breiding and Wiersema (2006) found that three participating states (Maryland, Massachusetts, and Rhode Island) had vastly higher percentages of undetermined intent deaths than all other participating states.

Finally, this study may lack precision in certain regression estimates because of the small numbers of deaths analyzed. In addition, even though significant discrepancies may be found in the ascertainment of child abuse homicides by victim or incident characteristics, there may not be enough power available in some analyses to detect any significant differences in the multivariate logistic regression analysis.

## TABLES

Table 1. Number of Child Violent Deaths, by ICD-10 Manner of Death and NVDRS Abstractor Manner of Death, 2003–2005

Manner of Death	ICD-10 Manner of Death (#)	NVDRS Abstractor Manner of Death (#)	Net Difference (NVDRS – ICD-10) (#)
Homicide	516	634	+118
Suicide	137	177	+40
Unintentional Firearm Death	29	117	+88
Undetermined Intent	92	396	+304
Missing ICD-10 Code	270	--	-270
Other Manners of Death	223	--	-223
Non-Firearm Unintentional Death	--	44	+44
Legal Intervention Death	0	1	+1
Unknown*	108	6	-102
<b>Total</b>	<b>1,375</b>	<b>1,375</b>	<b>0</b>

Notes: \*Unknown includes unknown or record not available or blank. See Appendix B for a description of manner of death categories.

Table 2. Number of Child Homicides Ascertained by NVDRS Abstractor, by ICD-10 Manner of Death Assigned, 2003–2005

<b>Manner of Death</b>	<b><u>With a History of Abuse by Caretaker</u> ICD-10 Manner of Death (#)</b>	<b><u>Without a History of Abuse by Caretaker</u> ICD-10 Manner of Death (#)</b>	<b><u>Total</u> ICD-10 Manner of Death (#)</b>
Homicide	92	401	493
Suicide	0	1	1
Unintentional Firearm Death	0	2	2
Undetermined Intent	0	5	5
Missing ICD-10 Code	5	65	70
Other Manners of Death	6	14	20
Unknown*	8	35	43
<b>Total</b>	<b>111</b>	<b>523</b>	<b>634</b>

Notes: \*Unknown includes record not available or blank. See Appendix B for a description of manner of death categories.

Table 3. Number of Child Violent Deaths With and Without a History of Substantiated or Unsubstantiated Abuse by Caretaker, by ICD-10 Manner of Death and NVDRS Abstractor Manner of Death, 2003–2005

Manner of Death	With a History of Abuse by Caretaker			Without a History of Abuse by Caretaker		
	ICD-10 Manner of Death (#)	NVDRS Abstractor Manner of Death (#)	Net Difference (NVDRS – ICD-10) (#)	ICD-10 Manner of Death (#)	NVDRS Abstractor Manner of Death (#)	Net Difference (NVDRS – ICD-10) (#)
Homicide	92	111	+19	424	523	+99
Suicide	0	0	0	137	177	+40
Unintentional Firearm Death	0	0	0	29	117	+88
Undetermined Intent	1	2	+1	91	394	+303
Missing ICD-10 Code	5	--	-5	265	--	-265
Other Manners of Death	7	--	-7	216	--	-216
Non-Firearm Unintentional Death	--	0	0	--	44	+44
Legal Intervention	0	0	0	0	1	+1
Unknown*	8	0	-8	100	6	-94
<b>Total</b>	<b>113</b>	<b>113</b>	<b>0</b>	<b>1,262</b>	<b>1,262</b>	<b>0</b>

Notes: \*Unknown includes unknown or record not available or blank. See Appendix B for a description of manner of death categories.

Table 4. Number of Child Homicides, by Caretaker or Unknown if By Caretaker With or Without a History of Substantiated or Unsubstantiated Abuse by Caretaker, by ICD-10 Classified Homicide and NVDRS Abstractor Classification Homicide, 2003–2005

	<u>With a History of Abuse by Caretaker</u>			<u>Without a History of Abuse by Caretaker</u>		
	ICD-10 Classification Homicide (#)	NVDRS Abstractor Classification Homicide (#)	Net Difference (NVDRS – ICD-10) (#)	ICD-10 Classification Homicide (#)	NVDRS Abstractor Classification Homicide (#)	Net Difference (NVDRS – ICD-10) (#)
Total Homicides	92	111	+19	424	523	+99
By Caretaker	79	96	+17	142	194	+52
Unknown/Not By Caretaker	13	15	+2	282	329	+47



Table 5. Number and Percent of Ascertained Child Abuse Homicides by Caretaker by ICD-10 Classification or NVDRS Abstractor Classification by State, 2003–2005

<b>State (# years participating)</b>	<b>Ascertained by ICD-10 Code # (%)</b>	<b>Ascertained by NVDRS # (%)</b>	<b>Net Difference (NVDRS – ICD-10)</b>
<i>Colorado (2 years)</i>	11 (14%)	11 (11%)	0
<i>Georgia (2 years)</i>	3 (4%)	4 (4%)	+1
<i>Kentucky (1 year)</i>	1 (1%)	1 (1%)	0
<i>Maryland (3 years)</i>	4 (5%)	4 (4%)	0
<i>Massachusetts (3 years)</i>	1 (1%)	3 (3%)	+2
<i>New Jersey (3 years)</i>	1 (1%)	2 (2%)	+1
<i>New Mexico (1 year)</i>	6 (8%)	7 (7%)	+1
<i>North Carolina (2 years)</i>	21 (27%)	21 (22%)	0
<i>Oklahoma (2 years)</i>	1 (1%)	8 (8%)	+7
<i>Oregon (3 years)</i>	8 (10%)	8 (8%)	0
<i>Rhode Island (2 years)</i>	1 (1%)	1 (1%)	0
<i>South Carolina (3 years)</i>	8 (10%)	8 (8%)	0
<i>Utah (1 year)</i>	1 (1%)	1 (1%)	0
<i>Virginia (3 years)</i>	12 (15%)	12 (13%)	0
<i>Wisconsin (2 years)</i>	0 (0%)	5 (5%)	+5
<b>Total</b>	<b>79 (100%)</b>	<b>96 (100%)</b>	<b>+17</b>

Table 6. Number and Percent of Ascertained Non-Abuse Child Homicides by Caretaker by ICD-10 Classification or NVDRS Abstractor Classification by State, 2003–2005

<b>State (# years participating)</b>	<b>Ascertained by ICD-10 Code # (%)</b>	<b>Ascertained by NVDRS # (%)</b>	<b>Net Difference (NVDRS – ICD-10)*</b>
<i>Alaska (3 years)</i>	6 (4%)	5 (3%)	-1
<i>California (1 year, select counties)</i>	0 (0%)	1 (<1%)	+1
<i>Colorado (2 years)</i>	16 (11%)	16 (8%)	0
<i>Georgia (2 years)</i>	20 (14%)	29 (15%)	+9
<i>Kentucky (1 year)</i>	2 (1%)	2 (1%)	0
<i>Maryland (3 years)</i>	7 (5%)	10 (5%)	+3
<i>Massachusetts (3 years)</i>	4 (3%)	6 (3%)	+2
<i>New Jersey (3 years)</i>	3 (2%)	12 (6%)	+9
<i>New Mexico (1 year)</i>	1 (<1%)	1 (<1%)	0
<i>North Carolina (2 years)</i>	22 (15%)	23 (12%)	+1
<i>Oklahoma (2 years)</i>	11 (8%)	18 (9%)	+7
<i>Oregon (3 years)</i>	7 (5%)	7 (4%)	0
<i>Rhode Island (2 years)</i>	3 (2%)	3 (2%)	0
<i>South Carolina (3 years)</i>	20 (14%)	26 (13%)	+6
<i>Utah (1 year)</i>	2 (1%)	2 (1%)	0
<i>Virginia (3 years)</i>	18 (13%)	22 (11%)	+4
<i>Wisconsin (2 years)</i>	0 (0%)	11 (6%)	+11
<b>Total</b>	<b>142 (100%)</b>	<b>194 (100%)</b>	<b>+52</b>

Notes: \*Net difference is the difference between NVDRS ascertained child homicides and child homicides ascertained by ICD-10 code. The net difference is +52 because of the cancellation of one death due to the overascertainment in Alaska. There were a total of 53 deaths that were ascertained by NVDRS.

Table 7. Descriptive Statistics for Child Abuse and Non-Abuse Homicides by Caretaker (With and Without North Carolina)

Characteristic	<b>Inflicted by the Child's Caretaker</b>			
	<b>Abuse Homicides Total (n=96) # (%)</b>	<b>Abuse Homicides W/O NC (n=75) # (%)</b>	<b>Non-Abuse Homicides Total (n=194) # (%)</b>	<b>Non-Abuse Homicides W/O NC (n=171) # (%)</b>
<b>Victim Sex</b>				
Male	59 (61%)	47 (63%)	104 (54%)	91 (53%)
Female	37 (39%)	28 (37%)	90 (46%)	80 (47%)
<b>Victim Race</b>				
White	59 (61%)	44 (59%)	108 (56%)	95 (56%)
Black	33 (34%)	27 (36%)	77 (40%)	67 (39%)
Other	4 (4%)	4 (5%)	9 (5%)	9 (5%)
<b>Victim Ethnicity</b>				
Not Hispanic	73 (76%)	57 (76%)	163 (84%)	141 (82%)
Hispanic	23 (24%)	18 (24%)	24 (12%)	23 (13%)
Unknown	0 (0%)	0 (0%)	7 (4%)	7 (4%)
<b>Caretaker Relationship to Victim</b>				
Parent	57 (59%)	42 (56%)	134 (69%)	114 (67%)
Acquaintance/Friend	20 (21%)	15 (20%)	32 (16%)	29 (17%)
Other*	4 (5%)	15 (20%)	11 (6%)	21 (12%)
Unknown	15 (16%)	3 (4%)	17 (9%)	7 (4%)
<b>Incident Occurred at Victim's Home</b>				
Yes	81 (84%)	66 (88%)	133 (69%)	121 (71%)
No	14 (15%)	9 (12%)	47 (24%)	38 (22%)
Unknown	1 (1%)	0 (0%)	14 (7%)	12 (7%)
<b>EMS at Scene</b>				
Yes	69 (72%)	52 (69%)	135 (70%)	120 (70%)
No	24 (25%)	20 (27%)	37 (19%)	31 (18%)
Unknown	3 (3%)	3 (4%)	22 (11%)	20 (12%)
<b>Place of Death</b>				
Hospital Inpatient	43 (45%)	35 (47%)	66 (34%)	58 (34%)
Emergency Department	30 (31%)	21 (28%)	47 (24%)	40 (23%)
Decedent's Home	11 (11%)	8 (11%)	39 (20%)	36 (21%)
Other**	12 (12%)	11 (15%)	42 (22%)	34 (20%)
Unknown	0 (0%)	0 (0%)	3 (2%)	3 (2%)
<b>Weapon Used</b>				
Blunt Instrument	13 (14%)	11 (15%)	17 (9%)	16 (9%)
Personal Weapons	41 (43%)	34 (45%)	29 (15%)	24 (14%)
Firearm	0 (0%)	0 (0%)	24 (12%)	19 (11%)
Hanging	4 (4%)	2 (3%)	10 (5%)	10 (6%)
Other***	32 (33%)	23 (31%)	98 (51%)	86 (50%)
Unknown	6 (6%)	5 (7%)	16 (8%)	16 (9%)

Notes: \*Other includes child, other relative, or other specified relationship.

\*\*Other includes nursing home or long-care facility, dead on arrival, or other.

\*\*\*Other includes sharp instrument, poisoning, combinations of weapons, and other weapons not mentioned.

Some percentages will not sum to 100 due to rounding error.

Table 8. Predicted Direction of Independent Variables in Multivariate Logistic Regression Models

<b>Independent Variables</b>	<b>Hypothesized Direction</b>
<i>Male</i>	+/-
<i>White</i>	+/-
<i>Hispanic</i>	+/-
<i>Parent</i>	+
<i>IncidentHome</i>	+
<i>EMS</i>	-
<i>Hospital</i>	-
<i>PersonalWeapons</i>	+

Table 9. Number and Percentage of Abuse and Non-abuse Child Homicides Inflicted by the Child’s Caretaker Classified and Misclassified by ICD-10 Manner of Death as Homicides, by Victim Sex and Victim Race, Including Cochran’s Q Test of Significance

Victim Characteristic	NVDRS Classified Homicides Total (n=290) # (%)	Child Abuse Homicides Inflicted by the Child’s Caretaker			Non-abuse Child Homicides Inflicted by the Child’s Caretaker				
		ICD-10 Classification Homicide (n=79) # (%)	Misclassified Deaths (n=17) # (%)	Cochran’s Q Statistic (ICD-10 /Misclassified)	Total (n=96) # (%)	ICD-10 Classification Homicide (n=142) # (%)	Misclassified Deaths (n=53)* # (%)	Cochran’s Q Statistic (ICD-10 /Misclassified)	Total (n=194) # (%)
<b>Victim Sex</b>									
Male	163 (56%)	47 (59%)	12 (71%)	n=59 Q=20.763 Sig.=.000	59 (61%)	76 (54%)	29 (55%)	n=105 Q=21.038 Sig.=.000	104 (54%)
Female	127 (44%)	32 (41%)	5 (29%)	n=37 Q=19.703 Sig.=.000	37 (39%)	66 (46%)	24 (45%)	n=90 Q=19.600 Sig.=.000	90 (46%)
Cochran’s Q Statistic (Male/Female)	n=290 Q=4.469 Sig.=.035	n=79 Q=2.848 Sig.=.091	n=17 Q=2.882 Sig.=.090	--	n=96 Q=5.042 Sig.=.025	n=142 Q=0.704 Sig.=.401	n=53 Q=0.472 Sig.=.492	--	n=194 Q=1.010 Sig.=.315
<b>Victim Race</b>									
White	167 (58%)	48 (61%)	11 (65%)	n=59 Q=23.203 Sig.=.000	59 (61%)	82 (58%)	27 (51%)	n=109 Q=27.752 Sig.=.000	108 (56%)
Non-White	123 (42%)	31 (39%)	6 (35%)	n=37 Q=16.892 Sig.=.000	37 (39%)	60 (42%)	26 (49%)	n=86 Q=13.442 Sig.=.000	86 (44%)
Cochran’s Q Statistic (White/Non-White)	n=290 Q=6.676 Sig.=.010	n=79 Q=3.658 Sig.=.056	n=17 Q=1.471 Sig.=.225	--	n=96 Q=5.042 Sig.=.025	n=142 Q=3.408 Sig.=.065	n=53 Q=0.019 Sig.=.891	--	n=194 Q=2.495 Sig.=.114

Notes: \*The sum of ICD-10 classification homicide and misclassified deaths does not equal the total number of non-abuse child homicides by caretaker due to deaths that were ICD-10 homicides but were reclassified by the NVDRS abstractor as non-homicides. One such death was in Alaska and can be found in Table 6. There were no ICD-10 classified child abuse homicides that were reclassified non-homicides by NVDRS abstractor.

Some percentages will not sum to 100 due to rounding error.

A Cochran’s Q statistic tests whether the percentages of a given variable are the same across multiple dependent samples. All Cochran’s Q tests had 1 degree of freedom and did not include unknowns. Probability levels are asymptotic and 2-tailed.

Table 10. Number and Percentage of Abuse and Non-abuse Child Homicides Inflicted by the Child's Caretaker Classified and Misclassified by ICD-10 Manner of Death as Homicides, by Victim Ethnicity and Caretaker Relationship to Victim, Including Cochran's Q Test of Significance

Victim Characteristic	Child Abuse Homicides Inflicted by the Child's Caretaker				Non-abuse Child Homicides Inflicted by the Child's Caretaker				
	NVDRS Classified Homicides Total (n=290) # (%)	ICD-10 Classification Homicide (n=79) # (%)	Misclassified Deaths (n=17) # (%)	Cochran's Q Statistic (ICD-10 /Misclassified)	Total (n=96) # (%)	ICD-10 Classification Homicide (n=142) # (%)	Misclassified Deaths (n=53)* # (%)	Cochran's Q Statistic (ICD-10 /Misclassified)	Total (n=194) # (%)
<b>Victim Ethnicity</b>									
Hispanic	<b>47 (16%)</b>	19 (24%)	4 (24%)	n=23 Q=9.783 Sig=.002	<b>23 (24%)</b>	18 (13%)	6 (11%)	n=24 Q=6.000 Sig=.014	<b>24 (12%)</b>
Non-Hispanic	<b>236 (81%)</b>	60 (76%)	13 (76%)	n=73 Q=30.260 Sig=.000	<b>73 (76%)</b>	123 (87%)	41 (77%)	n=164 Q=41.000 Sig=.000	<b>163 (84%)</b>
Unknown	<b>7 (2%)</b>	0 (0%)	0 (0%)	--	<b>0 (0%)</b>	1 (<1%)	6 (11%)	--	<b>7 (4%)</b>
Cochran's Q Statistic (Hispanic/Non-Hispanic)	<b>n=283 Q=126.223 Sig=.000</b>	n=79 Q=21.278 Sig=.000	n=17 Q=4.765 Sig=.029	--	<b>n=96 Q=26.042 Sig=.000</b>	n=141 Q=78.191 Sig=.000	n=47 Q=26.064 Sig=.000	--	<b>n=187 Q=103.321 Sig=.000</b>
<b>Caretaker Relationship to Victim</b>									
Parent	<b>191 (66%)</b>	47 (59%)	10 (59%)	n=57 Q=24.018 Sig=.000	<b>57 (59%)</b>	101 (71%)	34 (64%)	n=135 Q=33.252 Sig=.000	<b>134 (69%)</b>
Non-Parent**	<b>67 (23%)</b>	22 (28%)	2 (12%)	n=24 Q=16.667 Sig=.000	<b>24 (25%)</b>	31 (22%)	12 (23%)	n=43 Q=8.395 Sig=.004	<b>43 (22%)</b>
Unknown	<b>32 (11%)</b>	10 (13%)	5 (29%)	--	<b>15 (16%)</b>	10 (7%)	7 (13%)	--	<b>17 (9%)</b>
Cochran's Q Statistic (Parent/Non-Parent)	<b>n=258 Q=59.597 Sig=.000</b>	n=69 Q=9.058 Sig=.003	n=12 Q=5.333 Sig=.021	--	<b>n=81 Q=13.444 Sig=.000</b>	n=132 Q=37.121 Sig=.000	n=46 Q=10.522 Sig=.001	--	<b>n=177 Q=46.785 Sig=.000</b>

Notes: \*The sum of ICD-10 classification homicide and misclassified deaths does not equal the total number of non-abuse child homicides by caretaker due to deaths that were ICD-10 homicides but were reclassified by the NVDRS abstractor as non-homicides. One such death was in Alaska and can be found in Table 6. There were no ICD-10 classified child abuse homicides that were reclassified non-homicides by NVDRS abstractor.

\*\*Non-parent includes child, acquaintance or friend, other relative, or other specified relationship.

Some percentages will not sum to 100 due to rounding error.

A Cochran's Q statistic tests whether the percentages of a given variable are the same across multiple dependent samples. All Cochran's Q tests had 1 degree of freedom and did not include unknowns. Probability levels are asymptotic and 2-tailed.

Table 11. Number and Percentage of Abuse and Non-abuse Child Homicides Inflicted by the Child’s Caretaker, by ICD-10 Ascertained, ICD-10 Misclassified, and NVDRS Ascertained, by Victim Characteristic, Including Cochran’s Q Test of Significance

Victim Characteristic	<u>Statistical Test of Difference Between ICD-10 Abuse and Non-Abuse Homicides by Caretaker</u>			<u>Statistical Test of Difference Between Misclassified Abuse and Non-Abuse Homicides by Caretaker</u>			<u>Statistical Test of Difference Between NVDRS Ascertained Abuse and Non-Abuse Homicides by Caretaker</u>		
	ICD-10 Classification Abuse Homicide (n=79) # (%)	ICD-10 Classification Non-Abuse Homicide (n=142) # (%)	Cochran’s Q Statistic (Abuse/Non-Abuse)	Misclassified Child Abuse Homicides (n=17) # (%)	Misclassified Non-Abuse Homicides (n=53) # (%)	Cochran’s Q Statistic (Abuse/Non-Abuse)	Total Child Abuse Homicides (n=96) # (%)	Total Non-Abuse Homicides (n=194) # (%)	Cochran’s Q Statistic (Abuse/Non-Abuse)
<b>Sex</b>									
Male	47 (59%)	76 (54%)	n=123 Q=6.837 Sig.=.009	12 (71%)	29 (55%)	n=41 Q=7.049 Sig.=.008	59 (61%)	104 (54%)	n=163 Q=12.423 Sig.=.000
Female	32 (41%)	66 (46%)	n=98 Q=11.796 Sig.=.001	5 (29%)	24 (45%)	n=29 Q=12.448 Sig.=.000	37 (39%)	90 (46%)	n=127 Q=22.118 Sig.=.000
<b>Race</b>									
White	48 (61%)	82 (58%)	n=130 Q=8.892 Sig.=.003	11 (65%)	27 (49%)	n=38 Q=6.737 Sig.=.009	59 (61%)	108 (56%)	n=167 Q=14.377 Sig.=.000
Non-White	31 (39%)	60 (42%)	n=91 Q=9.242 Sig.=.002	6 (35%)	26 (51%)	n=32 Q=12.500 Sig.=.000	37 (39%)	86 (44%)	n=123 Q=19.520 Sig.=.000
<b>Ethnicity</b>									
Hispanic	19 (24%)	18 (13%)	n=37 Q=0.027 Sig.=.869	4 (24%)	6 (11%)	n=10 Q=.400 Sig.=.527	23 (24%)	24 (12%)	n=47 Q=.021 Sig.=.884
Non-Hispanic	60 (76%)	123 (87%)	n=183 Q=21.689 Sig.=.000	13 (76%)	41 (77%)	n=54 Q=14.519 Sig.=.000	73 (76%)	163 (84%)	n=236 Q=34.322 Sig.=.000
Unknown	0 (0%)	1 (<1%)	--	0 (0%)	6 (11%)	--	0 (0%)	7 (4%)	--
<b>Relationship to Victim</b>									
Parent	47 (59%)	101 (71%)	n=148 Q=19.703 Sig.=.000	10 (59%)	34 (64%)	n=44 Q=13.091 Sig.=.000	57 (59%)	134 (69%)	n=191 Q=31.042 Sig.=.000
Non-Parent*	22 (28%)	31 (22%)	n=53 Q=1.528 Sig.=.216	2 (12%)	12 (23%)	n=14 Q=7.143 Sig.=.008	24 (25%)	43 (22%)	n=67 Q=5.388 Sig.=.020
Unknown	10 (13%)	10 (7%)	--	5 (29%)	7 (13%)	--	15 (16%)	17 (9%)	--

Notes: \*Non-parent includes child, acquaintance or friend, other relative, or other specified relationship.

Some percentages will not sum to 100 due to rounding error.

A Cochran’s Q statistic tests whether the percentages of a given variable are the same across multiple dependent samples. All Cochran’s Q tests had 1 degree of freedom and did not include unknowns. Probability levels are asymptotic and 2-tailed.

Table 12. Number and Percentage of Abuse and Non-abuse Child Homicides Classified and Misclassified by ICD-10 Manner of Death as Homicides, by Incident Occurred at Victim’s House and EMS at Scene, Including Cochran’s Q Test of Significance

Incident Characteristic	Child Abuse Homicides Inflicted by the Child’s Caretaker				Non-abuse Child Homicides Inflicted by the Child’s Caretaker				
	NVDRS Classified Homicides Total (n=290) # (%)	ICD-10 Classification Homicide (n=79) # (%)	Misclassified Deaths (n=17) # (%)	Cochran’s Q Statistic (ICD-10 /Misclassified)	Total (n=96) # (%)	ICD-10 Classification Homicide (n=142) # (%)	Misclassified Deaths (n=53)* # (%)	Cochran’s Q Statistic (ICD-10 /Misclassified)	Total (n=194) # (%)
<b>Incident Occurred at Victim’s Home</b>									
Yes	214 (74%)	64 (81%)	17 (100%)	n=81 Q=27.272 Sig.=.000	81 (84%)	98 (69%)	35 (66%)	n=133 Q=29.842 Sig.=.000	133 (69%)
No	61 (21%)	14 (18%)	0 (0%)	n=14 Q=14.000 Sig.=.000	14 (15%)	32 (23%)	16 (30%)	n=48 Q=5.333 Sig.=.021	47 (24%)
Unknown	15 (5%)	1 (1%)	0 (0%)	--	1 (1%)	12 (8%)	2 (4%)	--	14 (7%)
Cochran’s Q Statistic (Home/Not Home)	n=275 Q=85.124 Sig.=.000	n=78 Q=32.051 Sig.=.000	n=17 Q=17.000 Sig.=.000	--	n=95 Q=47.253 Sig.=.000	n=130 Q=33.508 Sig.=.000	n=51 Q=7.078 Sig.=.008	--	n=180 Q=41.089 Sig.=.000
<b>EMS at Scene</b>									
Yes	204 (70%)	57 (72%)	12 (71%)	n=69 Q=29.348 Sig.=.000	69 (72%)	96 (68%)	39 (74%)	n=135 Q=24.067 Sig.=.000	135 (70%)
No	61 (21%)	19 (24%)	5 (29%)	n=24 Q=8.167 Sig.=.004	24 (25%)	28 (20%)	10 (19%)	n=38 Q=8.526 Sig.=.004	37 (19%)
Unknown	25 (9%)	3 (4%)	0 (0%)	--	3 (3%)	18 (13%)	4 (8%)	--	22 (11%)
Cochran’s Q Statistic (EMS/No EMS)	n=265 Q=77.166 Sig.=.000	n=76 Q=19.000 Sig.=.000	n=17 Q=2.882 Sig.=.090	--	n=93 Q=21.774 Sig.=.000	n=124 Q=37.290 Sig.=.000	n=49 Q=17.163 Sig.=.000	--	n=172 Q=55.837 Sig.=.000

Notes: \*The sum of ICD-10 classification homicide and misclassified deaths does not equal the total number of non-abuse child homicides by caretaker due to deaths that were ICD-10 homicides but were reclassified by the NVDRS abstractor as non-homicides. One such death was in Alaska and can be found in Table 6. There were no ICD-10 classified child abuse homicides that were reclassified non-homicides by NVDRS abstractor.

Some percentages will not sum to 100 due to rounding error.

A Cochran’s Q statistic tests whether the percentages of a given variable are the same across multiple dependent samples. All Cochran’s Q tests had 1 degree of freedom and did not include unknowns. Probability levels are asymptotic and 2-tailed.

Table 13. Number and Percentage of Abuse and Non-abuse Child Homicides Classified and Misclassified by ICD-10 Manner of Death as Homicides, by Place of Death and Weapon Used, Including Cochran's Q Test of Significance

Incident Characteristic	Child Abuse Homicides Inflicted by the Child's Caretaker				Non-abuse Child Homicides Inflicted by the Child's Caretaker				
	NVDRS Classified Homicides Total (n=290) # (%)	ICD-10 Classification Homicide (n=79) # (%)	Misclassified Deaths (n=17) # (%)	Cochran's Q Statistic (ICD-10 /Misclassified)	Total (n=96) # (%)	ICD-10 Classification Homicide (n=142) # (%)	Misclassified Deaths (n=53)* # (%)	Cochran's Q Statistic (ICD-10 /Misclassified)	Total (n=194) # (%)
<b>Place of Death</b>									
Hospital (Inpatient or Emergency Department)	<b>186 (64%)</b>	61 (77%)	12 (71%)	n=73 Q=32.890 Sig.=.000	<b>73 (76%)</b>	88 (62%)	25 (47%)	n=113 Q=35.124 Sig.=.000	<b>113 (58%)</b>
Not Hospital**	<b>101 (35%)</b>	18 (23%)	5 (29%)	n=23 Q=7.348 Sig.=.007	<b>23 (24%)</b>	53 (38%)	26 (49%)	n=79 Q=9.228 Sig.=.002	<b>78 (40%)</b>
Unknown	<b>3 (1%)</b>	0 (0%)	0 (0%)	--	<b>0 (0%)</b>	1 (<1%)	2 (4%)	--	<b>3 (2%)</b>
Cochran's Q Statistic (Hospital/Not Hospital)	<b>n=287 Q=25.174 Sig.=.000</b>	n=79 Q=23.405 Sig.=.000	n=17 Q=2.882 Sig.=.090	--	<b>n=96 Q=26.042 Sig.=.000</b>	n=141 Q=8.688 Sig.=.003	n=51 Q=.020 Sig.=.889	--	<b>n=191 Q=6.414 Sig.=.011</b>
<b>Weapon Used</b>									
Personal Weapon	<b>70 (24%)</b>	36 (46%)	5 (29%)	n=41 Q=23.439 Sig.=.000	<b>41 (43%)</b>	21 (15%)	8 (15%)	n=29 Q=5.828 Sig.=.016	<b>29 (15%)</b>
Not Personal Weapon***	<b>198 (68%)</b>	39 (49%)	10 (59%)	n=49 Q=17.163 Sig.=.000	<b>49 (51%)</b>	112 (79%)	38 (70%)	n=150 Q=36.507 Sig.=.000	<b>149 (77%)</b>
Unknown	<b>22 (8%)</b>	4 (5%)	2 (12%)	--	<b>6 (6%)</b>	9 (6%)	7 (13%)	--	<b>16 (8%)</b>
Cochran's Q Statistic (Personal Weapon/Not Personal Weapon)	<b>n=268 Q=61.134 Sig.=.000</b>	n=75 Q=0.120 Sig.=.729	n=15 Q=1.667 Sig.=.197	--	<b>n=90 Q=0.711 Sig.=.399</b>	n=133 Q=62.263 Sig.=.000	n=46 Q=19.565 Sig.=.000	--	<b>n=178 Q=80.899 Sig.=.000</b>

Notes: \*The sum of ICD-10 classification homicide and misclassified deaths does not equal the total number of non-abuse child homicides by caretaker due to deaths that were ICD-10 homicides but were reclassified by the NVDRS abstractor as non-homicides. One such death was in Alaska and can be found in Table 6. There were no ICD-10 classified child abuse homicides that were reclassified non-homicides by NVDRS abstractor.

\*\*Not Hospital includes decedent's home, nursing home or long-care facility, dead on arrival, or other.

\*\*\*Not Personal Weapon includes blunt instrument, firearm, hanging, sharp instrument, poisoning, combinations of weapons, and other weapons not mentioned.

Some percentages will not sum to 100 due to rounding error.

A Cochran's Q statistic tests whether the percentages of a given variable are the same across multiple dependent samples. All Cochran's Q tests had 1 degree of freedom and did not include unknowns. Probability levels are asymptotic and 2-tailed.



Table 14. Number and Percentage of Abuse and Non-abuse Child Homicides Inflicted by the Child's Caretaker, by ICD-10 Ascertained, ICD-10 Misclassified, and NVDRS Ascertained, by Incident Characteristic, Including Cochran's Q Test of Significance

Incident Characteristic	Statistical Test of Difference Between ICD-10 Abuse and Non-Abuse Homicides by Caretaker			Statistical Test of Difference Between Misclassified Abuse and Non-Abuse Homicides by Caretaker			Statistical Test of Difference Between NVDRS Ascertained Abuse and Non-Abuse Homicides by Caretaker		
	ICD-10 Classification Abuse Homicide (n=79) # (%)	ICD-10 Classification Non-Abuse Homicide (n=142) # (%)	Cochran's Q Statistic (Abuse/Non-Abuse)	Misclassified Child Abuse Homicides (n=17) # (%)	Misclassified Non-Abuse Homicides (n=53) # (%)	Cochran's Q Statistic (Abuse/Non-Abuse)	Total Child Abuse Homicides (n=96) # (%)	Total Non-Abuse Homicides (n=194) # (%)	Cochran's Q Statistic (Abuse/Non-Abuse)
<b>Incident Occurred at Victim's Home</b>									
Yes	64 (81%)	98 (69%)	n=162 Q=7.136 Sig=.008	17 (100%)	35 (66%)	n=52 Q=6.321 Sig=.013	81 (84%)	133 (69%)	n=214 Q=12.636 Sig=.000
No	14 (18%)	32 (23%)	n=46 Q=7.043 Sig=.008	0 (0%)	16 (30%)	n=16 Q=16.000 Sig=.000	14 (15%)	47 (24%)	n=61 Q=17.852 Sig=.000
Unknown	1 (1%)	12 (8%)	--	0 (0%)	2 (4%)	--	1 (1%)	14 (7%)	--
<b>EMS at Scene</b>									
Yes	57 (72%)	96 (68%)	n=153 Q=9.941 Sig=.002	12 (71%)	39 (74%)	n=51 Q=14.294 Sig=.000	69 (72%)	135 (70%)	n=204 Q=21.353 Sig=.000
No	19 (24%)	28 (20%)	n=47 Q=1.723 Sig=.189	5 (29%)	10 (19%)	n=15 Q=1.667 Sig=.197	24 (25%)	37 (19%)	n=61 Q=2.770 Sig=.096
Unknown	3 (4%)	18 (13%)	--	0 (0%)	4 (8%)	--	3 (3%)	22 (11%)	--
<b>Place of Death</b>									
Hospital	61 (77%)	88 (62%)	n=149 Q=4.893 Sig=.027	12 (71%)	25 (47%)	n=37 Q=4.568 Sig=.033	73 (76%)	113 (58%)	n=186 Q=8.602 Sig=.003
Not Hospital*	18 (23%)	53 (38%)	n=71 Q=17.254 Sig=.000	5 (29%)	26 (49%)	n=31 Q=14.226 Sig=.000	23 (24%)	78 (40%)	n=101 Q=29.950 Sig=.000
Unknown	0 (0%)	1 (<1%)	--	0 (0%)	2 (4%)	--	0 (0%)	3 (2%)	--
<b>Weapon Used</b>									
Personal Weapon	36 (46%)	21 (15%)	n=57 Q=3.947 Sig=.047	5 (29%)	8 (15%)	n=13 Q=0.692 Sig=.405	41 (43%)	29 (15%)	n=70 Q=2.057 Sig=.151
Not Personal Weapon**	39 (49%)	112 (79%)	n=151 Q=35.291 Sig=.000	10 (59%)	38 (70%)	n=48 Q=16.333 Sig=.000	49 (51%)	149 (77%)	n=198 Q=50.505 Sig=.000
Unknown	4 (5%)	9 (6%)	--	2 (12%)	7 (13%)	--	6 (6%)	16 (8%)	--

Notes: \*Not Hospital includes decedent's home, nursing home or long-care facility, dead on arrival, or other.

\*\*Not Personal Weapon includes blunt instrument, firearm, hanging, sharp instrument, poisoning, combinations of weapons, and other weapons not mentioned.

Some percentages will not sum to 100 due to rounding error.

A Cochran's Q statistic tests whether the percentages of a given variable are the same across multiple dependent samples. All Cochran's Q tests had 1 degree of freedom and did not include unknowns. Probability levels are asymptotic and 2-tailed.

Table 15. Number and Percentage of Abuse and Non-abuse Child Homicides Inflicted by the Child's Caretaker, Used in Model I

Characteristic	<u>Inflicted by the Child's Caretaker</u>		
	Homicides Total (n=290) # (%)	Abuse Homicides Total (n=96) # (%)	Non-Abuse Homicides Total (n=194) # (%)
<b>Victim Sex</b>			
Male	163 (56%)	59 (61%)	104 (54%)
Female	127 (44%)	37 (39%)	90 (46%)
<b>Victim Race</b>			
White	167 (58%)	59 (61%)	108 (56%)
Non-White	123 (42%)	37 (39%)	86 (44%)
<b>Victim Ethnicity</b>			
Not Hispanic	236 (81%)	73 (76%)	163 (84%)
Hispanic	47 (16%)	23 (24%)	24 (12%)
Unknown	7 (2%)	0 (0%)	7 (4%)
<b>Caretaker Relationship to Victim</b>			
Parent	191 (66%)	57 (59%)	134 (69%)
Acquaintance/Friend	52 (18%)	20 (21%)	32 (16%)
Other*	15 (5%)	4 (5%)	11 (6%)
Unknown	32 (11%)	15 (16%)	17 (9%)
<b>Incident Occurred at Victim's Home</b>			
Yes	214 (74%)	81 (84%)	133 (69%)
No	61 (21%)	14 (15%)	47 (24%)
Unknown	15 (5%)	1 (1%)	14 (7%)
<b>EMS at Scene</b>			
Yes	204 (70%)	69 (72%)	135 (70%)
No	61 (21%)	24 (25%)	37 (19%)
Unknown	25 (9%)	3 (3%)	22 (11%)
<b>Place of Death</b>			
Hospital Inpatient Emergency	109 (38%)	43 (45%)	66 (34%)
Department	77 (27%)	30 (31%)	47 (24%)
Decedent's Home	50 (17%)	11 (11%)	39 (20%)
Other**	51 (17%)	12 (12%)	42 (22%)
Unknown	3 (1%)	0 (0%)	3 (2%)
<b>Weapon Used</b>			
Blunt Instrument	30 (10%)	13 (14%)	17 (9%)
Personal Weapons	70 (24%)	41 (43%)	29 (15%)
Firearm	24 (8%)	0 (0%)	24 (12%)
Hanging	14 (5%)	4 (4%)	10 (5%)
Other***	130 (45%)	32 (33%)	98 (51%)
Unknown	22 (8%)	6 (6%)	16 (8%)

Notes: \*Other includes child, other relative, or other specified relationship.

\*\*Other includes nursing home or long-care facility, dead on arrival, or other.

\*\*\*Other includes sharp instrument, poisoning, combinations of weapons, and other weapons not mentioned.

Some percentages will not sum to 100 due to rounding error.

Table 16. Number and Percentage of Abuse and Non-abuse Child Homicides Inflicted by the Child's Caretaker, Deaths with Unknown Characteristics Dropped, Used in Model II

<b><u>Inflicted by the Child's Caretaker</u></b>			
<b>Characteristic</b>	<b>Homicides Total (n=212) # (%)</b>	<b>Abuse Homicides Total (n=74) # (%)</b>	<b>Non-Abuse Homicides Total (n=138) # (%)</b>
<b>Victim Sex</b>			
Male	115 (54%)	47 (64%)	68 (49%)
Female	97 (46%)	27 (36%)	70 (51%)
<b>Victim Race</b>			
White	126 (59%)	46 (62%)	80 (58%)
Black	78 (37%)	25 (34%)	53 (38%)
Other	8 (4%)	3 (4%)	5 (4%)
<b>Victim Ethnicity</b>			
Not Hispanic	179 (84%)	58 (78%)	121 (88%)
Hispanic	33 (16%)	16 (22%)	17 (12%)
<b>Caretaker Relationship to Victim</b>			
Parent	155 (73%)	53 (72%)	102 (74%)
Acquaintance/Friend	45 (21%)	17 (23%)	28 (20%)
Other*	12 (6%)	4 (5%)	8 (6%)
<b>Incident Occurred at Victim's Home</b>			
Yes	161 (76%)	62 (84%)	99 (72%)
No	51 (24%)	12 (16%)	39 (28%)
<b>EMS at Scene</b>			
Yes	159 (75%)	53 (72%)	106 (77%)
No	53 (25%)	21 (28%)	32 (23%)
<b>Place of Death</b>			
Hospital Inpatient	83 (39%)	35 (47%)	48 (35%)
Emergency			
Department	63 (30%)	24 (32%)	39 (28%)
Decedent's Home	32 (15%)	7 (9%)	25 (18%)
Other**	34 (16%)	8 (11%)	26 (19%)
<b>Weapon Used</b>			
Blunt Instrument	27 (13%)	12 (16%)	15 (11%)
Personal Weapons	52 (25%)	31 (42%)	21 (15%)
Firearm	18 (8%)	0 (0%)	18 (13%)
Hanging	12 (6%)	4 (5%)	8 (6%)
Other***	103 (49%)	27 (36%)	76 (55%)

Notes: \*Other includes child, other relative, or other specified relationship.

\*\*Other includes nursing home or long-care facility, dead on arrival, or other.

\*\*\*Other includes sharp instrument, poisoning, combinations of weapons, and other weapons not mentioned.

Some percentages will not sum to 100 due to rounding error.

Table 17. Multivariate Odds Ratios for Child Abuse Homicides by Caretaker (Models I and II)

Independent Variable Description	Model I (n=281)			Model II (n=212)		
	Odds Ratio	p> z	SE	Odds Ratio	p> z	SE
Victim Male	1.3104	.345	0.375	1.9753*	.036	0.640
Victim White	0.9466	.854	0.281	1.0275	.936	0.346
Victim Hispanic	1.9396	.086	0.749	1.8586	.163	0.083
Parent Suspect	0.7381	.201	0.267	0.8940	.387	0.349
Suspect Relationship Unknown	1.2083	.367	0.669	--	--	--
Incident Occurred at Victim's Home	2.3862*	.011	0.900	2.2833*	.023	0.940
Incident Place Unknown	0.3754	.199	0.434	--	--	--
EMS was Present at Scene	0.5302*	.037	0.187	0.4841*	.030	0.187
EMS Unknown	0.1708*	.011	0.130	--	--	--
Victim Died at Hospital	1.5130	.096	0.479	1.8419*	.050	0.683
Personal Weapons	3.8437***	.000	1.223	4.1719***	.000	1.493
Weapon Unknown	1.1988	.381	0.719	--	--	--
Pseudo R <sup>2</sup>		.1403			.1278	

Notes: Two-tailed p-values reported for Victim Male, Victim White, and Victim Hispanic. One-tailed p-values reported for all other variables.

\*Significant at p≤.05

\*\*Significant at p≤.01

\*\*\*Significant at p≤.001

## APPENDICES

### APPENDIX A

#### **Sources of Data in the NVDRS**

The NVDRS is coordinated and funded at the federal level but depends on separate data collection efforts in each participating state managed by each state health department. The system is designed for data to be incident-based rather than victim-based. The record for an incident includes information about all the victims and suspects, their relationships, and any weapon(s) involved in each incident.

To fully characterize incidents, states collect information about each incident from three primary data sources: death certificates, coroner/medical examiner records, and police records. A fourth source, crime lab records, is tapped when a firearm is involved in the incident. At a minimum, 85 unique data elements are collected for a relatively simple incident like a firearm suicide by an adult. Many additional variables are available as options or for more complicated cases.

Additional data sources that are particularly useful for characterizing specific kinds of violent death may be added to the system. If funded and available, Supplementary Homicide Reports (SHRs), Hospital Emergency Department data, and Child Fatality Review Team data can be recorded in the NVDRS database. When a firearm is involved in the incident, data available through the Bureau of Alcohol, Tobacco, Firearms, and Explosives can also be entered. Data collection from these sources is however optional (unless a state is being funded to test an optional source).

The strength of the NVDRS is its use of multiple, complimentary data sources. Given that data would be obtained from multiple sources, each with its own documents, and that data might be entered from one source about an incident before the information is available from a second source, the NVDRS was designed to keep the data sorted by source. The following table shows the sources from which data on different topics are to be recorded in the NVDRS according to the NVDRS Manual.

Data Topic	DC	CME	PR	SHR	CFRT	LAB	ATF	USER
Case status								X
Number of persons and weapons								X
Incident narrative		X	X		X			
Document tracking								X
Person type (victim/suspect)	X	X	X	X				
Name, address	X	X	X					
Age/sex/race/ethnicity	X	X	X	X				
When and where (injury/death)	X	X	X					
Cause of death ICD code(s)	X							
Manner of death	X	X			X			X
Additional person descriptors	X	X	X		X			
Alcohol and drug tests		X						
Wounds	X	X	X					
Associated circumstances		X	X	X	X			
Victim-suspect relationship		X	X	X				

History of victim abuse		X			X			
Suspect was victim caretaker		X	X		X			
Weapon type								X
Firearm trace							X	
Firearm descriptors		X	X			X		
Poison details		X	X					
Weapon used by/on person		X	X	X				
Person purchasing firearm			X				X	

NOTES: DC=death certificate; CME=coroner/medical examiner; PR=police record; SHR=Supplemental Homicide Report; CFRT=child fatality review team; Lab=crime lab; ATF=Bureau of Alcohol, Tobacco, Firearms, and Explosives.; USER=NVDRS Abstractor.

The hospital source was left out of the table to save space. It only captures whether inpatient or Emergency Department (ED) care occurred and what International Classification of Disease (ICD) codes were assigned. SOURCE: NVDRS Coding Manual, 2003.

### Primacy Among Data Sources

Data sources may not always agree about every fact of a given incident. A way to identify what is likely the best available information among different sources is needed. Therefore, the data sources have been ranked in terms of their likely accuracy for each data element. The term used for the ranking is “primacy.” The source with 1<sup>st</sup> primacy is considered most reliable for a given variable and is the source of choice. Lower primacy sources are the most reliable after 1<sup>st</sup> primacy and are used when a higher primacy source is not available. For example, sex of the victim is taken first from the death certificate, second from the CME, and finally from the police.

States will retain all the data and can determine their own primacy in their state-specific analysis files. States may even choose to use different primacy rankings for different parts of the state or different time periods. When different sources have complete but discordant data, the simplest approach is to use primacy. For nationwide comparisons, the CDC uses the primacy ranking built into the software. The primacy of each source for each variable used in this analysis is shown in the table below. Unfortunately, I am unable to decipher which source each variable in my analysis came from. All that is known are the data sources they could have come from, and the hierarchy of sources the NVDRS utilizes for gathering reliable information about each variable.

Variable	1 <sup>st</sup> Primacy	2 <sup>nd</sup> Primacy	3 <sup>rd</sup> Primacy	4 <sup>th</sup> Primacy
ICD-10 Manner of Death	DC			
Abstractor Manner of Death	USER			
Victim Sex	DC	CME	SHR	PR
Victim Race	DC	CME	SHR	PR
Victim Ethnicity	DC	CME	SHR	PR
Victim to Suspect Relationship	PR	CME		
History of Abuse	CME			
Caretaker of Victim	CME	PR		
Place of Death	DC	CME		
Incident Occurred At Home	CME	PR		
EMS at Scene	CME	PR		
Weapon Used	USER			

NOTES: DC=death certificate; CME=coroner/medical examiner; PR=police record; SHR=Supplemental Homicide Report; USER=NVDRS Abstractor.

SOURCE: NVDRS Coding Manual, 2003.

## APPENDIX B

### **ICD-10 Manner of Death**

The manner of death for the deceased person based on the valid ICD-10 underlying cause of death code (see a description of ICD-10 codes below). ICD-10 codes—as found on the deceased’s death certificate—report manner of death with one of the following classifications:

#### *Homicide*

Includes terrorism, ICD-10 cause of death codes X85-X99; Y00-Y09; Y87.1; U01.0-U01.9; U02 (where due to homicide)

#### *Suicide*

Includes terrorism, ICD-10 cause of death codes: X60-X84; Y87.0; U03.0-U03.9; U02 (where due to suicide)

#### *Unintentional Firearm Death*

Includes ICD-10 cause of death codes W32-W34; Y86 (firearms)

#### *Undetermined Intent*

Includes ICD-10 cause of death codes Y10-Y34; Y87.2; Y89.9

#### *Missing ICD-10 Code*

Includes ICD-10 code ‘missing’

#### *Other Manners of Death*

Includes ICD-10 cause of death codes F00-F99; S00-T98; V01-W31; W35-X59; Y36; Y35.5; Y40-Y84; Y90-Y98; A00-E99; G00-R99; Z00-Z99; U00; U04-U99

#### *Legal Intervention Death*

Includes ICD-10 cause of death codes Y35.0-Y35.4; Y35.6-Y35.7; Y89.0

#### *Unknown*

Includes ICD-10 cause of death codes L99.99 and any value starting with ‘9’

### Description of ICD-10 coding of external causes of death:

U01 Assault by terrorism

U01.0 Assault by terrorism by explosion of marine weapons

U01.1 Assault by terrorism involving destruction of aircraft

U01.2 Assault by terrorism involving other explosions and fragments

U01.3 Assault by terrorism involving fires, conflagration, hot substances

U01.4 Assault by terrorism involving firearms

U01.5 Assault by terrorism involving nuclear weapons

U01.6 Assault by terrorism involving biological weapons

U01.7 Assault by terrorism involving chemical weapons

U01.8 Assault by terrorism, other specified

U01.9 Assault by terrorism, unspecified

U02 Sequelae of terrorism

U03 Intentional self-harm by terrorism

U03.0 Intentional self-harm by terrorism involving explosions and fragments

U03.9 Intentional self-harm by terrorism by other and unspecified means

W32 Accidental handgun discharge  
W33 Accidental rifle, shotgun, and larger firearm discharge  
W34 Accidental discharge from other and unspecified firearms (this code does not discriminate between firearms and nonpowder guns)  
X60-X69 Intentional self-poisoning  
X70 Intentional self-harm by hanging, strangulation, and suffocation  
X71 Intentional self-harm by drowning and submersion  
X72 Intentional self-harm by handgun discharge  
X73 Intentional self-harm by rifle, shotgun, and larger firearm discharge  
X74 Intentional self-harm by other and unspecified firearm discharge  
X75 Intentional self-harm by explosive material  
X76 Intentional self-harm by smoke, fire, and flames  
X77 Intentional self-harm by steam, hot vapors, and hot objects  
X78 Intentional self-harm by sharp object  
X79 Intentional self-harm by blunt object  
X80 Intentional self-harm by jumping from a high place  
X81 Intentional self-harm by jumping or lying before moving object  
X82 Intentional self-harm by crashing a motor vehicle  
X83 Intentional self-harm by other specified means  
X84 Intentional self-harm by unspecified means  
X85 Assault by drugs, medicaments, and biological substances  
X86 Assault by corrosive substance  
X87 Assault by pesticides  
X88 Assault by gases and vapors  
X89 Assault by other specified chemicals and noxious substances  
X90 Assault by other unspecified chemicals and noxious substances  
X91 Assault by hanging, strangulation, and suffocation  
X92 Assault by drowning and submersion  
X93 Assault by handgun discharge  
X94 Assault by rifle, shotgun, and larger firearm discharge  
X95 Assault by other and unspecified firearm discharge  
X96 Assault by explosive material  
X97 Assault by smoke, fire, and flames  
X98 Assault by steam, hot vapors, and hot objects  
X99 Assault by sharp object  
Y00 Assault by blunt object  
Y01 Assault by pushing from high place  
Y02 Assault by pushing or placing victim before moving object  
Y03 Assault by crashing a motor vehicle  
Y04 Assault by bodily force (unarmed brawl or fight)  
Y05 Sexual assault by bodily force  
Y06 Neglect and abandonment  
Y07 Other maltreatment syndromes (physical or sexual abuse, torture)  
Y08 Assault by other specified means  
Y09 Assault by unspecified means  
Y22 Handgun discharge, undetermined intent



Y23 Rifle, shotgun, and larger firearm discharge, undetermined intent  
Y24 Other and unspecified firearm discharge, undetermined intent  
Y35.0 Legal intervention involving firearm discharge  
Y35.1 Legal intervention involving explosives  
Y35.2 Legal intervention involving gas  
Y35.3 Legal intervention involving blunt objects  
Y35.4 Legal intervention involving sharp objects  
Y35.6 Legal intervention involving other specified means  
Y35.7 Legal intervention, means unspecified  
Y87.0 Sequelae of intentional self-harm  
Y87.1 Sequelae of assault  
Y89.0 Sequelae of legal intervention  
L88.88 Not applicable\*  
L99.99 Unknown or missing\*  
\*Not an ICD-10 code, added codes.

SOURCE: (ICD-10) International Statistical Classification of Diseases and Related Health Problems: 10th Revision: Geneva: World Health Organization 1992.

### **NVDRS Manner of Death**

The manner of death for the deceased person based on combining the manners of death from different data sources. NVDRS abstractors report manner of death for each deceased person with one of the following classifications:

*Homicide, including terrorism*

*Suicide, including terrorism*

*Unintentional Firearm Death*

*Undetermined Intent*

*Non-Firearm Unintentional Death*

*Legal Intervention Death*

*Pending Investigation*

*Natural*

*Record not Available or Blank*

There were no violent child deaths classified as pending investigation or natural in this analysis.

SOURCE: NVDRS Coding Manual, 2003.

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