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Child Maltreatment-Related Homicides: Examining Characteristics and Circumstances in the Context of Victim-Perpetrator Relationship

Rebecca Wilson

ABSTRACT

Child Maltreatment-Related Homicides: Examining Characteristics and Circumstances in the Context of Victim-Perpetrator Relationship

By

Rebecca Faye Wilson

July 18, 2018

Background: Homicide is the fifth leading cause of death among children from birth to 17-years-old, with approximately 1,700 child maltreatment (CM)-related homicides occurring in the U.S. annually. In 2016, more than three-quarters (78%) of these deaths involved biological parents acting alone, together, or with other individuals, and approximately 17% were perpetrated by a nonparent, suggesting different victim-perpetrator relationships present different levels of risks. The present study examined the association between child, family, and perpetrator characteristics and method of lethality used in CM-related homicides in the context of victim-perpetrator relationship. ***Methodology:*** Data are from the National Violent Death Reporting System (NVDRS). NVDRS captures data using death certificates, law enforcement (LE) reports, and coroner/medical examiner (C/ME) reports. Using content analysis, which is a research technique to systematically code textual material into categorical data, CM-related homicides of children ages 0-17 for 2012-2015 in 32 states were examined. Bivariate and multinomial logistic regression models were used to evaluate associations between method of lethality used in CM-related homicides and victim-perpetrator relationship, and child, family, and perpetrator characteristics. ***Results:*** During the 2012-2015 data collection period, 996 children were victims of CM-related homicide. Biological fathers were the most common perpetrators (37.8%), followed by mother's male companion (26.8%), biological mother (21.8%), and "other" perpetrator (13.6%). With respect to method of lethality, more than one third of the children were beaten/bludgeoned to death (37.3%) and deaths by "other" means was the second most prevalent method of lethality (24.1%). Further, the odds of a child being beaten/bludgeoned to death versus dying by abusive head trauma (AHT) among those killed by mother's male companion was 1.98 (95% CI [1.02, 3.88]) times greater the odds of being beaten/bludgeoned to death by biological fathers, adjusting for all other predictors in the model. Moreover, the presence of a bystander significantly increased the odds of a child being beaten/bludgeoned to death, Adjusted Odds Ratio (*aOR*) = 2.31, 95% CI [1.04, 5.14]. In addition, the presence of intimate partner violence, parental relationship conflict, and arguments were each associated with increased odds of firearm-related deaths in children versus death by AHT, *aOR* = 8.67, 95% CI [2.60, 28.91], *aOR* = 9.17, 95% CI [1.78, 47.18], and *aOR* = 13.85, 95% CI [2.51, 76.52], respectively. ***Conclusion:*** This study helps to better understand the circumstances and characteristics of CM-related homicides, which may inform primary prevention efforts, prevent child death, and, when used in the context of a comprehensive prevention strategy, may help in assuring safe, stable, nurturing relationships and environments for all children.

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APPROVAL PAGE

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Author's Statement Page

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Chapter 1: Statement of Problem and Literature Review

Defining the Problem

In 2016, there were approximately 1,750 child maltreatment-related homicides in the U.S., representing a 7.4 percent increase from 2012 (USDHHS, 2018). According to the Centers for Disease Control and Prevention (CDC, 2018a), homicide is the fifth leading cause of death among children from birth to 17-years-old. More than three-quarters (78%) of these deaths involved biological parents acting alone, together, or with other individuals, and approximately 17% were perpetrated by a nonparent (USDHHS, 2018), suggesting that different victim-perpetrator relationships present varying levels of risks. Moreover, these estimates provide overwhelming evidence that children are more likely to be killed at home, by a family member or someone known to them. Biological parents and mothers' male companions (e.g., mother's boyfriend, stepfather of child) represent the greater share of perpetrators who commit these types of crimes (Daly & Wilson, 1994; Harris et al., 2007; Stiffman, Schnitzer, Adam, Kruse, & Ewigman, 2002; U.S. Department of Health and Human Services [USDHHS], 2018; Weekes-Shackelford & Shackelford, 2004).

The term child fatality is often used to describe deaths that are precipitated by child maltreatment; however, because the term child fatality covers a wide range of child deaths (e.g., child homicide, neonaticide, infanticide, filicide, and early and late filicide), the term child maltreatment (CM)-related homicide will be used herein to refer specifically to the death of a child, ages 0-17 years old, caused by intentional or unintentional injury resulting from abuse or neglect or where abuse or neglect was a contributing factor. CM-related deaths are generally characterized by heterogeneous circumstances or conditions that led directly and subsequently to the death of the child, and independent of judicial outcomes, manner of death assigned by the medical examiner or coroner is homicide.

Magnitude of the Problem

The magnitude of CM-related homicide is difficult to ascertain because national estimates come primarily from child welfare data (Schnitzer et al., 2013; Sedlak et al., 2010; USDHHS, 2018), which has been found to only identify between 24% and 65% of CM-related homicides (Ewigman et al., 1993; Klevens & Leeb, 2010; Schnitzer et al., 2008). This under ascertainment is due, at least in part, to the fact that not all CM-related deaths come to the attention of child welfare agencies (USDHHS, 2018), and CM definitions vary within states (Child Welfare Information Gateway, 2016a). Analyses based on death certificate data also underestimate CM-related homicides, as these analyses identify approximately 10%-51% of cases, with misclassifications particularly high for cases of fatal neglect (Crume et al., 2002; Herman-Giddens et al., 1999; Schnitzer et al., 2013). Given that estimates of CM-related homicides vary by source, research has shown the value of combining multiple data sources to provide more accurate estimates of CM-related homicides (Ewigman, et al., 1993; Putnam-Hornstein, Cleves, Licht, & Needell, 2013; Schnitzer et al., 2008).

The present study draws on data from the National Violent Death Reporting System (NVDRS) to examine the association between victim-perpetrator relationship (primary predictor) and method of lethality used in CM-related homicide (primary outcome). For purposes of this study, a biological parent is described as a mother or father who has a genetic relationship with the child. Conversely, a nonparent (e.g., mother's male partner, father's female partner, family friend, and paramour) is someone who does not share a biological connection to the child but may have a romantic (married or unmarried) relationship with the biological parent of the child or reside in the home with the child. Furthermore, the association between victim-perpetrator relationship and method of lethality used in CM-related homicide is examined to determine whether or not it differs in the context of *child-related*

characteristics (e.g., victim's age, race), *family characteristics* (e.g., intimate partner violence, parental relationship conflict), and *perpetrator characteristics* (e.g., mental illness, alcohol or drug abuse).

Literature Review

In a well-established body of literature, studies have identified multiple factors that increase risk of CM-related homicide (CDC, 2018b; Malvaso, Delfabbro, Proeve, & Nobes, 2015; Peterson & Brown, 1994). Households wherein multiple risk factors are present have been found to increase the likelihood of CM-related homicide (Malvaso, Delfabbro, Proeve, & Nobes, 2015; Turner, Finkelhor, Hamby, & Shattuck, 2013; Yampolskaya, Greenbaum, & Berson, 2009). However, a non-biological caregiver is consistently identified as one of the single most important risk factors for CM-related homicide (Daly & Wilson, 1980; Daly & Wilson, 1994; Schnitzer & Ewigman, 2005; Stiffman, Schnitzer, Adam, Kruse, & Ewigman, 2002; Weekes-Shackelford & Shackelford, 2004; Yampolskaya, Greenbaum, & Berson, 2009).

Type of maltreatment experienced by child victim. Children who die as a result of CM often experience multiple types of abuse. For example, of the 1,750 CM-related homicide victims reported in 2016, about 75% experienced neglect, 44.0% experienced physical abuse, 5.7% experienced medical neglect, and 15% experienced other forms of maltreatment (USDHHS, 2018). This suggests that in the case of CM-related homicide, the circumstances (e.g., malnutrition, medical neglect) or injury(ies) (e.g., abusive head trauma) that led directly to the death may have resulted from the combined effect of experiencing multiple types of CM. Relatedly, using the National Survey of Children's Exposure to Violence, Finkelhor and colleagues (2011) examined children's exposure to multiple types of violence and found that of the children surveyed, approximately 39% self-reported having experienced multiple forms of violence, including CM, during the previous year. In the

sections that follow, risk factors for CM-related homicide are summarized according to child, family, and perpetrator characteristics.

Child-Related Characteristics and CM-related Homicide

Considerable research has linked child characteristics with increased risk of CM-related homicide (Bennett et al., 2006; CDC, 2018b; Farrell et al., 2017; USDHHS, 2018; Welch & Bonner, 2013). For example, previous research indicates child age (Bennett et al., 2006), sex (USDHHS, 2018), race (Farrell et al., 2017), and previous nonfatal injury (King, Kiesel, & Simon, 2006; Lyman et al., 2003; Pierce et al., 2017) are all associated with elevated risk of CM-related homicides. While child-related characteristics (e.g., age, sex) are important to consider in the context of CM-related homicides, children do not bear the responsibility of their abusive experiences. Literature examining child characteristics is presented below in an attempt to provide a more complete examination of precipitating circumstances and factors that elevate risk of CM-related homicide.

Age. With regard to *child-related characteristics*, age is important, with children 0-4 years of age being the most vulnerable for death (Bennett et al., 2006; CDC, 2018b; Klevens & Leeb, 2010; Schnitzer & Ewigman, 2005; USDHHS, 2018). In 2016, children younger than 4-years-old disproportionally represented 70% of CM-related homicides in the U.S., and children younger than 1 year of age accounted for the highest victimization at 44% (USDHHS, 2018). Furthermore, injury patterns in CM-related homicides show that the peak age ranges during which these fatalities occur are 0-3 months (25%) and 2-6 years (19%), with 50% of deaths occurring in infants 9-months-old or younger (Ross, Abel, & Radisch, 2009). Klevens and Leeb (2010) noted that two-thirds of child fatalities resulting from child abuse and neglect were for abusive head trauma of children under the age of 5 years.

Some research has found the highest risk for CM-related homicides to be with neonates or those in the first 24 hours of life (Paulozzi & Sells, 2002; Porter & Gavin, 2010). Paulozzi and Sells (2002) examined the variations in homicide risk in U.S. infants, and found that, of the infant deaths that occurred during the first week of birth, 82.6% were killed within 24 hours of their birth, translating to a risk that is greater than at any other time of life. These patterns of age-related risk also exist in low-income countries. For example, Outwater et al. (2010) examined homicides of children in Dar es Salaam, Tanzania using police reports and qualitative data collection methods and found the neonaticide rate to be 27.7 per 100,000 births compared to the overall age adjusted rate of CM-related homicides of 2.05 per 100,000 births. Importantly, CM-related homicides occurring among younger children seems to be a consistent issue globally, as a retrospective study examining child homicides in France, Makhlouf and Rambaud (2014) found that slightly more than half (51.4%) of the child homicide cases they reviewed were of victims less than 1-year-old.

Sex of child victim. U.S. estimates of CM-related homicide suggest that boys are disproportionately represented in child fatality data (Putnam-Hornstein, Cleves, Licht, & Needell, 2013; USDHHS, 2018; Welch & Bonner, 2013). In 2016, boys had a CM-related homicide rate of 2.87 per 100,000 boys in the U.S. population, while the rate for girls was 2.11 per 100,000 (USDHHS, 2018). Similarly, when analyzed by sex of the child victim, in Dar es Salaam, Tanzania, boys had a neonaticide rate almost three times that of girls at 43.3/100,000 male births compared to 17.6/100,000 female births (Outwater et al., 2010).

Race of child victim. In addition to variations in CM-related homicides based on age and sex of the child, there are considerable differences within specific race and ethnic groups. In the U.S., significant disparities in CM-related homicide rates exist between White and minority children, with minority children being overrepresented (Douglas, 2015; Farrell et al., 2017; Lyman et al., 2003;

USDHHS, 2018). In 2016, African Americans had a CM-related homicide rate of 4.65 per 100,000 children, which was more than twice that of Whites, who had a rate of 2.08 per 100,000 (USDHHS, 2018). Hispanics had the lowest rates (1.58 per 100,000), while American-Indian or Alaska Native children had the highest at 14.2 per 1,000. These racial disparities may be due, in part, to the fact that minority children may be more likely to live in environments characterized by violence and poverty, and/or exposed to other household and community factors that elevate risk (Farrell et al., 2017). The heightened levels of risk in these families may compromise the quality of parenting and increase levels of stress, which, in turn, may lead to harsh and abusive parenting in response to normative child behavior, such as infant crying and tantrums. Harsh and abusive parenting may then increase the risk of CM-related homicide (Chen & Chan, 2015).

Child's crying behavior and abusive head trauma. Crying in and of itself is not considered a risk factor for CM-related homicide, but it is the most commonly reported antecedent of violent shaking in infants or small children (Barr, 2014; Flaherty, 2006; Kajese et al., 2011). This violent shaking, which may be known as Abusive Head Trauma (AHT) or shaken baby syndrome, often occurs in the context of caregiver frustration, fatigue, and anger and, which is largely triggered by developmentally normative crying in infants (Adamsbaum, Grabar, Mejean, & Rey-Salmon, 2010; Barr, 1990; National Center on Shaken Baby Syndrome, 2018). According to Barr (1990), crying in infants follows a developmental trajectory wherein crying begins to intensify at about 2 weeks after birth, peaks in the 2nd month, and declines thereafter. Despite the fact that crying is developmentally appropriate, many infants and young children are harmed or consequently killed by adults who may be unprepared and ill-equipped to care for a child during this peak crying period.

AHT is a form of child physical abuse and is the leading cause of CM-related homicides in the U.S., with approximately 1,300 cases reported annually and 25% of them fatal (National Center on

Shaken Baby Syndrome, 2018). The majority of AHT victims survive their injuries, which subsequently increases their risk for re-injury and death (National Center on Shaken Baby Syndrome, 2018). To better understand the risk factors for AHT, Adamsbaum et al. (2010) evaluated the clinical and forensic evidence in 112 fatal and nonfatal medicolegal cases of AHT, and of the 29 perpetrators who confessed to shaking the child, 100% of them attributed their actions to the fatigue and irritation associated with the child's crying behavior. Many of the perpetrators who confessed also expressed ambivalent emotions to the act of shaking, yet 55% of them repeatedly shook the child, with incidents of shaking ranging from 2 to 30 times (*Mean* = 10), because this action was effective in stopping the child's crying (Adamsbaum et al., 2010). Similarly, Flaherty's (2006) evaluation of perpetrators' confessions of abuse toward 41 children found that crying was the most cited event triggering the abuse.

Prior history of abuse and/or previous nonfatal injury. Nonfatal injuries caused by AHT and other forms of abuse are seldom witnessed, and even in the presence of a confession, perpetrators may minimize events or provide false accounts of their prior history of maltreating the child (Adamsbaum et al., 2010; Flaherty, 2006). Due to the delayed recognition of ongoing or prior abuse, victims of CM may suffer more serious abuse or death. This suggests that children with a previous history of abuse or prior nonfatal injury are at an increased risk of CM-related homicide (King, Kiesel, & Simon, 2006; Lyman et al., 2003; Pierce et al., 2017; Sheets, Leach, Koszewski, Lessmeier, Nugent, & Simpson, 2013).

Pierce et al. (2017) assessed risk factor commonalities among 30 cases of fatal (n = 20) and near fatal (n = 10) physical child abuse to determine if predictive indicators were present prior to the fatal or near fatal event. They found that 64% of the children with available medical records had previously documented patterns of unexplained injuries. A history of unexplained injuries also was

present in the research of King et al. (2006) wherein medical examiner reports and hospital records of 37 CM-related homicide victims were examined. In that research, 24% of the child victims had fractures at the time of death, 19% of which were in various stages of healing (King et al., 2006). This research suggests that violence towards children may not be a one-time event but may be repeated over an unspecified period of time and escalate to a level that is fatal.

Family Characteristics and CM-Related Homicide

Research has linked certain family characteristics with heightened risk of CM-related homicide (Turner, Finkelhor, Hamby, & Shattuck, 2013). For example, past studies have identified parental relationship conflict (Apicella & Marlowe, 2004), intimate partner violence (Jaffe et al., 2012; Smith, Fowler, & Nolan, 2010), harsh and abusive parenting and use of corporal punishment (Chen & Chan, 2015; Margolin, 1990), involvement with child protective services (USDHHS, 2018), and poverty (Doidge et al., 2017; Douglas & Mohn, 2014; Ettaro, Berger, & Songer, 2004; Farrell and colleagues, 2017) as risk factors for CM-related homicide. A better understanding of the way in which family characteristics increase risk may assist in the identification of strategies for the primary prevention of CM-related homicide.

Parental relationship conflict. Occasional conflict in romantic relationships is normative and a part of family life; however, high levels of parental relationship conflict can foster stress and violence, consequently increasing risk of CM-related homicide for children residing in such environments (Logan, Walsh, Patel, & Hall, 2013; Turner, Finkelhor, Hamby, & Shattuck, 2013). When examining the various family structures, research contends that households comprised of single parents and stepparents have more interpersonal conflict and lower relationship quality than the traditional family structure of two biological parents (Daly & Wilson, 1996; Dunn, 2002; McLanahan & Sandefur, 1994; Pryor & Rodgers, 2001; Turner, Finkelhor, Hamby, & Shattuck, 2013). Families

without two biological parents present may be structurally predisposed to conflict due to relationship dynamics (e.g., frequent conflict between biological parents, child sees stepparent as a "replacement" of biological parent or does not view stepparent as "real parent", or stepparent does not easily connect with child). In this regard, the relationship may be characterized by frequent arguments, custody disputes, relationship or marital separation, divorce, and intimate partner violence, which are often precipitators of CM-related homicide (Bourget & Gagne, 2005; Dalley, 1997/2000; Farnsworth, 2011; Fowler, Dahlberg, Haileyesus, Gutierrez, & Bacon, 2017; Harris, Hilton, Rice, & Eke, 2007; Holland, Brown, Hall, & Logan, 2015; Johnson, 2006; Kajese et al., 2011; Wilcyznski, 1995).

Bourget and Gagne (2005) provide evidence of the link between parental relationship conflict and CM-related homicide in a retrospective study of 77 paternal filicide cases in Quebec, Canada. Of the cases, 40% had a recent dissolution of marriage. It has been hypothesized that in such cases, the perpetrator reacts to the loss of a significant relationship by displacing their feelings of anger for the spouse onto the child (Resnick, 1969). Historically, such cases have been viewed as spousal revenge filicide, as the motive is to exact revenge upon the spouse by killing the child, hence the child becomes a victim of intimate partner conflict (Resnick, 1969).

Intimate partner violence. Related evidence examining the role of parental conflict on intimate partner violence suggests that children in households with persistent parental relationship conflict may be especially likely to witness and experience intimate partner violence, placing them at risk of CM-related homicide (Cavanagh, Dobash & Dobash, 2005; Douglas, 2015; Kajese et al., 2011; Logan, Walsh, Patel, & Hall, 2013; Sillito & Salari, 2011). Many studies have examined the relationship between intimate partner violence and children as corollary victims. For example, in one study, researchers examined the characteristics of intimate partner homicide and related deaths in 16 states within the U.S., and found that, of the corollary victims, 25% were children ≤ 17-years-old

(Smith, Fowler, & Niolon, 2014). Similarly, Dobash and Dobash (2012) provide evidence of the dangers children face when exposed to domestic violence. In their research, Dobash and Dobash (2012) evaluated child victims of intimate partner violence by reviewing case files and conducting interviews of convicted perpetrators. From the case files, 19 children were identified as corollary victims of intimate partner violence, 65% of the perpetrators used violence towards the child and female partner prior to killing the child, and 69% of the perpetrators were stepfathers of the children (Dobash & Dobash, 2012). Additionally, in 2017, the New York State Division of Criminal Justice Services, Office of Justice Research and Performance found that 29 children died in 2016 as a result of intimate partner violence-related homicide. Importantly, 62% were < 5-years-old, and 72% of the deaths were perpetrated by a biological parent, mostly fathers (Division of Criminal Justice Services, Office of Justice Research and Performance, 2017). These studies highlight intimate partner violence as an important risk factor of CM-related homicide because it threatens the safety and well-being of children. Children who are exposed to intimate partner violence may also come to the attention of child protective services (CPS) through court legal proceedings, because an assessment of the child's safety may warrant the situation to be treated as a social services matter.

Family involvement with child protective services. Families with a history of CPS involvement are at a heightened risk of CM-related homicides, irrespective of whether the abuse and/or neglect is substantiated (Sabotta & Davis, 1992; Sorenson & Peterson, 1994) or whether they have children known to CPS (Douglas, 2015; Hicks & Gaughan, 1995; Jonson-Reid, Chance, & Drake, 2007; Putnam-Hornstein, 2011; USDHHS, 2018). In 2016, approximately 4.1 million children came to the attention of CPS by way of a report for allegations of abuse and neglect, and of the 1,750 reported child fatalities, about 30% were known to CPS in the 3 years prior to the date of death (USDHHS, 2018). Furthermore, 7.0% had at least one victim contact with CPS, 17.1% were known by CPS by

way of a sibling or another family member having an abuse allegation, and 5.6% had both victim and other family member contact with CPS prior to the fatal event (USDHHS, 2018).

Most prior studies with families known to CPS have examined risk differences between fatal and nonfatal child maltreatment in families previously investigated by CPS. For example, Miyamoto and colleagues (2017) evaluated risk differential in a matched case-control study of fatal and nonfatal CM in families previously investigated by CPS. When compared to controls (n = 468), the children identified as cases (n = 234) were more at risk for fatal and nonfatal CM if they were male, if they were being cared for by a young mother, if there were three or more children under the age of 5 living in the home, and if the child's biological parents did not reside in the home. These results were consistent with research by Putnam-Hornstein et al. (2013), wherein a prospective, population-based study yielded a 4-fold increase in risk of an intentional injury in children with a prior report of physical abuse when compared to children with a previous allegation of neglect.

Bystander. CM-related homicide cases often involve two or more perpetrators, and the commission of such crimes largely involves broader microsystems or other people who have direct contact with the child (Cooper & Smith, 2011). In 2016, approximately 37.1% of the reported 1,750 CM-related homicides involved two or more perpetrators: father and nonparent(s) (1.9%); mother and nonparent(s) (10.7%); mother and father (20.1%); mother, father, and nonparent (1.6%); or more than one non-parental perpetrator (2.8%; USDHHS, 2018). Bystanders are adults who are in a caregiving role and given the caregiver role, have a responsibility to protect the child but are complicit in abuse by virtue of their failure to act (Adams, 1994; Child Welfare Information Gateway, 2016b). Bystanders have a critical role to play when it comes to preventing CM-related homicide.

Theoretical knowledge that bystanders could be influenced to take action was first presented by Darley and Latane (1968) in an article on participants' responses to a medical emergency (i.e.,

epileptic seizure). Though research on bystander intervention has expanded to several areas in violence prevention, including bullying (Cappadocia, Pepler, Cummings, & Craig, 2012; Thornberg, Tenenbaum, Varjas, Meyers, Jungert, & Vanegas, 2012), campus sexual assault (Banyard, Monihan, & Crossman, 2009; Coker et al., 2011; Salazar, Vivolo-Kantor, Hardin, & Berkowitz, 2014), and intimate partner violence (Wee, Todd, Oshiro, Greene, & Frye, 2016), few studies (Christy & Voigt, 1994; Hoefnagels, 1994; Van Burik & Geldorp, 1997) have theoretically applied bystander intervention to child abuse prevention. Christy and Voigt (1994) were among the first to apply this theoretical framework by studying bystander responses to public episodes of child abuse; however, because the majority of children are abused at home and by someone known to them, findings from the study have limited practical application.

The scant research on bystander intervention in child abuse prevention is problematic for a few reasons. First, sources that report bystanders' inaction are primarily limited to media coverage in high profile child sexual abuse scandals (Petri, 2011; Powers, 2013). Second, most children are killed by a family member or someone known to them; thus, it is important to understand whether other adults in the immediate environment in which children live are bystanders in cases of fatal abuse. Due to the paucity of research in this area, possible explanations for bystander inaction in CM can be drawn from research that examines the presence of a stepfather as a risk factor.

Alexandre et al. (2010) examined associated risk of child physical abuse in the presence of a stepfather. The researchers posited that a mother's abuse of her child may be used as a tactic to dissuade the stepfather from causing additional or fatal harm to the child. They suggested that the mother may become a perpetrator of physical abuse of her child in her natural urge to protect the child (Alexandre et al., 2010). In other research, Obenson and England (2015) examined the mothers' role in 14 CM-related homicide cases in which the child was killed by the mother's male companion.

Seven of the mothers were charged as an accomplice for not intervening on the child's behalf, because they were aware of the ongoing abuse. Borrowing from literature on battered women, Obenson and England (2015) suggested that the mother may have failed to intervene because of low self-esteem, a desire to keep the family unit intact, a personal history of abuse, feeling responsible for keeping the relationship intact, and feeling pressure from society to be in a relationship. Margolin (1992) evaluated the overrepresentation of child abuse committed by mothers' boyfriends and offered two possible reasons for this behavior. First, the boyfriend and the mother may agree that the boyfriend will assume responsibility for disciplining the child, and the discipline escalates to a level that is deemed abusive. Second, the boyfriend may become violent towards the child as a way of "protecting" the mother. For example, the boyfriend may perceive the child as "taking advantage" of or "mouthing off" at the mother; hence, he may feel responsible for protecting her against the child's "perceived" misbehavior. Although these are hypothesized reasons for why mothers' boyfriends may be overrepresented as perpetrators of abuse, the mother is a bystander, as she is often aware of the abuse and does nothing about it. This would also likely hold true in the case of CM-related homicide.

Perpetrator Characteristics and CM-Related Homicide

Prior studies have linked certain perpetrator characteristics (e.g., alcohol and drug abuse, mental illness, victim-perpetrator relationship) to increased risk of CM-related homicides (Lucas et al., 2002; Malvaso, Delfabbro, Proeve, & Nobes, 2015; Schnitzer & Ewigman, 2005; Turner, Finkelhor, Hamby, & Shattuck, 2013; Yampolskaya, Greenbaum, & Berson, 2009). Families presenting a multitude of these perpetrator risk factors are at an increased risk of committing CM-related homicide. In the section that follows, literature on perpetrator characteristics are presented.

Alcohol and substance abuse. Studies that have focused on perpetrator characteristics as predictors of CM-related homicide, have identified alcohol and drug abuse as predictors of risk

associated with CM, and more specifically, CM-related homicide (Flynn, Shaw, & Abel, 2013; Lucas et al., 2002; USDHHS, 2018). According to the National Child Abuse and Neglect Data System, in 2016, 5.7% of CM-related homicides were linked to caregiver alcohol abuse in 27 states, while 15.1% of CM-related homicides were associated with caregiver drug abuse in 31 states (USDHHS, 2018). Douglas (2013) surveyed 135 CPS caseworkers whose caseloads included a CM-related homicide victim and found that drug and alcohol use problems were indicated in 36% and 24% of the parents of the child victims, respectfully. A study by Lucas et al. (2002) found previous alcohol use was reported by 32% of perpetrators who committed CM-related homicide. Similarly, Yampolskaya, Greenbaum, and Berson (2009) examined the characteristics of 196 perpetrators of CM and found that perpetrators with a history of substance abuse were two times more likely to commit CM-related homicide compared to those without a history of substance abuse. Analysis of perpetrator alcohol and substance abuse will serve useful in increasing awareness and knowledge of perpetrator characteristics that elevate risk of CM-related homicide.

Mental illness. Perpetrator mental illness has been implicated in CM-related homicides, but the association between these two factors is not well understood due to the limited information about the perpetrator's diagnosis of mental illness and small sample sizes (McKee & Shea, 1998). Of studies that have examined this issue, findings have consistently indicated that perpetrator mental illness is a distinctive feature in CM-related homicide; however, perpetrator characteristics (e.g., gender) may influence the relationship between mental illness and CM-related homicide (Adinkrah, 2001; Bourget & Gagné, 2002; Bourget & Gagné, 2005; Flynn, Shaw, & Abel, 2007; Flynn, Shaw, & Abel, 2013; Krischer et al., 2007; Resnick, 1969). For example, Flynn, Shaw, and Abel (2013) examined mental illness in perpetrators of filicide in England and Wales (N = 297) and found the prevalence of mental illness in this sample to be as high as 40%, with the most common diagnoses being affective and

personality disorders. Additionally, the presence of a mental illness was more common in maternal versus paternal perpetrators, and mothers were more likely to exhibit symptoms of mental illness at the time of the fatal event (Flynn, Shaw, & Abel, 2013). Further, when compared to stepfathers, biological fathers were more likely to have a diagnosis of a mental illness at the time of the fatal injury (Flynn, Shaw, & Abel, 2013). Similarly, in a review of 77 paternal filicide cases, Bourget and Gagné (2005) found evidence of severe psychopathology (e.g., major depressive disorder, schizophrenia) in 60% of the father perpetrators, with nearly one-third in a psychotic state when they inflicted the fatal injury onto the child. In a similar study on maternal filicide, Bourget and Gagné (2002) noted the presence of a mental illness was established in 22 (81%) maternal perpetrators. Douglas (2013) surveyed 135 CPS caseworkers whose caseloads included a CM-related homicide victim and found that 56% of the parents of the child victims suffered from a mental illness. Flynn and colleagues (2007) found that of the 112 perpetrators convicted of infanticide in England and Wales, 24% had symptoms of mental illness at the time of the offense, 34% had a lifetime history of mental illness, and 14% had been treated for their mental illness. Likewise, in a study of families in the U.S. Air Force, Lucas et al. (2002) found that perpetrators of CM-related homicides of young and older children had more frequent contacts with mental health workers than perpetrators of infanticide (i.e., killing of child less than 1 year of age). Understanding the association between CM-related homicide and mental illness is important for prevention efforts, as perpetrators may or may not come to the attention of mental health providers prior to the fatal event. Thus, depending on mental health treatment status and other risk factors (e.g., intimate partner violence, substance abuse), CM-related homicide prevention strategies may differ for potential perpetrators.

Quality and affordable child care. Research has identified decreased child care burden, which is defined as having adequate resources for quality and affordable child care (Coulton, Korbin,

Su, & Chow, 1995; Fortson, Klevens, Merrick, Gilbert, & Alexander, 2016; Klevens, Barnett, Florence, & Moore, 2015; Watamura, Phillips, Morrissey, McCartney, & Bub, 2011), as one pathway to CM-related homicide prevention. For example, using Census tract level data, Klein (2011) explored the relationship between child care and neighborhood rates of child maltreatment and found that neighborhoods that had more licensed child care spaces relative to child care need, had lower rates of early CM referrals, whereas those with fewer child care spaces relative to need had more CM referrals. Similarly, in a trend analysis of state policies that reduce child physical abuse and neglect, Klevens and colleagues (2015) found that states that met the demands for child care assistance had lower rates of child abuse and neglect. Moreover, Michalopoulos, Lundquist, and Castells (2010) examined the impact of child care subsidies on moderate-income families in Cook County, Illinois and found that families who used child care subsidies reported greater satisfaction with child care, more stable care, fewer problems at work related to child care, reduced parental stress, and increased feelings of well-being. In other research, Ha, Collins, and Martino (2015) examined the association between child care burden and risk of CM among low-income working families and found that mothers who reported unstable child care were more likely to commit physical and psychological child abuse. Child care burden may lead to CM-related homicide when parents utilize an ill-equipped partner (e.g., stepparent, mother's boyfriend) for child care due to lack of dependable, affordable, and quality services (Douglas & Mohn, 2014; Ettaro, Berger, & Songer, 2004; Marion County Children Services, 2011).

Victim-perpetrator relationship. When perpetrator characteristics are considered as an index for risk of CM-related homicide, the victim-perpetrator relationship remains the single most important risk factor for CM in general, and more specifically, CM-related homicide (Daly & Wilson, 1980; Daly & Wilson, 1985; Weekes-Shackelford & Shackelford, 2004). In a systematic review of perpetrators of CM-related homicides, Stöckl and colleagues (2017) examined data from 44 countries and found that

58% of CM-related homicides were committed by parents, confirming that children face the highest risk of CM-related homicide by parents or someone in a caregiving role (Stöckl et al., 2017). The categories of victim-perpetrator relationships described below are not exhaustive of all victim-perpetrator relationships, but, instead account for the greater share of perpetrators implicated in CM-related homicides. In the section below, some motives and reasons for the elevated risk are provided, as risk relates to mothers, fathers, and nonrelated caregivers.

Mothers. Of the 1,750 reported CM-related homicides in 2016, mothers were involved in 59.4% of the cases, either acting alone, with a nonparent, with the father, or with the father and other nonparent. Research on CM-related homicides suggests that the characteristics of the homicides committed by mothers are different from those committed by fathers and other male perpetrators (Bourget, Grace, & Whitehurst, 2007; Liem & Koenraadt, 2008; Putkonen, et al., 2011). For example, several studies have found that mothers, who are the primary perpetrators of neonaticide, which is the killing of a neonate within the first 24 hours of life, tend to be motivated by the shame, concealment, and stigma associated with the illegitimate birth of the child (Ciana & Fontanesi, 2012; Friedman & Resnick, 2009; Tanaka et al., 2017). Friedman, Cavney, and Resnick (2012) developed a profile of mothers who commit neonaticide. They determined that these perpetrators are usually not suffering from psychopathology; instead, the child is often unwanted and there are limited resources available to care for the child. Maternal infanticide, which is the killing of a child before age 1, is distinct from neonaticide in that many cases of infanticide are noted to occur as an end result of ongoing abuse (Brookman & Nolan, 2006). Additionally, maternal infanticide tends to be characterized by motives of revenge, psychosis, and perceived humane acts of rescue and altruism (Friedman, Holden, Hrouda, & Resnick, 2008; Harris, Hilton, Rice, & Eke, 2007; Resnick, 2016), and the lethal methods used in the child's death are most often beating, asphyxiation, strangulation, or drowning (Resnick, 2016).

Results from prior research suggest that genetically related mothers pose a great risk to infants and newborns; research also highlights the importance of identifying and addressing maternal characteristics that elevate risk of CM-related homicides (Brookman & Nolan, 2006; Friedman & Resnick, 2009). As children age, perpetrator motives and methods for CM-related homicide often change. For example, mothers who kill older children (e.g., children older than 1 year of age) are often diagnosed with mental illness and psychopathology is implicated, which further highlights the importance of identifying and addressing factors, including mental health issues, that may increase the risk of child deaths (Adinkrah, 2001; Bourget & Gagne, 2002; Krischer et al., 2007; Logan, Walsh, Patel, & Hall, 2013; McKee & Egan, 2013).

Fathers. Biological fathers are the most common male perpetrators of CM-related homicide (Lucas et al., 2002; Schnitzer & Ewigman, 2005; Starling, Sirotnak, Heisler, & Barnes-Eley, 2007). In a study conducted by Lee and Lathrop (2010), of 45 child deaths, the biological father of the decedent was implicated in 36% of the deaths, which was more than any other parental figure. Similarly, Kajese and colleagues (2011) reviewed 170 CM-related homicide cases from 1994-2007 and found that the victim's biological father was the most common perpetrator (26.6%), followed by the mother (24.9%), and the mother's male paramour (19.8%). Fathers who kill their own children tend to be older (Bourget, Grace, & Whitehurst, 2007; Lucas et al., 2002), kill older children (Bourget & Gagne, 2005; Debowska, Boduszek, & Dhingra, 2015; Kunz & Bahr, 1996), have a history of family violence (Holland, Brown, Hall, & Logan, 2015; McGowan et al., 2006), and commit familicide (i.e., killing of multiple family members; Liem & Koenraadt, 2008). Additionally, when fathers kill their own offspring, these deaths tend to be motivated by revenge (Liem & Koenraadt, 2008; Wilczynski, 1997) and marital disharmony (Adinkrah, 2003; Bourget & Gagne, 2005; Harris, Hilton, Rice, & Eke, 2007; Kajese et al., 2011; Putkonen, et al., 2011). Sillito and Salari (2011) found homicide-suicide as a

distinctive feature associated with paternal CM-related homicides, suggesting that fathers who kill their children are more likely to kill themselves when compared to other types of perpetrators. In this context, suicidal ideation may be viewed as a risk factor for CM-related homicide. Other studies have yielded results similar to those of Sillito and Salari (e.g., Bourget et al., 2007; Debowska, Boduszek, & Dhingra, 2015; Hatters-Friedman, et al., 2005).

Nonrelated caregivers. Research has suggested that the presence of a non-related adult in the home is the strongest predictor of child abuse and CM-related homicide (Daly & Wilson, 1994; Harris et al., 2007; Lightcap, Kurland, & Burgess, 1982; Sariola & Uutela, 1992; Schnitzer & Ewigman, 2005; Stiffman, Schnitzer, Adam, Kruse, & Ewigman, 2002; Weekes-Shackelford & Shackelford, 2004; Yampolskaya, Greenbaum, & Berson, 2009). Children residing in households with a stepparent or non-biologically related adult are disproportionately at risk for fatal abuse (Daly & Wilson, 1980; Daly & Wilson, 1994; McRee, 2008; Schnitzer & Ewigman, 2005; Stiffman, Schnitzer, Adam, Kruse, & Ewigman, 2002; Weekes-Shackelford & Shackelford, 2004).

According to the U.S. Census Bureau, in 2010, there were approximately 2.8 million households comprising 4.3 million stepchildren under the age of 18, which translates into a considerable number of children living in households that include stepparents. The usage of the term stepparent has evolved from its traditional meaning and has grown more inclusive, describing both formal (married) and informal (unmarried) parental relationships (U.S. Census Bureau, 2018). As a consequence, when reviewing the literature, many terms, including *stepparent, mother's male companion, stepfather, stepmother, paramour, father figure, non-genetically related male, substitute father, social father, mother's male companion, non-biologically related father*, and *father surrogate,* were all used to describe the victim-perpetrator relationship. For simplicity, when describing findings from existing literature, the terminology used within that particular study is used, with the

understanding that the variation in nomenclature is used to reflect the type of relationship between children and their non-genetically related, co-resident caregiver, and has no bearing on marital status.

To examine whether victim-perpetrator relationship is a predictor of CM-related homicides, Daly and Wilson (1988) assessed father and stepfather victim-perpetrator relationship as a risk factor and found that fatal child abuse by stepfathers was up to 100 times higher than by genetically related fathers. In another study by Daly and Wilson (1994), preschoolers residing with one biological parent and a stepparent were 60 times more likely to experience child abuse when compared to children living with both biological parents, independent of maternal age at birth, family size, and poverty. Schnitzer and Ewigman (2005) conducted a study that yielded similar differences in risk of fatal child abuse and victim-perpetrator relationship when they reviewed 149 child deaths and found that children living in a household with a non-genetically related adult were 50 times more likely to die of inflicted injuries than children residing with two biologically related parents. More than 80% of the child victims in the study lived with their mother and her boyfriend, with the boyfriend being the perpetrator in 74% of the cases.

Stiffman, Schnitzer, Adam, Kruse, and Ewigman (2002) found that children residing with at least one biological parent and one or more unrelated adult (e.g., mother's boyfriend, paramour) were eight times more likely to experience CM-related homicide when compared to non-maltreated children living with both biological parents. Further, in a longitudinal sample of at-risk children, Radhakrishna, Bou-Saada, Hunter, Catellier, and Kotch (2001) assessed the presence of a stepfather as a risk factor for CM and found that children who had a father surrogate present in the home were twice as likely to be reported for CM when compared to children residing in households with both biological parents. More recently, Alexandre et al. (2010) examined the risk of child physical abuse associated with the presence of a stepfather and found that 34% of children with a stepfather in the home experienced

abuse compared to 18% of children living with genetically related fathers. In other research, Obenson and England (2015) examined the time it takes, after first contact, for a non-biologically related adult male to kill his partner's child in CM-related homicide cases (n =15). Time intervals ranged from 14 to 240 days, with 75 days as the median. Eighty percent of child victims were killed within 90 days of initial contact with the perpetrator, and the majority died from blunt force trauma.

Some research has attributed the overrepresentation of CM in stepfamilies to the multitude of risk factors (e.g., perpetrator criminal history) associated with stepfamilies, suggesting that no single risk factor (e.g., genetic relatedness), by itself, can explain the increased relative risk for CM in stepfamilies (Termin et al, 2011; Turner, Finkelhor, Hamby, & Shattuck, 2013; Turner, Finkelhor, & Ormrod 2007). For instance, Margolin (1992) identified five conditions that explained differential risk: the geographical location of child care in single-parent homes, perpetrators' gender, step-relationship, mothers' boyfriends' self-perceptions of illegitimacy as caregivers, and mothers' boyfriends' competition with his stepchildren. Additionally, Termin et al. (2011) found that the risk of perpetrating CM-related homicide was higher among families whose family structure consisted of one biological parent and a stepparent when compared to families with two biological parents living in the household; however, these differences emerged reportedly due to differences in the two groups on other factors, such as previous criminality and perpetrator personality characteristics. Malvaso, Delfabbro, Proeve, and Nobes (2015) identified various contextual factors that elevate risk of CM in stepfamilies and found that stepfamilies experience lower socioeconomic status and more child conduct problems, more maternal alcohol use, and housing instability; thus, the constellation of these risk factors were said to have contributed to the greater risk of child injury. Lastly, Turner, Finkelhor, and Ormrod (2007) found that the overrepresentation of victimization in stepfamilies was linked to

family problems, which was a composite measure used to assess parental imprisonment, parental employment, parental drug and alcohol problems, and parental arguing.

Not all step-relationships are violent; thus, there have been several reasons posed to explain the relationship between the presence of a stepparent and elevated rates of CM-related homicide. A search for an ecological or biological basis for these risk differences is found in various theoretical perspectives. In this study, the main two are highlighted: 1) ecological theoretical perspective and 2) evolutionary theoretical perspective.

Ecological theoretical perspective. Bronfenbrenner (1979) put forth the seminal ecological model that has been adapted to understand context of risks associated with CM. The theoretical underpinnings of the ecological model suggest that CM does not occur in isolation of other factors and are therefore not solely biologically based, but risk of CM is constructed on a confluence of socioecological factors and is more prevalent among families facing a multitude of these factors (Belsky, 1980; Cicchetti & Carlson, 1989; Dahlberg & Krug, 2002; Wolfe, 1985). When the ecological model is applied to CM, risk factors may exist at the level of the individual parent (e.g., depression, substance abuse, poverty, single parenthood, low education, parental attitudes towards parental discipline), the family (e.g., child behavior management struggles, intimate partner violence, social isolation, family instability), and the neighborhood (e.g., high exposure to violence, high unemployment rates). As such, the ecological framework has provided opportunities for researchers to consider multiple factors of risk.

Evolutionary theoretical perspective. The most widely adopted model used to explain the patterned variation of violence found in stepfamilies is the evolutionary theoretical framework (Daly & Wilson, 1989; Daly & Wilson, 1996; Friedman, Cavney, & Resnick, 2012; Hilton, Harris, & Rice, 2014; Lightcap, Kurland, & Burgess, 1982; O'Connor & Boag, 2010). When applied to CM in

general, and more specifically, CM-related homicides, it is posited that parental investment (Fisher, 1930) and discriminative parental solicitude (i.e., care and concern for a child who is genetically related) are shaped by fathers' evolutionary interest in passing on their genes (Daly & Wilson, 1994/1995). From an evolutionary perspective, a father's solicitude and investment in a child are a function of his genetic relatedness to the child. Thus, a father weighs his investment decisions carefully because to invest limited resources in an unrelated child, he risks depriving care to biological offspring, who can pass on his genes (Daly & Wilson, 1999). Daly and Wilson (2005) described the differential risk for maltreatment of stepchildren versus biological children as the "Cinderella Effect". In their seminal work on this phenomenon, they provide evidence to suggest that there is discriminative parental solicitude against stepchildren relative to how children who are genetically related are treated.

There is an extensive research base linking fathers' parental investment and discriminative parental solicitude to paternity uncertainty or abuse in stepchildren (Daly & Wilson, 1980; Daly & Wilson, 1995; Hilton, Harris, & Rice, 2015), as parental investment and discriminative parental solicitude have been identified as indicators of risk for child abuse (Daly and Wilson, 1988). Apicella and Marlowe (2004) found that men who perceived their children as having greater resemblance to themselves reported greater investment in their children. Males who have high levels of investment, in turn, are more likely to have positive interactions in the father/child relationship, consequently lowering risk of CM-related homicide. In other research, Alvergne, Faurie, and Raymond (2009) examined the relationship between father-child facial and odor similarities and paternal investment and its effects on child health. Alvergne et al. (2009) found that paternal investment was also linked to the child's nutritional condition, such that children who received greater paternal investment had better health. Theoretically, then, it can be posited that stepfathers, who are certain of their lack of paternity

to their stepchildren and bear no resemblance to them, have no evolutionary reason to care for stepchildren, and thus are less likely to invest in the children. This discrimination consequently increases the stepchild's risk of being mistreated or dying from fatal child abuse (Daly & Wilson, 1980).

Methods of Lethality and Associations with Perpetrator Type in CM-Related Homicide

The evolutionary perspective has been used to explain the variability in methods by which stepparents versus genetically related parents kill a child. For example, using a national sample of child homicides that occurred between 1974-1990 in Canada, Daly and Wilson (1994) examined the ways in which stepfathers and biological fathers kill their children and found that stepfathers tended to use more violent methods (e.g., bludgeoning and beating), whereas biological fathers were more inclined to use relatively quick and painless methods (e.g., shooting, asphyxiation). One limitation of the Daly and Wilson 1994 study is that the researchers only examined death rates and methods used by victim-perpetrator relationship and failed to include any contextual factors, such as family characteristics and perpetrator risk factors. Similarly, using data from the Federal Bureau of Investigation, Supplemental Homicide Reports, Weekes-Shackelford and Shackelford (2004) found that in U.S. children 5-years-old and younger, stepparents killed children at an annual rate of 51.2 per 1,000,000 children, and motives included rage, anger, and bitterness. Genetically related parents, on the other hand, killed offspring at an annual rate of 15.6 per 1,000,000 children, and these deaths were motivated by feelings of sorrow and perceptions of "rescuing the child". When these rates are assessed based on perpetrators' gender, stepfathers killed children at 60.0 per 1,000,000 children compared to a rate of 7.0 per 1,000,000 children for biological fathers. Likewise, stepmothers killed at a rate of 20.6 per 1,000,000 children compared to 8.6 per 1,000,000 children for biological mothers.

Results from the research of Daly and Wilson (1994) and Weekes-Shackelford and Shackelford (2004) suggest that the methods used by perpetrators to kill a child are a function of the degree of genetic relatedness, and the variability in the level of violence used to inflict a fatal injury may suggest an evolutionary connectedness that biological fathers share with their children that is absent in non-biological victim-perpetrator relationships. While there are differences in how parents kill children, these differences cannot be explained only by genetic relatedness, as CM-related homicide does not occur in a vacuum and is therefore not solely a function of the perpetrator's degree of genetic relatedness to the child; rather, a myriad of risk factors (e.g., victim-perpetrator relationship, perpetrator, family, and child-related characteristics) likely influence parental methods used to kill children.

Purpose of the Current Study

There is limited research examining the association between victim-perpetrator relationship and methods used to kill a child. This appears to be one of the first studies to assess the association between victim-perpetrator relationship and methods used in fatal CM, in the context of child, family, and perpetrator characteristics. The few studies that have examined the association between victim-perpetrator relationship and methods used to kill a child relied on limited data (Daly & Wilson, 1994; Weekes-Shackelford & Shackelford, 2004). Further, in prior studies, much of the statistical evidence used to explain the variability found in the perpetrators' methods of assault has been limited to rates (Daly & Wilson, 1994; Weekes-Shackelford & Shackelford, 2004).

To address the gaps found in most surveillance systems, the CDC, through the National Violent Death Reporting System (NVDRS), has improved surveillance on CM-related homicides by linking multiple data sources, including coroner/medical examiner reports, law enforcement reports, and death certificate data. The integration of these multiple data sources provides comprehensive information on

precipitating circumstances of CM-related homicides, with respect to child decedent, perpetrator, and family characteristics. As such, an area worth additional research is the association between victim-perpetrator relationship and methods used to kill a child, in the context of child, family, and perpetrator characteristics. This is an exploratory study designed to better understand these associations at a macro level. Further, the present study attempts to address the limitations found in prior literature by examining data from death certificates (DC), law enforcement reports (LE), and coroner/medical examiner reports (C/ME), thereby allowing for the description of child, family, and perpetrator characteristics associated with methods of lethal assault used in CM-related homicides. In addition, by using integrated data, this study aims to identify risk factors that may be used to inform decision-making during CPS intake, assessment, and case-management.

The current study addresses the following research question: What is the association between victim-perpetrator relationship and methods of lethality used in CM-related homicide? The test of association will be expanded to include a multivariate analysis of victim-perpetrator relationship and methods used to kill a child and characteristics of the child, family, and perpetrator. It is hypothesized that there will be a statistically significant relationship between victim-perpetrator relationship and method of lethality used in CM-related homicides.

Chapter 2: Methods

Data Sources

Data for this research study are drawn from the NVDRS, which is an active, state-based surveillance system that uses a CDC web-based platform to link data from DC, LE reports, and C/ME records including toxicology. NVDRS was created in 2002 in response to the Institute of Medicine's recommendation that the federal government develop a national surveillance system to capture data on violent deaths. A violent death is defined as a death that results from intentional use of force or power, threatened or actual, against oneself, another person, or a group or community (Krug, Dahlberg, Mercy, Zwi, & Lozano, 2002). The first appropriation from Congress for NVDRS occurred in 2002, and in 2003, data collection for NVDRS began in six states. Today, NVDRS contains data on homicides, suicides, unintentional firearm deaths, deaths of undetermined intent, and deaths by legal intervention in 40 States, the District of Columbia, and Puerto Rico. States that participate in NVDRS generally use the death certificate to identify violent deaths by means of the World Health Organization's International Classification of Diseases, Tenth Revision (ICD-10) codes. Death certificates indicate both an underlying cause of death and a manner of death, for which the medical examiner or coroner is primarily responsible for certifying, whereas risk factors, family characteristics, and precipitating circumstances emerge from LE reports and C/ME records.

The public health value of NVDRS is that it integrates data from multiple sources, including the DC, LE reports, and C/ME records, as well as other supplemental data sources (e.g., Child Fatality Review reports, hospital records), into one incident in an effort to capture information related to violent deaths. Furthermore, each incident includes two narratives: one based on information from the C/ME records and one based on information from the LE report, both of which provide a written account of connected events, circumstances, family characteristics, and details surrounding the fatal

event. If supplemental data sources are included, the information is incorporated into the LE narrative. The C/ME and LE narratives are essential in coding some of the circumstances, precipitators, and family characteristics that place children at risk of CM-related homicide. Together, these sources of data provide important information on victim-perpetrator relationship, weapon(s) used, circumstances of the violence that produced the fatal injury, and precipitators that initiated the chain of events leading directly to or significantly contributing to the violent death.

Data Collection

Although CDC maintains NVDRS on a web-based platform, NVDRS is managed and implemented by states via their state health department or a bona fide agent (e.g., academic institution, Office of the Chief Medical Examiner), and data are collected and entered into NVDRS by a state-specific data abstractor. NVDRS collects data on more than 600 data elements, including demographic data for both the victim and perpetrator, method of lethality, etc. To ensure standardization of data collection and coding of these variables, CDC provides training, case definitions, and guidance on how to collect and code all required data elements via a NVDRS Coding Manual, NVDRS Implementation Manual, and various other training modalities. Finally, before NVDRS data are made available for public use, CDC's data quality team, in collaboration with state data abstractors, validate the quality of the data and its' compliance with CDC guidelines, using a data validation process, which involves error checks for logical inconsistencies in the data and missing data in key fields.

Procedures

This study specifically focuses on CM-related homicide, which is defined as the death of a child, ages 0-17 years old, caused by intentional or unintentional injury resulting from abuse or neglect or where abuse or neglect was a contributing factor (Leeb, et al., 2008) and manner of death assigned by the medical examiner/coroner was homicide. According to the CDC (2003), a homicide "occurs

when death results from... [an injury or poisoning or from] ...a volitional act committed by another person to cause fear, harm, or death. Intent to cause death is a common element but is not required for classification as homicide". Therefore, since the act of homicide is volitional, understanding circumstances and characteristics of these types of deaths can help inform primary prevention efforts, prevent child death, and ensure safe, stable, nurturing relationships and environments for all children.

Cases. Using initial search criteria for age, manner of death, and year of death, all cases involving a child ranging in age from 0-17-years-old, where manner of death was homicide, and the death occurred in 2012-2015 were extracted from NVDRS. This broad search criteria yielded 2,099 cases. Due to the fact that different variables were added to NVDRS at various times, for this study, data for data years 2012-2015 were examined because this is the timeframe for when variables related to CM are stable and were consistently collected. After identifying cases, three independent raters reviewed the C/ME and LE narratives to determine whether the circumstances of the violent death met the case definition for inclusion in the study. Cases that were missing both a C/ME and LE narrative were excluded from the study, as the narratives were used to determine whether the case definition was met. Conversely, cases with either or both C/ME and/or LE narratives were included if the case definition was met. To ensure consistency among the three raters, each rater independently coded each case using the case definition and then coders met to review each case and discuss discrepancies. Inter-rater reliability was achieved by evaluating the percentage of cases that were agreed upon by all three raters. For this study, 100% inter-rater reliability was achieved, as all three raters agreed on cases for inclusion when applying case inclusion criteria. A total of 1103 cases met the inclusion criteria for the present study. Of the 1103 cases, 103 were excluded due to missing victim-perpetrator relationship or method of lethality, and four cases were excluded because both biological parents were identified as perpetrators. Thus, the final sample size was 996 cases. Data were drawn from 32 U.S. states,

including Alaska, Arizona, Colorado, Connecticut, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, New York, North Carolina, New Hampshire, New Jersey, New Mexico, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Utah, Vermont, Virginia, Washington, and Wisconsin. Data are not available for all 32 states for all data years (2012-2015); Appendix A provides a map that depicts data availability for each of the aforementioned states.

Content Analysis

Many of the risk factors, circumstances, and child and perpetrator characteristics of interest in this study are not quantitatively captured in NVDRS but rather emerge from the narratives of C/ME and LE reports; thus, a content analysis was conducted. A content analysis is a research technique used to systematically code textual material into categorical data using a priori operational definitions for each coded variable (Rosengren, 1981). To begin the content analysis, the existing literature was reviewed to identify variables of interest. This list was then used to develop a coding manual that included operational definitions of the variables that was subsequently used to guide coding. As additional patterns, themes, and risk factors emerged from C/ME and LE narratives, new variables (and operational definitions of the variables) were added to the coding manual. After the coding manual was complete, each rater used it to independently code the LE and C/ME narratives for all cases. The presence of a variable in the narratives was coded as 1 = *Yes*; if the narratives did not include information on the variable of interest, it was coded as 0 = *No*. Once each rater independently coded cases for each of the identified variables, the three raters convened to discuss all cases and coded variables. Perfect (100%) agreement was reached for all variables. Moreover, raters relied solely on content within the LE and C/ME narratives and did not make any assumptions about circumstances beyond those indicated in the narratives.

Measures

A number of variables were included in this study to evaluate child, perpetrator, and family characteristics. As noted previously, an initial list of variables was identified based on a review of the literature. As the coding of the LE and C/ME narratives continued, new variables, along with their operational definitions, were added. The section that follows includes a list of all the variables coded for analyses.

Primary outcome. *Method of lethality*, which is the primary outcome measure, refers to the method of lethal assault used by the perpetrator to kill the child. Because medical examiners and coroners vary significantly in nomenclature they use in listing the same underlying cause of death (method of lethality) on the death certificate, five broad categories for method of lethality were created: AHT, gunshot wound, asphyxiation, beating/bludgeoning, and "other" (i.e., nonspecific physical injury, neglect, stabbing, drowning, and drug poisoning). Deaths due to nonspecific physical injury, neglect, stabbing, drowning, and drug poisoning were collapsed into the "other" category due to their low rate of occurrence.

Child-related characteristics. Child characteristics, including *victim's age* (in years, months, weeks, days, and hours), *victim's race,* and *victim's sex* were assessed. *Child's crying behavior* was also included as a child characteristic and is defined as a situation whereby a perpetrator inflicted the fatal injury onto the child because the child was crying (1 = *Yes,* 0 = *No).* *History of abuse* was coded as yes if the child decedent had a history of abuse (e.g., physical, sexual, or psychological) or neglect (physical, including medical/dental, emotional, or educational neglect; or exposure to violent environments or inadequate supervision) prior to the fatal injury. *Previous nonfatal injury* was coded as yes when the child decedent had signs of nonfatal injury(ies) as evidenced by anatomical evidence of old or healing injuries (e.g., hospital examination, coroner or medical examiner record).

Family characteristics. *Intimate partner violence* was coded as yes when the child's death was related to immediate or ongoing violence between the parents and/or a current or former intimate partner. This included all child deaths where the child's parent was killed by her/his current or former intimate partner. *Parental relationship conflict* was coded as yes when the perpetrator was described as having relationship issues with another adult (e.g., wife, girlfriend, ex-girlfriend, ex-wife, husband, ex-husband, and boyfriend) at the time of the fatal event. *Argument* was defined as a verbal altercation or conflict between the perpetrator and the child victim or another adult that preceded the fatal event and is believed to have led to the child's death (1 = *Yes,* 0 = *No).* *Family involvement with child protective services* was coded as yes when the family of the child decedent had an open child abuse or neglect case with CPS at the time of the child's death or the family of the child decedent had a closed case with CPS related to child abuse or neglect of the decedent and/or sibling(s) of decedent. *Bystander effect* was coded as yes when a family member or other adult either witnessed the decedent being abused/neglected by the perpetrator in the past or were at least aware of abuse and failed to intervene, or an adult (e.g., spouse, nonparent) either participated in the maltreatment of the child victim, failed to protect the child from maltreatment or encouraged the maltreatment, or was also charged as a suspect.

Perpetrator characteristics. Several demographic characteristics of the perpetrator, including *perpetrator age* (in years), *perpetrator's race/ethnicity*, and *sex of perpetrator*, were used in assessing risk. *Homicide-suicide*, another of the perpetrator characteristics assessed, was coded as yes when the fatal injury of the child victim preceded or occurred at the same time the perpetrator killed him/herself. *Mentally ill* was coded as yes when the perpetrator's behavior toward the child victim was believed to be a direct result of a mental illness, or the perpetrator had a suspected mental illness or a mood disorder at the time of the fatal event. *Drugs and/or alcohol* were coded as yes when drugs and/or

alcohol were used by the perpetrator even if the incident was not directly related to substance use or substance use was incidental. *Work* was coded as yes when the perpetrator was tasked with supervision of the child victim while the primary parent (e.g., mother) was at work, and the fatal injury occurred during this time of supervision.

Primary predictor. NVDRS captures the primary relationship of the child victim to the perpetrator using 11 categories (i.e., father, mother, mother's boyfriend, father's girlfriend, stepparent, grandparent, babysitter, uncle/aunt, foster or adoptive parent, family friend, and unknown). For ease of interpretation and due to relative infrequency of some relationships, *victim-perpetrator relationship* was collapsed into four broad categories: biological mother, biological father, mother's male companion, and "other" (i.e., stepmother, father's girlfriend, grandparent, babysitter, uncle/aunt, foster or adoptive parent, family friend). Stepfather and mother's male companion also were combined given the relative infrequency of the stepfather relationship in the dataset.

Statistical Analysis

All analyses were performed using SAS 9.4. In the study, descriptive, bivariate, and multivariate analyses were conducted. Each analytic step is described in detail below.

Descriptive analysis. A descriptive analysis was conducted, as an initial data analytic technique, to provide a description of family (e.g., intimate partner violence), child (e.g., age), and perpetrator (e.g., victim-perpetrator relationship) characteristics. In this step, data were summarized using frequency distributions (for categorical variables) and measures of central tendency (for continuous variables). Median was used as the measure of central tendency for continuous variables that were not normally distributed.

Bivariate analysis. To develop an optimal statistical model to quantify the association between method of lethality (primary outcome), victim-perpetrator relationship (primary predictor),

and other variables of interest as outlined previously, a bivariate analysis for each covariate and method of lethality, using $\alpha = 0.05$ as the level of statistical significance, was conducted. AHT is the leading cause of CM-related homicides in the U.S. (National Center on Shaken Baby Syndrome, 2018); thus, it was used as the reference method of lethality in this study. Similarly, biological fathers are the most common perpetrators of CM-related homicides; thus, they were used as the reference perpetrator. Categorical data were analyzed using logistic regression.

Multinomial logistic regression analysis. After examining results from the bivariate analysis, a series of multinomial logistic regression models were specified to examine the association between all predictors and the five outcome categories of method of lethality: AHT, gunshot wound, asphyxiation, beating/bludgeoning, and "other". Additionally, predictors that were included in the model taxonomy were those predictors known to be associated with CM-related homicide from previous studies and/or the predictors were statistically significant in the bivariate analysis. Furthermore, instead of entering all predictors into the model at once, several nested models with different predictors, based on theory and/or results from the bivariate analysis, were created. When comparing and contrasting results in the model taxonomy, Akaike Information Criterion (AIC) was used to select the final model, as a small AIC indicates better model fit (Kingdom & Prins, 2016).

Chapter 3: Results

Descriptive statistics for child, family, and perpetrator characteristics used in this study are presented in Table 1. Also, since victim-perpetrator relationship is the primary predictor, the distribution of child, family, and perpetrator characteristics by victim-perpetrator relationship are presented in Table 2, and results for all analyses are organized by child, family, and perpetrator characteristics. During data years 2012-2015, 996 children were victims of CM-related homicide. When examining the relationship of child victims to their perpetrators, biological father was the most common perpetrators (37.8%), followed by mother's male companion (26.8%), biological mother (21.8%), and "other" perpetrator (13.6%). Thus, over half (59.6%) of the perpetrators were biological parents. With regard to method of lethality used in CM-related homicides, 37.3% of the children were beaten/bludgeoned to death, 24.1% died by "other" means (i.e., nonspecific physical injury, neglect, stabbing, drowning, and drug poisoning), 16.2% died from firearm-related injuries, 11.7% sustained their fatal injuries from AHT, and 10.7% died from asphyxiation.

Child-related characteristics. The median age for child victims was 2-years-old (Interquartile Range: 4 years-0 years; range 10 minutes old to 17 years of age), with the majority of child victims being ≤ 5 years of age (79.6 %) and 32.9% younger than 1 year of age. In addition, the percentage of child victims was higher for boys (56.7%) than girls (43.3%), and most child victims were of three races or ethnicities—White, non-Hispanic (46.2%), African American, non-Hispanic (34.8%), and Hispanic (11.0%). Further, 18.0% of child victims had a previous non-fatal injury, 34.4% had a history of abuse, and 6.0% of the deaths were reportedly triggered by the child's crying behavior.

Family characteristics. Of the five family characteristics evaluated in this study, 19.8% of the CM-related homicides occurred in the context of immediate or ongoing violence between the parents

and/or a current or former intimate partner. Likewise, 15.6% of child deaths occurred in families with parental relationship conflict, 13.0% were precipitated by an argument between the perpetrator and another adult or the child victim, and 9.5% of the families were known by CPS. Lastly, in 16.8% of the child deaths, a family member or other adult was identified as a bystander, indicating that someone, in addition to the perpetrator, was either charged with, participated in, or witnessed the child decedent being abused and/or neglected by the perpetrator in the past or were at least aware of abuse and failed to intervene.

Perpetrator characteristics. When examining perpetrator characteristics, the majority of perpetrators were males (71.1%) and were serving in a caregiver role when they allegedly inflicted the fatal injury (68.9%). The median age of perpetrators was 28-years-old (Interquartile Range: 35-23; range 14-68 years of age), with 69.6% between 18-40-years-old. Additionally, 41.8% were White, non-Hispanic, 32.0% were African American, non-Hispanic, 6.3% were Hispanic, 1.4% were American Indian/Alaska Natives, non-Hispanic, 1.0% were Asian/Pacific Islander, non-Hispanic, 0.7% were two or more races, non-Hispanic, and the remaining 17.1% were either of Unknown Race, non-Hispanic or had missing values for race. Close to a fifth (17.4%) of CM-related homicides were characterized by the abuse of drugs/alcohol by the perpetrator. Perpetrator mental illness was included in LE and C/ME narratives in 11.7% of CM-related homicides, and 14.3% of the child victims died in homicide-suicide incidents, which means the fatal injury of the child victim preceded or occurred at the same time the perpetrator killed him/herself. More than half (63.0%) of children killed in homicide-suicide incidents in this study were killed by the biological father. Lastly, 11.6% of the perpetrators were tasked with supervising the child while the other caregiver was at work, and the fatal injury to the child occurred during this time of supervision.

Primary predictor. The bivariate analysis, predicting each method of lethality, with AHT as the reference method of lethality, is presented in Table 3. The odds of children being beaten/bludgeoned to death versus dying by AHT when the perpetrator was the mother's male companion was 4.06 times greater than when it is the biological father, 95% CI [2.41, 6.86]. Additionally, children killed by their biological mothers were 9.03 times greater odds of dying by "other" (i.e., nonspecific physical injury, neglect, stabbing, drowning, and drug poisoning) methods of lethality versus dying by AHT, 95% CI [4.22, 19.29] than those killed by biological fathers. Similarly, compared to biological fathers, mothers were at greater odds of killing children via beating/bludgeoning or asphyxiation rather than AHT, *OR* = 2.04, 95% CI [0.90, 4.64] and *OR* = 7.76, 95% CI [3.42, 17.61], respectively.

Child-related characteristics. With respect to child-related characteristics, victim sex and race were not significantly associated with the method of lethality (see Table 3). The child's crying behavior, on the other hand, was significantly associated with three of the four methods of lethality the perpetrator used to kill the child victim. Children who exhibited crying behavior compared to those who did not, were found to have an 86% decrease in the odds of dying by "other" method of lethality versus AHT, *OR* = 0.14, 95% CI [0.06, 0.31]. Similarly, the odds of a child who exhibited crying behavior being beaten/bludgeoned to death versus dying by AHT was 84% less than that of a child who did not exhibit crying behavior, *OR* = 0.16, 95% CI [0.08, 0.32]. The odds of children who exhibited crying behavior being asphyxiated to death versus dying by AHT was 62% less than that of children who did not exhibit crying behavior, *OR* = 0.38, 95% CI [0.17, 0.84].

Having a history of abuse was found to be related to a decrease in the odds of children dying by "other" means, being asphyxiated to death, and dying by gun violence compared to dying by AHT. From Table 3, the odds of a child dying by "other" methods of lethality versus AHT among children

who had a history of abuse was 43% less than that of children who did not have a history of abuse, *OR* = 0.57, 95% CI [0.36, 0.90]. Children with a history of abuse were at a 67% decrease in risk of being asphyxiated to death versus dying by AHT when compared to children with no history of abuse, *OR* = 0.33, 95% CI [0.18, 0.59]. Additionally, the odds of a child dying by gunshot wounds versus AHT among children who had a history of abuse was 0.06 times the odds among children who did not have a history of abuse, 95% CI [0.03, 0.14]. Likewise, a previous nonfatal injury was significantly associated with decreased odds of children dying by "other" methods of lethality (*OR* = 0.37, 95% CI [0.22, 0.63]) or being asphyxiated to death (*OR* = 0.21, 95% CI [0.09, 0.45]) compared to dying by AHT. Age was also found to have a statistically significant association with method of lethality. For every one year increase in age, the odds of a child dying by "other" methods of lethality versus AHT increased by 21%, *OR* = 1.21, 95% CI [1.10, 1.34]. And, the odds of a child being either killed by a firearm or being asphyxiated to death versus dying by AHT was found to increase with each additional year of age, *OR* = 1.55, 95% CI [1.40, 1.71] and *OR* = 1.18, 95% CI [1.06, 1.31], respectively.

Family characteristics. Family characteristics that may explain differences in methods of lethality used in CM-related homicides were also examined. With respect to the occurrence of intimate partner violence as a family characteristic, the odds of children dying from gunshot wounds versus AHT was estimated to be 31.70 times greater among children residing in homes with intimate partner violence compared to children not exposed to intimate partner violence in the home, 95% CI [13.12, 76.57]. Moreover, children residing in homes with intimate partner violence present were at greater risk of dying from "other" methods of lethality or asphyxiation versus dying by AHT than children with no intimate partner violence in the home, *OR* = 3.89, 95% CI [1.60, 9.44] and *OR* = 6.67, 95% CI [2.63, 16.87], respectively. A child residing in families with parental relationship conflict was found to have 88.67 times greater odds of dying by gun violence versus AHT compared to a child with no

parental relationship conflict present in the home, 95% CI [21.15, 371.77]. Further, children living in families with parental relationship conflict were found to have 18.04 times greater odds of being asphyxiated to death versus dying from injuries sustained from AHT than children with no parental relationship conflict, 95% CI [4.15, 78.38]. Similarly, when an argument between the perpetrator and another adult or the child victim preceded the fatal event, children were at greater odds of dying by either "other" methods of lethality, firearms, or asphyxiation versus AHT when compared to children whose deaths were not precipitated by an argument, *OR* = 5.75, 95% CI [1.33, 24.90], *OR* = 44.97, 95% CI [10.74, 188.32], and *OR* = 8.06, 95% CI [1.77, 36.61], respectively.

When assessing families known by CPS, the odds of a child being shot to death versus dying by AHT was 0.24 less the odds than those not known by CPS, *OR* = 0.24, 95% CI [0.76, 0.78]. Moreover, when a bystander was present, children had 3.41 times greater odds of being beaten/bludgeoned to death versus dying by AHT when compared to child deaths with no bystander, 95% CI [1.76, 6.62]. Children also were at greater odds of dying by "other" methods of lethality versus AHT (*OR* = 2.21, 95% CI [1.10, 4.46]) when there was a bystander present compared to child deaths with no bystander but at a decreased risk of being shot to death, *OR* = 0.18, 95% CI [0.05, 0.67].

Perpetrator characteristics. When perpetrator's age was examined as a predictor of method of lethality for CM-related homicides, the age of the perpetrator was significantly related to increased risk of death by "other" methods of lethality and firearm-related deaths relative to AHT. For each 1 year increase in a perpetrator's age, the odds of a child dying by "other" means or firearm versus dying by AHT increased, *OR* = 1.06, 95% CI [1.03, 1.10] and *OR* = 1.13, 95% CI [1.09, 1.17], respectively. In the bivariate analyses, the association between method of lethality and race and sex of the perpetrator were individually examined. Race was not significantly associated with any method of

lethality relative to AHT; however, females had 91% increase in odds of killing children using "other" methods of lethality versus death by AHT than male perpetrators, *OR* = 3.91, 95% CI [2.30, 6.64]. Additionally, the presence of perpetrator mental illness at the time of the child's death increased the likelihood of a child being killed by a firearm (*OR* = 8.61, 95% CI [3.30, 22.48]), being asphyxiated to death (*OR* = 4.29, 95% CI [1.52, 12.08]), or dying by "other" methods of lethality (*OR* = 3.29, 95% CI [1.25, 8.70]) versus dying by AHT-related injuries.

Perpetrators' use of drugs and/or alcohol was a statistically significant predictor for all methods of lethality used in CM-related homicides. As such, the odds of a child dying from gunshot wounds versus AHT was 5.94 times greater among children residing in homes characterized by perpetrators' use of drugs and/or alcohol compared to children with no perpetrators' use of drugs and/or alcohol in the home, 95% CI, [2.25, 15.72]. Also, children residing in homes characterized by perpetrators' use of drugs and/or alcohol were at greater odds of being beaten/bludgeoned to death, dying by "other" methods of lethality, or be asphyxiated to death versus dying by AHT when compared to children with no perpetrators' use of drugs and/or alcohol in the home, *OR* = 3.69, 95% CI [1.44, 9.46], *OR* = 7.56, 95% CI [2.95, 19.41], and *OR* = 5.22, 95% CI [1.88, 14.48], respectively. Finally, children who were left in the care of the perpetrator while the mother or father were at work were at a decreased odds of being shot (*OR* = 0.14, 95% CI [0.04, 0.49]) or asphyxiated (*OR* = 0.21, 95% CI [0.06, 0.76]) to death versus dying by AHT when compared to children who were not left under the supervision of the perpetrator while the mother or father was at work.

Multivariate Analysis

When comparing and contrasting results in the model taxonomy, Akaike Information Criterion (AIC) was used to assess the effectiveness of each model in explaining method of lethality for CM-related homicides. The final model yielded a smaller AIC (2394.152) than all other models tested in the

model taxonomy, thereby suggesting a better model fit. Thus, only the final model is presented herein (see Table 4). After the bivariate analysis, a series of nested models were estimated and compared using multivariate multinomial logistic regression analysis. Variables included in the model specification were those characteristics identified in previous research with known associations with CM-related homicides, as well as predictors that were statistically significant at $\alpha = 0.05$ in the bivariate analysis. The analytic sample size for the multivariate analysis is 797, as all observations with a missing response for perpetrator age were removed. The following variables were included in the final model: *victim-perpetrator relationship, victim's age, child's crying behavior, history of abuse, age of perpetrator, perpetrator's drug/alcohol abuse, intimate partner violence, parental relationship conflict, argument,* and *bystander*. Homicide-suicide did not occur in children killed by AHT, and, as such, an association could not be estimated; therefore, only univariate descriptive statistics for homicide-suicide incidents are provided.

Primary predictor. After adjusting for victim's age, child's crying behavior, history of abuse, age of perpetrator, perpetrator's drug/alcohol abuse, intimate partner violence, parental relationship conflict, argument, and bystander effect, children killed by mother's male companion were at an increased risk of being beaten/bludgeoned to death versus dying by AHT than those killed by their biological father, *aOR* = 1.98, 95% CI [1.02, 3.88]. Also, the adjusted odds of a child being shot to death as opposed to dying by AHT among children killed by mother's male companion was 77% less than the adjusted odds of dying by a firearm when killed by a biological father, *aOR* = 0.23, 95% CI [0.08, 0.70]. Mothers, on the other hand, were at greater odds of using asphyxiation or "other" methods of lethality rather than violently shaking the child (AHT) when compared to biological fathers, *aOR* = 8.45, 95% CI [2.94, 24.27] and *aOR* = 9.01, 95% CI [3.35, 24.20], respectively.

Child-related characteristics. The increased odds of child death by "other" means, gunshot wounds, beating/bludgeoning, and asphyxiation were all explained by an increase in the child's age. For example, the odds of a child dying by "other" lethal means versus dying by AHT is expected to increase 1.39 times with each additional year increase in age, 95% CI [1.14, 1.69]; children dying by firearm-related injuries is expected to increase 1.86 times with each additional increase in age, 95% CI [1.51, 2.29], after adjusting for all other predictors. The same pattern of association between age and death by beating/bludgeoning and asphyxiation held true. Consistent with the bivariate results, child's crying behavior was associated with a decreased risk of being beaten/bludgeoned to death (*aOR* = 0.14, 95% CI [0.06, 0.32]) or death by "other" methods of lethality, (*aOR* = 0.18, 95% CI [0.06, 0.52]) versus death from abusive head trauma-related injuries. The decreased odds of children dying by asphyxiation, gunshot wound, and "other" lethal means versus dying by AHT was accounted for by the child's history of abuse (see Table 4).

Family characteristics. When family characteristics were examined, intimate partner violence, parental relationship conflict, and arguments each explained more of the risk of a child dying by firearms relative the risk of dying by AHT. Moreover, after adjusting for all predictors, children residing in households characterized by intimate partner violence (*aOR* = 8.67, 95% CI [2.60, 28.91]), parental relationship conflict (*aOR* = 9.17, 95% CI [1.78, 47.18]), or argument (*aOR* = 13.85, 95% CI [2.51, 76.52]) were at greater odds of being shot to death versus dying by AHT when compared to children without these family characteristics. This suggests that these family characteristics alone, and in tandem, are significant predictors of firearm-related deaths in children. Finally, having a bystander present was associated with an increased risk of being beaten/bludgeoned to death versus dying by AHT, *aOR* = 2.31, 95% CI [1.04, 5.14].

Perpetrator characteristics. The abuse of drugs/alcohol by the perpetrator was a statistically significant predictor of all methods of lethality. Children residing in homes characterized by perpetrator drugs and/or alcohol abuse were 8.93 times the odds to die by "other" means versus AHT than children with no perpetrator drugs / alcohol abuse, 95% CI [2.85, 28.01]). Likewise, when a perpetrator abused drugs/alcohol, the odds of a child dying from gun violence versus AHT increased (*aOR* = 7.05, 95% CI [1.90, 26.21]). The same general pattern held true for children residing in homes characterized by perpetrator drugs and/or alcohol abuse who were beaten and bludgeoned to death (*aOR* = 3.80, 95% CI [1.23, 11.72]) and asphyxiated (*aOR* = 4.70, 95% CI [1.37, 16.11]) versus those who died by AHT.

Chapter 4: Discussion

CM-related homicide is a leading cause of childhood death in the U.S., with an estimated 1,800 children dying from maltreatment-related injuries every year (USDHHS, 2018). Although children who die from CM-related injuries make up a small percentage of homicide victims, the years of potential life lost and economic burden associated with these violent crimes represent a significant public health concern because of their preventability (Fang, Brown, Florence, & Mercy, 2012). The act of CM-related homicide is volitional. In this volitional act, methods of lethality used in CM-related homicides are often similar when certain child, family, and perpetrator characteristics are present; however, some methods appear to be dependent on the victim-perpetrator relationship. A better understanding of the circumstances and characteristics of CM-related homicides may help in informing primary prevention efforts, preventing child death, and assuring safe, stable, nurturing relationships and environments for all children.

In this study, the associations between child, family, and perpetrator characteristics and methods of lethality in the context of victim-perpetrator relationship were examined. Important predictors associated with the methods by which a perpetrator killed a child included *victim-perpetrator relationship, age of victim and perpetrator, child's crying behavior, child's history of abuse, child exposure to a previous nonfatal injury, sex of perpetrator, perpetrator's mental illness, perpetrator's use of drugs and/or alcohol, perpetrator supervision of the child while the primary parent was at work, households characterized by intimate partner violence, parental relationship conflict, arguments, families known by CPS, and bystanders*.

Similar to national estimates (Lucas et al., 2002; Schnitzer & Ewigman, 2005; Starling, Sirotnak, Heisler, & Barnes-Eley, 2007; USDHHS, 2018), children less than one-year-old were the most vulnerable victims, and the majority of perpetrators were biological parents, with father being the

most common perpetrator. More than one third of the children in this study were beaten/bludgeoned to death, with deaths by "other" means being the second most prevalent method of lethality used to kill children. Based on past research, it was expected that victim-perpetrator relationship would be significantly associated with method of lethality used in CM-related homicides. The sections below summarize the research findings based on method of lethality.

Beating/bludgeoning. As with findings from previous research (Daly & Wilson, 1994; Harris, Hilton, Rice, & Eke, 2007; Weekes-Shackelford & Shackelford, 2004), almost two-thirds of children beaten/bludgeoned to death were killed by either the biological father or the mother's male companion, with the mother's male companion at an increased risk of beating/bludgeoning a child to death. Consistent with the research hypothesis, there is statistical evidence to suggest that children are more likely to be beaten/bludgeoned to death versus die by AHT when the perpetrator was the mother's male companion than when he was the biological father. Moreover, of children killed by the mother's male companion, more were beaten/bludgeoned to death than all four other methods of lethality combined. Further, the increased risk of death by beating/bludgeoning associated with mother's male companion remained present even after adjusting for other risk factors. As noted previously, Daly and Wilson (1994) and Weekes-Shackelford and Shackelford (2004) note that mothers' male companions may be more likely to beat/bludgeon a child to death than the biological father because of the lack of genetic-relatedness found in mothers' male companion/child-victim dyads. The researchers posited that the lack of genetic-relatedness may be characterized by discriminative parental solicitude and antipathy the mother's male companion has for his partner's child(ren). Other perspectives found that the presence of a stepfather or mother's male companion increases the risk of death by intentional fatal injury and physical abuse (Radhakrishna, Bou-Saada, Hunter, Catellier, & Kotch, 2001; Schnitzer & Ewigman, 2005; Stiffman, Schnitzer, Adam, Kruse, & Ewigman, 2002). Given that beating/bludgeoning is a

method of lethality that logically stems from acts of physical abuse, the risk associated with a child being beaten/bludgeoned to death by his/her mother's male companion is heightened. Putnam-Hornstein, Cleves, Licht, and Needell (2013) suggested that the increased risk of death by beating/bludgeoning is associated with a history of abuse and previous CPS allegations. Findings from the bivariate analysis are consistent with findings from previous research suggesting that these characteristics are significantly associated with child death, particularly when the child is beaten/bludgeoned to death (see Table 3). Results from the multivariate analysis, however, do not align with the previous research, as there was a decrease in risk of death by beating/bludgeoning versus death by AHT in children with a history of abuse. This discrepancy could be an artifact of the data, as this study was only able to assess history of abuse by reviewing the information contained in the LE and C/ME narratives.

Differences in methods of lethality used when a bystander was present were identified in this study. In the sample, there were 167 CM-related homicides (at least based on narratives) that included a bystander, and of those, 41.0% of the perpetrators were the mothers' male companions, and in most instances, the mother was the bystander. Further, even after adjusting for all other predictors, the presence of a bystander significantly increased the odds of a child being beaten/bludgeoned to death than dying by AHT. Although bystanders' degree of participation in CM-related homicides was not evaluated in this study, it is not unusual for the bystander to actively participate in or ignore the abuse, putting the child at additional risk (Korobov, 2010). Reasons for bystanders' inaction were not examined in this study, but other research has attempted to offer some explanations. Obenson and England (2015) posited that the mother may fail to intervene because of intrapersonal reasons (e.g., low self-esteem, a personal history of abuse). Margolin (1992) suggested that a mother may permit her male companion to assume responsibility for disciplining the child or the male companion and mother

may create a dynamic wherein the male companion becomes violent towards the child as a way of "protecting" the mother against a perceived infraction committed by the child. Korobov (2010) noted that because accomplices or bystanders in CM-related homicide cases are usually not held accountable by the criminal justice system, they may not be deterred from their complicit behavior (Korobov, 2010). Other research specific to intimate partner violence suggests that a person may act as a bystander and fail to protect their child(ren) because of their own victim status (California Partnership to End Domestic Violence, 2015). The latter explanation may be applicable to the small percentage (10%) of CM-related homicides that were characterized by the co-occurrence of intimate partner violence and bystander inaction. The current study appears to be the first to assess bystander inaction and its link to method of lethality in CM-related homicides. While bystander inaction requires further research, strategies and programs that engage people (e.g., bystanders) within the microsystem (e.g., immediate environment in which children live), may be an effective strategy for preventing CM-related homicides.

Asphyxiation. The use of asphyxiation as a method of lethality in CM-related homicides was similar for maternal and paternal perpetrators, accounting for a little more than three-quarters of the children who died by asphyxiation. Mothers were more likely to use asphyxiation versus AHT as a means of killing their offspring when compared to biological fathers. These results are consistent with the research of Resnick (2016) who found that mothers most often use asphyxiation or drowning as the lethal method in the child's death. In the current study, younger children were at an increased risk of dying by asphyxiation, as age was significantly associated with a 39% increase in risk of death compared to AHT. Prior studies suggest that children's risk of death by asphyxiation may be motivated by the mother's shame, concealment of pregnancy, mental illness, and poverty (Adinkrah, 2001; Bourget & Gagne, 2002; Ciana & Fontanesi, 2012; Friedman & Resnick, 2009; Krischer et al.,

2007; Logan, Walsh, Patel, & Hall, 2013; McKee & Egan, 2013; Tanaka et al., 2017). Additionally, asphyxiation is a method of lethality that often produces a quick and painless death; mothers who use this method may be motivated by psychological distress or relationship conflict (Friedman & Resnick, 2009; Logan, Walsh, Patel, & Hall, 2013). Death by asphyxiation may also be motivated by intimate partner violence and substance abuse. In the current study, these two factors were associated with a significantly increased risk of a child dying by asphyxiation than AHT.

Gunshot. Biological fathers were the most common perpetrators when children were killed by firearms, representing over half of victim-perpetrator dyads in CM-related homicide victims killed using this method. These rates are consistent with those of Daly and Wilson (1994), Harris, Hilton, Rice, & Eke (2007), and Weekes-Shackelford and Shackelford (2004), who found that fathers used shooting as a method of lethality more than stepfathers and other perpetrators. Further, when all predictors were regressed onto methods of lethality, these findings held true. Some studies suggest that a variety of life stressors, including unemployment, divorce, child custody battles, and high relationship conflict may be precipitators of these types of killings (Bourget & Gagne, 2005; Dalley, 1997/2000; Farnsworth, 2011; Fowler, Dahlberg, Haileyesus, Gutierrez, & Bacon, 2017; Holland, Brown, Hall, & Logan, 2015; Johnson, 2006; Wilcyznski, 1995). Furthermore, Carruthers (2016) posits that anger and a loss of a sense of identity may be the main motivating factors of paternal filicide, and this anger may stem from a loss of social power caused by the dissolution of a significant relationship.

Increasing attention is being given to intimate partner violence and its association to CM-related homicides (Cavanagh, Dobash & Dobash, 2005; Douglas, 2015; Kajese et al., 2011; Logan, Walsh, Patel, & Hall, 2013; Sillito & Salari, 2011; Fowler, Dahlberg, Haileyesus, Gutierrez, & Bacon, 2017; Smith, Fowler, & Niolon, 2014). Previous research indicates that intimate partner violence and

parental-relationship conflict threaten the safety and well-being of the child. When the conflict is high and includes hostility, custody disputes, and separation or divorce, children are at a heightened risk of CM-related homicide (Bourget & Gagne, 2005; Dalley, 1997/2000; Farnsworth, 2011; Fowler, Dahlberg, Haileyesus, Gutierrez, & Bacon, 2017; Harris, Hilton, Rice, & Eke, 2007; Holland, Brown, Hall, & Logan, 2015; Johnson, 2006; Kajese et al., 2011; Wilcyznski, 1995). In the current study, children residing in homes characterized by intimate partner violence, arguments, and parental-relationship conflict were at an increased risk of dying by firearms compared to children where these characteristics were not present, suggesting that when perpetrators have access to more lethal means, such as firearms, children may be likely to die in the context of the conflict. Additionally, children were more likely to die from asphyxiation rather than AHT when residing in homes where intimate partner violence was present. Findings from the current study support those of Fowler, Dahlberg, Haileyesus, Gutierrez and Bacon (2017) and Sillito and Salari (2011) who found a link between a child's risk of death by firearm and intimate partner or family conflict. Children may be killed as a way for the perpetrator to exact revenge upon the intimate partner, hence the child becomes a "corollary victim" in intimate partner conflict (Resnick, 1969; Smith, Fowler, & Niolon, 2010; Wilcyznski, 1995). Moreover, child deaths may be precipitated by the intimate partner of the perpetrator threatening or attempting to leave the relationship, which is the most dangerous time for her and her children (The National Domestic Violence Hotline, 2018). The increased risk for violence after separation may help explain the increased risk of death by firearms for children residing in homes characterized by intimate partner violence, as risk to personal safety may influence decisions as to whether the intimate partner of the perpetrator remains in the abusive relationship at the expense of the safety of her children. The particular significance of intimate partner violence, parental relationship conflict, and arguments in helping explain the increased odds of death by firearms in CM-related

homicides may be important areas of intervention, thus helping to reduce risk to children residing in homes characterized by intimate partner violence.

Abusive head trauma. Results from the current study were consistent with results from earlier research that found male caregivers were the most common perpetrators of AHT (Adamsbaum, Grabar, Mejean, & Rey-Salmon, 2010; Barr, 2014; Flaherty, 2006). Based on descriptive statistics, fathers and mothers' male companions represented a significant portion of perpetrators who used AHT as a method of lethality, with fathers perpetrating more than half of these deaths. This disparity of male caregivers killing a child by AHT may be due, at least in part, to the fact that fathers and mothers' male companions often serve in a caregiver role while the mother is at work. In the current study, 115 children were killed when the perpetrator was tasked with supervising the child while the primary parent (usually the mother) was at work, and of them, 12.0% were shaken to death, while an additional 64.3% beaten/bludgeoned to death. Of them, the median age of children who were shaken to death was 2 months of age. Prior research suggests that the victim's age is the primary risk factor for death by AHT (Barr, 2014; National Center on Shaken Baby Syndrome, 2018). Thus, male caregivers may experience stress and frustration due to the demands of caring for a young, crying child (Adamsbaum, Grabar, Mejean, & Rey-Salmon, 2010), as the child's crying behavior is the most common precipitating circumstance reported in deaths by AHT (Adamsbaum, Grabar, Mejean, & Rey-Salmon, 2010; Barr, 2014; Flaherty, 2006). Moreover, the lack of a perpetrator's preparedness and unrealistic expectations about what is developmentally appropriate in infants may be evidenced by the method of lethality used to kill children who exhibit crying behavior, as the patterns of injury can take on many forms (e.g., AHT, beating/bludgeoning, blunt impact, asphyxiation). In the current study, of the 60 children whose crying behavior precipitated their deaths, 42.0% were violently shaken to death, and slightly more than one-quarter were beaten/bludgeoned to death. Based on the best available evidence,

the Centers for Disease Control and Prevention offers a number of strategies to help prevent deaths by AHT (Fortson, Klevens, Merrick, Gilbert, & Alexander, 2016). These strategies include actions for the parent, caregiver, and those who serve in a supportive role to these individuals. A few examples of these strategies are: strengthen economic supports to families, change social norms to support families and positive parenting, and provide quality care and education early in life. When implemented, these strategies are designed to prevent CM-related homicides.

Other. The increased risk associated with maternal perpetrators and death by "other" methods of lethality are consistent with research from Resnick (2016) who found that mothers most often use drowning as the lethal method when they kill their offspring. In the current study, children with a history of abuse were at an increased risk of dying by "other" methods of lethality. The increased risk of CM-related homicides by "other" means may be due, in part, to the fact that deaths caused by neglect, drowning, and drug poisoning are included in the "other" method of lethality category, and these types of deaths have been considered as evidence of inadequate supervision or failure to properly care for the child (Child Welfare Gateway, 2016a; USDHHS, 2018).

Prevention CM-related homicide can result due to a number of methods of lethality, including blunt force trauma, head injury, abusive head trauma, neglect, starvation, gunshot wound, shaking, drowning, and violent physical abuse, to name a few. Research has advanced the understanding of the epidemiologic protective and risk factors of CM-related homicides, and in response to this knowledge, a broad range of evidence-based programs and practices have been developed to help prevent these types of deaths. A few strategies are highlighted below.

Much is known about the risk factors for intimate partner violence-related homicides and the strategies to prevent intimate partner violence-related homicides, which includes child "corollary victims." Programs typically are designed to target individual behaviors, as well as broader

microsystems (i.e., relationships, families, schools, and communities; Niolon et al., 2017). State laws that limit access to firearms for persons under domestic violence restraining orders may serve as preventive measures for firearm-related intimate partner homicide (Zeoli & Webster, 2010). When state statutes restrict perpetrators' access to lethal means, such as firearms, Zeoli and Webster (2010) found a 19% reduction in risk of intimate partner homicide, which also translates into a reduced risk to child "corollary victims".

Another strategy that is recommended as a preventive measure for CM-related homicides is the provision of quality and affordable child care through child care subsidies. Previous studies found access to affordable and quality child care lowers the risk of CM-related homicide (Coulton, Korbin, Su, & Chow, 1995; Klevens, Barnett, Florence, & Moore, 2015). An unrelated adult in the home is a risk factor for CM-related homicide; however, due to lack of access to affordable child care, many women choose untrustworthy caregivers (e.g., boyfriend, stepfather), which heightens risk of CM-related homicide. To highlight the need to increase awareness of the importance of caregiver selection, the state of Ohio developed a campaign called *Choose Your Partner Carefully,* with the intent to increase awareness regarding the risks that are inherent in choosing untrustworthy caregivers even if they are a lover, relative, or friend (Marion County Children Services, 2011). An evaluation of the awareness campaign, conducted by Prevent Child Abuse Nevada (2015), yielded results whereby 90% of parents receiving the *Choose Your Partner Carefully* awareness materials and parent training reported a change in their behavior in choosing appropriate caregivers for their children when compared to parents who did not receive the *Choose Your Partner Carefully* intervention. As such, this change in behavior resulted in 36 of the 40 parents removing their children out of the care of someone they determined to be untrustworthy and at risk for harming their child (Prevent Child Abuse Nevada, 2015). Two additional strategies used to prevent CM-related homicides, more specifically,

those caused by AHT, is parental education and paid family leave. For example, Klevens and colleagues (2016) examined the population rate of hospital admissions for AHT in California, which has implemented a paid family leave policy and 7 comparison states with no paid family leave policy implementation. Results revealed that the implementation of paid family leave policy was associated with a decrease of 5.1 in the AHT hospital admissions per 100,000 children < 1 year. Additionally, prior studies have shown that parents who receive education about AHT prevention strategies report an increase in knowledge and understanding about developmentally appropriate crying in infants (Barr et al, 2009; Zolotor et al., 2015). One program that has been used to educate parents about normal crying behavior in infants is the Period of PURPLE Crying program, which is an evidence-based program that was developed by pediatricians to prevent AHT (National Center on Shaken Baby Syndrome, 2018). The program is designed to educate parents about normative infant crying and the dangers of shaking babies (National Center on Shaken Baby Syndrome, 2018).

Although a review of the literature provides inconsistent evidence regarding the effectiveness of the Period of PURPLE Crying program in preventing AHT, one study found that mothers who received program materials reported higher scores for knowledge about infant crying and other parental behaviors that increase risk for shaking babies (Barr et al, 2009). Other research found a reduction in the number of telephone calls parents made to the nurse advice line for child's crying behavior but found no decrease in AHT incidence rates within that state (Zolotor et al., 2015). Male caregivers are the main perpetrators of abusive head trauma cases. Given the disproportionate number of male caregivers shaking babies relative to female caregivers, programs that provide education to male caregivers about normative crying behavior and the dangers of AHT as well as the implementation policies (e.g., paid family leave, earned income tax credit) that support working parents, are likely to yield more success in reducing the incidence rates of AHT.

Limitations

This study has several limitations. The first limitation is that the data are collected and entered into NVDRS by a state-specific data abstractor, increasing chances for administrative errors and inaccurate data entry. Due to confidentiality concerns, the original DC, LE, and C/ME reports were not available. This is identified as a limitation because this study relied solely on information in NVDRS, and raters did not make any assumptions about child, family, and perpetrator characteristics beyond those indicated in NVDRS. The rate of occurrence for many of the characteristics is likely much higher than outlined in the data. A second limitation to this study is that deaths due to nonspecific physical injury, neglect, stabbing, drowning, and drug poisoning were collapsed into the "other" category due to their low rate of occurrence, limiting the ability to examine the unique contribution that these types of deaths had on research findings. The collapsing of methods of lethality into the "other" category was done in order to make meaningful and accurate inferences. Another limitation worth noting is approximately 10% of the 1103 cases were excluded due to missing data for victim-perpetrator relationship or method of lethality; thus, this study was limited in describing characteristics and the risks associated with the deaths of all CM-related homicide victims. Lastly, data were drawn from 32 U.S. states, limiting the ability to generalize findings beyond those 32 states.

Conclusions

As evidenced by the findings in this study, CM in general, and more specifically, CM-related homicide, imposes a huge public health burden on the population. The results from this study build on the growing body of literature and highlight the need to understand the characteristics that increase risk for child death and will aid in efforts to assure safe, stable, nurturing relationships and environments for all children. Further, this is an exploratory study that is broad in scope when examining the contextual factors associated with method of lethality used to kill children. As such, additional

research in a few key areas is necessary to move this study beyond a macro-level examination of characteristics that heighten risk. To move the field forward, future research should examine the distinctive characteristics and circumstances of all methods of lethality, rather than collapsing the methods with small frequencies into a broad category of "other", as the field could benefit from an in-depth analysis of children who die by these methods of lethality. The majority of CM-related homicides are perpetrated by biological parents and stepfathers; as result, very few studies examine characteristics of these "other" victim-perpetrator relationships (e.g., grandparent, uncle/aunt) in the context of CM-related homicides. Limited research in the area of "other" victim-perpetrator relationships could be due in part to the infrequencies of some victim-perpetrator relationships. Lastly, the findings that perpetrator's drug/alcohol use significantly increased the odds of children dying by all methods of lethality is an important area of intervention. Given the dramatic increase in opioid abuse, overdose deaths, and dependency, this perpetrator characteristic likely is extremely harmful to the safety and well-being of many children.

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Table 1 (continued). Descriptive statistics for child maltreatment-related homicide victims (*N* = 996)			
Characteristics			***n* (%)**
Child-Related Characteristics	**Sex of Victim**	**Female**	430 (43.3%)
		Male	566 (56.7%)
	Child's Crying Behavior	**Yes**	60 (6.0%)
		No	936 (94.0%)
	History of Abuse	**Yes**	342 (34.4%)
		No	654 (65.6%)
	Previous Nonfatal Injury	**Yes**	179 (18.0%)
		No	817 (82.0%)
	Race (Victim)	**White, Non-Hispanic**	460 (46.2%)
		Black, Non-Hispanic	347 (34.8%)
		Hispanic	110 (11.1%)
		American Indians/Alaska Natives, Non-Hispanic	23 (2.3%)
		Asian/Pacific Islander, Non-Hispanic	21 (2.1%)
		Other, Non-Hispanic	8 (0.8%)
		Two or more races, Non-Hispanic	24 (2.4%)
		Unknown Race, Non-Hispanic	3 (0.3%)
Victim-Perpetrator Relationship	**Victim-Perpetrator Relationship**	**Mother**	217 (21.8%)
		Father	376 (37.8%)
		Mother's Male Companion	267 (26.8%)
		Other	136 (13.6%)
		Missing	35 (3.5%)
	Sex of Perpetrator	**Female**	283 (28.4%)
		Male	708 (71.1%)
		Missing	5 (0.5%)
	Race (Perpetrator)	**White, Non-Hispanic**	412 (41.8%)
		Black, Non-Hispanic	315 (32.0%)
		Hispanic	62 (6.3%)
		American Indian/Alaska Natives, Non-Hispanic	14 (1.4%)
		Asian/Pacific Islander, Non-Hispanic	10 (1.0%)
		Two or more races, Non-Hispanic	7 (0.7%)
		Unknown Race, Non-Hispanic	158 (16.0 %)
		Unknown or Missing Ethnicity	7 (0.7%)

Table 1 (continued). Descriptive statistics for child maltreatment-related homicide victims (*N* = 996)			
		Missing	12 (1.20%)
	Mental Illness	**Yes**	116 (11.7%)
		No	880 (88.3%)
	Homicide-Suicide	**Yes**	142 (14.3%)
		No	854 (85.7%)
	Drugs/ Alcohol Involved	**Yes**	173 (17.4%)
		No	823 (82.6%)
	Work	**Yes**	115 (11.6%)
		No	881 (88.4%)
	Serving in Caregiver Role	**Yes**	668 (68.9%)
		No	301 (31.1%)
Family Characteristics	**Intimate Partner Violence**	**Yes**	197 (19.8%)
		No	799 (80.2%)
	Argument	**Yes**	129 (13.0%)
		No	867 (87.0%)
	Parental Relationship Conflict	**Yes**	155 (15.6%)
		No	841 (84.4%)
	Child Protective Services	**Yes**	94 (9.5%)
		No	902 (90.5%)
	Bystander Effect	**Yes**	169 (16.8%)
		No	827 (83.2%)
Primary Outcome	**Method of Lethality**	**Abusive Head Trauma**	116 (11.7%)
		Gunshot Wound	161 (16.2%)
		Beating/Bludgeoning	372 (37.3%)
		Asphyxiation	106 (10.7%)
		Other	240 (24.1%)

Notes. IQR = Interquartile Range; Median and IQR were used for variables with non-normal distributions

Table 2 (continued). Distribution of characteristics by victim-perpetrator relationship in child maltreatment-related homicides (*N* = 996)						
Characteristics			**Mother's male companion (*n* = 267)**	**Mother (*n* = 217)**	**Father (*n* = 376)**	**Other (*n* = 136)**
Child-Related Characteristics	**Age of victim, years (Median, IQR)**		2.0 (4-1)	1.0 (4-0)	1.0 (5.5-0)	2.0 (3-0)
	Sex of Victim	**Female**	118 (11.9%)	112 (11.2%)	139 (14%)	62 (6.2%)
		Male	149 (15%)	105 (10.5%)	237 (23.8%)	74 (7.4%)
	Child's Crying Behavior	**Yes**	17 (1.7%)	6 (0.6%)	30 (3.0%)	7 (0.7%)
		No	250 (25%)	211 (21%)	346 (34.6%)	128 (12.8%)
	History of Abuse	**Yes**	121 (12.1%)	64 (6.4%)	124 (12.4%)	33 (3.3%)
		No	146 (14.7%)	152 (15.2%)	252 (25.2%)	103 (10.4 %)
	Previous Nonfatal Injury	**Yes**	60 (6.0%)	31 (3.1%)	75 (7.5%)	13 (1.3%)
		No	207 (20.8%)	186 (18.6%)	301 (30.1%)	123 (12.4%)
	Race (Victim)	**White, Non-Hispanic**	140 (14.1%)	81 (8.1%)	182 (18.2%)	57 (5.7%)
		Black, Non-Hispanic	82 (8.2%)	90 (9.0%)	131 (13.1%)	44 (4.4%)
		Hispanic	24 (2.4%)	29 (2.9%)	37 (3.7%)	20 (2.0%)
		American Indians/ Alaska Natives, Non-Hispanic	6 (0.6%)	7 (0.7%)	3 (0.3%)	7 (0.7%)
		Asian/ Pacific Islander, Non-Hispanic	4 (0.4%)	4 (0.4%)	8 (0.8%)	5 (0.5%)
		Other, Non-Hispanic	2 (0.2%)	3 (0.3%)	3 (0.3%)	0 (0.0%)
		Two or more races, Non-Hispanic	9 (0.9%)	3 (0.3%)	10 (1.0%)	2 (0.2%)

Table 2 (continued). Distribution of characteristics by victim-perpetrator relationship in child maltreatment-related homicides (*N* = 996)						
		Unknown Race, Non-Hispanic	0 (0.0%)	0 (0.0%)	2 (0.2%)	1 (0.1%)
Perpetrator Characteristics	**Age of perpetrator, years (Median, IQR)**		27 (33-23)	27 (34-22)	29 (36-23)	31 (42-25)
	Missing (199)					
	Sex of Perpetrator	**Female**	0 (0.0%)	217 (21.7%)	0 (0.0%)	66 (6.6%)
		Male	267 (26.8%)	0 (0.0%)	376 (37.8%)	66 (6.6%)
		Missing	N/A	N/A	N/A	4 (0.4%)
	Race (Perpetrator)	**White, Non-Hispanic**	113 (11.5%)	76 (7.7%)	166 (16.9%)	57 (5.8%)
		Black, Non-Hispanic	80 (8.1%)	75 (7.6%)	123 (12.5%)	37 (3.8%)
		Hispanic	11 (1.1%)	15 (1.5%)	26 (2.6%)	10 (1.0%)
		American Indian/ Alaska Natives, Non-Hispanic	2 (0.2%)	5 (0.5%)	4 (0.4%)	3 (0.3%)
		Asian/ Pacific Islander, Non-Hispanic	2 (0.2%)	2 (0.2%)	3 (0.3%)	3 (0.3%)
		Two or more races, Non-Hispanic	0 (0.0%)	2 (0.2%)	4 (0.4%)	1 (0.1%)
		Unknown Race Non-Hispanic	52 (5.3%)	37 (3.8%)	46 (4.7%)	23 (2.3%)
		Unknown or Missing Ethnicity	3 (0.3%)	0 (0.0%)	3 (0.3%)	1 (0.1%)
		Missing (11)				
	Mental Illness	**Yes**	14 (14%)	42 (4.2%)	46 (4.6%)	14 (1.4%)

Table 2 (continued). Distribution of characteristics by victim-perpetrator relationship in child maltreatment-related homicides (*N* = 996)						
		No	253 (25.4%)	175 (17.5%)	330 (33.2%)	122 (12.3%)
	Homicide-Suicide	**Yes**	16 (1.6%)	25 (2.5%)	89 (9.0%)	12 (1.2%)
		No	251 (25.3%)	192 (19.2%)	287 (28.9%)	124 (12.4%)
	Drugs/ Alcohol Involved	**Yes**	47 (4.7%)	41 (4.1%)	65 (6.5%)	20 (2.0%)
		No	220 (22.1%)	176 (17.6%)	311 (31.3%)	116 (11.7%)
	Work	**Yes**	59 (5.9%)	5 (5.0%)	31 (3.1%)	20 (2.0%)
		No	208 (20.9%)	212 (21.3%)	345 (34.6%)	116 (11.7%)
Family Characteristics	**Intimate Partner Violence**	**Yes**	54 (5.4%)	10 (1.0%)	116 (11.7%)	17 (1.7%)
		No	213 (21.4%)	207 (20.7%)	260 (26.1%)	119 (12%)
	Argument	**Yes**	37 (3.7%)	19 (1.9%)	62 (6.2%)	11 (1.1%)
		No	230 (23.1%)	198 (19.8%)	314 (31.6%)	125 (12.6%)
	Parental Relationship Conflict	**Yes**	21 (2.1%)	38 (3.8%)	89 (9.0%)	7 (0.7%)
		No	246 (24.8%)	179 (18%)	287 (28.9%)	129 (13%)
	Child Protective Services	**Yes**	20 (2.0%)	27 (2.7%)	28 (2.8%)	19 (1.9%)
		No	247 (24.8%)	190 (19%)	348 (35%)	117 (11.8%)
	Bystander Effect	**Yes**	69 (6.9%)	33 (3.3%)	47 (4.7%)	18 (1.8%)
		No	198 (19.9%)	184 (18.5%)	329 (33.1%)	118 (11.9%)
Method of Lethality	**Abusive Head Trauma**		25 (2.5%)	9 (0.90%)	65 (6.53%)	17 (1.7%)
	Other		37 (3.7%)	95 (9.6%)	76 (7.6%)	33 (3.3%)
	Gunshot Wound		29 (2.9%)	26 (2.6%)	92 (9.3%)	14 (1.4%)
	Beating/Bludgeoning		161 (16.2%)	44 (4.4%)	103 (10.4%)	64 (6.4%)
	Asphyxiation		15 (1.5%)	43 (4.3%)	40 (4.0%)	8 (0.8%)

Table 3 (Continued). Bivariate Multinomial logistic regression of method of lethality used in child maltreatment-related homicides (*N* = 996)											
Characteristics			**Methods of Lethality**					**OR (95% CI) Abusive Head Trauma vs Other**	**OR (95% CI) Abusive Head Trauma vs Gunshot**	**OR (95% CI) Abusive Head Trauma vs Beating/ Bludgeoning**	**OR (95% CI) Abusive Head Trauma vs Asphyxiation**
			Abusive Head Trauma (*n* = 116)	**Other (*n* = 240)**	**Gunshot (*n* = 161)**	**Beating/ Bludgeoning (*n* = 372)**	**Asphyxiation (*n* = 106)**				
Child-Related Characteristics	**Age of victim, years (Median, IQR)**		0.0 (1-0)	1.0 (4-1)	8 (13-5)	1.0 (2-0)	1.0 (4-0)	1.21 (1.10, 1.34)*	1.55 (1.40, 1.71)*	1.09 (0.99, 1.20)	1.18 (1.06, 1.31)**
	Sex of Victim	**Female**	49 (4.9%)	118 (11.9%)	82 (8.2%)	135 (13.6%)	47 (4.7%)	1.32 (0.85, 2.07)	1.42 (0.88, 2.30)	0.78 (0.51, 1.19)	1.11 (0.65, 1.89)
		Male	67 (6.7%)	122 (12.3%)	79 (7.9%)	237 (23.8%)	58 (5.8%)	1.00	1.00	1.00	1.00
	Child's Crying Behavior	**Yes**	25 (2.5%)	9 (0.9%)	0 (0.0%)	16 (1.6%)	10 (1.0%)	0.14 (0.06, 0.31)*	--	0.16 (0.08, 0.32)*	0.38 (0.17, 0.84)***
		No	91 (9.2%)	231 (23.3%)	160 16.1%)	356 (35.8%)	95 (9.6%)	1.00	1.00	1.00	1.00
	History of Abuse	**Yes**	52 (5.2%)	77 (7.6%)	8 (0.8%)	183 (18.4%)	22 (2.2%)	0.57 (0.36, 0.90)***	0.06 (0.03, 0.14)*	1.19 (0.78, 1.81)	0.33 (0.18, 0.59)*
		No	64 (6.4%)	165 (16.5%)	153 (15.4%)	189 (19.0%)	83 (8.3%)	1.00	1.00	1.00	1.00
	Previous Nonfatal Injury	**Yes**	36 (3.6%)	34 (3.4%)	0 (0.0%)	100 (10.0%)	9 (0.9%)	0.37 (0.22, 0.63)*	--	0.82 (0.52, 1.29)	0.21 (0.09, 0.45)*
		No	80 (8.0%)	207 (20.7%)	161 (16.2%)	272 (27.3%)	97 (9.7%)	1.00	1.00	1.00	1.00
	Race (Victim)	**White, Non-Hispanic**	45 (4.5%)	111 (11.2%)	98 (9.8%)	156 (15.7%)	50 (5.0%)	1.00	1.00	1.00	1.00
		Black, Non-Hispanic	46 (4.6%)	83 (8.3%)	37 (3.7%)	148 (14.9%)	32 (3.2%)	0.73 (0.44, 1.21)	0.37 (0.21, 0.65)	0.93 (0.58, 1.48)	0.63 (0.34, 1.15)
		Hispanic	16 (1.6%)	31 (3.1%)	16 (1.6%)	34 (3.4%)	13 (1.3%)	0.79 (0.39, 1.58)	0.46 (0.21, 0.99)	0.61 (0.31, 1.21)	0.73 (0.32, 1.69)
		American Indians/ Alaska Natives,	2 (0.2%)	5 (0.5%)	2 (0.2%)	12 (1.2%)	2 (0.2%)	1.01 (0.19, 5.42)	0.46 (0.06, 3.36)	1.73 (0.37, 8.02)	0.90 (0.12, 6.66)

Table 3 (Continued). Bivariate Multinomial logistic regression of method of lethality used in child maltreatment-related homicides (*N* = 996)											
		Non-Hispanic									
		Asian/ Pacific Islander, Non-Hispanic	3 (0.3%)	6 (0.6%)	4 (0.4%)	5 (0.5%)	3 (0.3%)	0.81 (0.19, 3.38)	0.61 (0.13, 2.85)	0.48 (0.11, 2.09)	0.90 (0.17, 4.69)
		Other, Non-Hispanic	0 (0.0%)	1 (0.1%)	2 (0.2%)	4 (0.4%)	1 (0.1%)	--	--	--	--
		Two or more races, Non-Hispanic	4 (0.4%)	3 (0.3%)	1 (0.1%)	11 (1.1%)	5 (0.5%)	0.30 (0.07, 1.41)	0.12 (0.01, 1.06)	0.79 (0.24, 2.61)	1.12 (0.28, 4.45)
		Unknown Race, Non-Hispanic	0 (0.0%)	0 (0.0%)	1 (0.1%)	2 (0.2%)	0 (0.0%)	--	--	--	--
Victim-Perpetrator Relationship	**Victim-Perpetrator Relationship**	**Mother's male companion**	25 (2.5%)	36 (3.6%)	29 (2.9%)	161 (16.2%)	15 (1.5%)	1.23 (0.67, 2.26)	0.82 (0.44, 1.53)	4.06 (2.41, 6.86)*	0.98 (0.46, 2.07)
		Mother	9 (0.9%)	95 (9.5%)	26 (2.6%)	44 (4.4%)	43 (4.3%)	9.03 (4.22, 19.29)*	2.04 (0.90, 4.64)	3.09 (1.41, 6.74)***	7.76 (3.42, 17.61)*
		Father	65 (6.5%)	76 (7.6%)	92 (9.2%)	103 (10.3%)	40 (4.0%)	1.00	1.00	1.00	1.00
		Other	17 (1.7%)	33 (3.3%)	14 (1.4%)	64 (6.4%)	8 (0.8%)	1.66 (0.85, 3.25)	0.58 (0.27, 1.26)	2.38 (1.28, 4.41)	0.77 (0.30, 1.93)
Perpetrator Characteristics	**Age of perpetrator, years (Median, IQR)**		24 (30-21)	30 (36-24)	37 (46-32)	25 (30-22)	28 (35-23)	1.06 (1.03, 1.10)*	1.13 (1.09, 1.17)*	0.99 (0.95, 1.02)	1.03 (0.99, 1.07)
	Sex of Perpetrator	**Female**	22 (2.2%)	115 (11.6%)	26 (2.6%)	74 (7.4%)	46 (4.6%)	3.91 (2.30, 6.64)**	0.81 (0.43, 1.51)	1.04 (0.61, 1.77)	3.21 (1.75, 5.86)
		Male	92 (9.2%)	123 (12.4%)	135 (13.6%)	297 (29.8%)	60 (6.0%)	1.00	1.00	1.00	1.00
	Race	**White, Non-Hispanic**	39 (4.0%)	95 (9.6%)	97 (9.9%)	135 (13.7%)	46 (4.7%)	1.00	1.00	1.00	1.00
		Black, Non-Hispanic	38 (3.9%)	77 (7.8%)	36 (3.7%)	133 (13.5%)	30 (3.0%)	0.83 (0.49, 1.43)	0.38 (0.21, 0.69)	1.01 (0.61, 1.68)	0.67 (0.35, 1.27)

Table 3 (Continued). Bivariate Multinomial logistic regression of method of lethality used in child maltreatment-related homicides (*N* = 996)											
		Hispanic	7 (0.7%)	17 (1.7%)	13 (1.3%)	18 (1.8%)	7 (0.7%)	0.99 (0.38, 2.59)	0.75 (0.28, 2.01)	0.74 (0.29, 1.91)	0.85 (0.27, 2.63)
		American Indian/ Alaska Natives, Non-Hispanic	0 (0.0%)	8 (0.8%)	2 (0.2%)	3 (0.3%)	1 (0.1%)	--	--	--	--
		Asian/ Pacific Islander, Non-Hispanic	0 (0.0%)	4 (0.4%)	1 (0.1%)	4 (0.4%)	1 (0.1%)	--	--	--	--
		Two or more races, Non-Hispanic	0 (0.0%)	1 (0.1%)	0 (0.0%)	1 (0.1%)	5 (0.5%)	--	--	--	--
		Unknown Race Non-Hispanic	32 (3.2%)	34 (3.5%)	7 (0.7%)	72 (7.3%)	13 (1.3%)	0.44 (0.24, 0.80)	0.09 (0.04, 0.22)	0.65 (0.38, 1.12)	0.34 (0.16, 0.75)
		Unknown or Missing Ethnicity	0 (0.0%)	2 (0.2%)	2 (0.2%)	3 (0.3%)	0 (0.0%)	--	--	--	--
	Mental Illness	**Yes**	5 (0.5%)	31 (3.1%)	45 (4.5%)	18 (1.8%)	17 (1.7%)	3.29 (1.25,8.70)***	8.61 (3.30, 22.48)*	1.13 (0.41, 3.11)	4.29 (1.52, 12.08)**
		No	111 (11.2%)	209 (21.0%)	116 (11.7%)	354 (35.6%)	88 (8.8%)	1.00	1.00	1.00	1.00
	Homicide-Suicide	**Yes**	0 (0.0%)	17 (1.7%)	106 (10.7%)	4 (0.4%)	15 (1.5%)	--	--	--	--
		No	116 (11.7%)	226 (23.0%)	55 (5.5%)	367 (37.0%)	90 (9.1%)	1.00	1.00	1.00	1.00
	Drugs/ Alcohol Involved	**Yes**	5 (0.5%)	61 (6.1%)	34 (3.4%)	53 (5.3%)	20 (2.0%)	7.56 (2.95, 19.41)*	5.94 (2.25, 15.72)*	3.69 (1.44, 9.46)**	5.22 (1.88, 14.48)**
		No	111 (11.2%)	179 (18.0%)	127 (12.8%)	319 (32.1%)	85 (8.5%)	1.00	1.00	1.00	1.00
	Work	**Yes**	14 (1.4%)	20 (2.0%)	3 (0.3%)	74 (7.4%)	3 (0.3%)	0.66 (0.33, 1.36)	0.14 (0.04, 0.49)**	1.81 (0.98, 3.34)	0.21

Table 3 (Continued). Bivariate Multinomial logistic regression of method of lethality used in child maltreatment-related homicides (*N* = 996)											
											(0.06, 0.76)***
		No	102 (10.2%)	220 (22.1%)	158 (15.9%)	298 (30.0%)	103 (10.3%)	1.00	1.00	1.00	1.00
Family Characteristics	**Intimate Partner Violence**	**Yes**	6 (0.6%)	42 (4.2%)	102 (10.3%)	19 (1.9%)	28 (2.8%)	3.89 (1.60, 9.44)**	31.70 (13.12, 76.57)*	0.99 (0.39, 2.53)	6.67 (2.63, 16.87)*
		No	110 (11.1%)	198 (20.0%)	59 (5.9%)	353 (35.5%)	77 (7.7%)	1.00	1.00	1.00	1.00
	Argument	**Yes**	2 (0.2%)	22 (2.2%)	71 (7.1%)	21 (2.1%)	13 (1.3%)	5.75 (1.33, 24.90)***	44.97 (10.74, 188.32)*	3.41 (0.79, 14.77)	8.06 (1.77, 36.61)**
		No	114 (11.5%)	218 (21.9%)	90 (9.0%)	351 (35.3%)	92 (9.3%)	1.00	1.00	1.00	1.00
	Parental Relationship Conflict	**Yes**	2 (0.2%)	28 (2.8%)	98 (9.9%)	2 (0.2%)	25 (2.5%)	7.53 (1.76, 32.17)**	88.67 (21.15, 371.77)*	0.31 (0.04, 2.21)	18.04 (4.15, 78.34)*
		No	114 (11.5%)	212 (21.3%)	63 (6.3%)	370 (37.3%)	79 (8.0%)	1.00	1.00	1.00	1.00
	Child Protective Services	**Yes**	11 (1.1%)	23 (2.3%)	4 (0.4%)	50 (5.0%)	6 (0.6%)	1.01 (0.48, 2.15)	0.24 (0.76, 0.78)***	1.48 (0.74, 2.95)	0.58 (0.21, 1.62)
		No	105 (10.6%)	217 (21.8%)	157 (15.8%)	322 (32.4%)	99 (10.0%)	1.00	1.00	1.00	1.00
	Bystander Effect	**Yes**	11 (1.1%)	45 (4.5%)	3 (0.3%)	98 (9.9%)	9 (0.9%)	2.21 (1.10, 4.46)***	0.18 (0.05, 0.67)**	3.41 (1.76, 6.62)*	0.90 (0.36, 2.25)
		No	105 (10.6%)	194 (19.5%)	158 (15.9%)	274 (27.6%)	96 (9.7%)	1.00	1.00	1.00	1.00

Notes. -- No frequencies available; OR = Unadjusted Odds Ratio; IQR = Interquartile Range; CI = Confidence Interval, *$p < 0.001$, ***$p < 0.01$, ****$p < 0.05$.

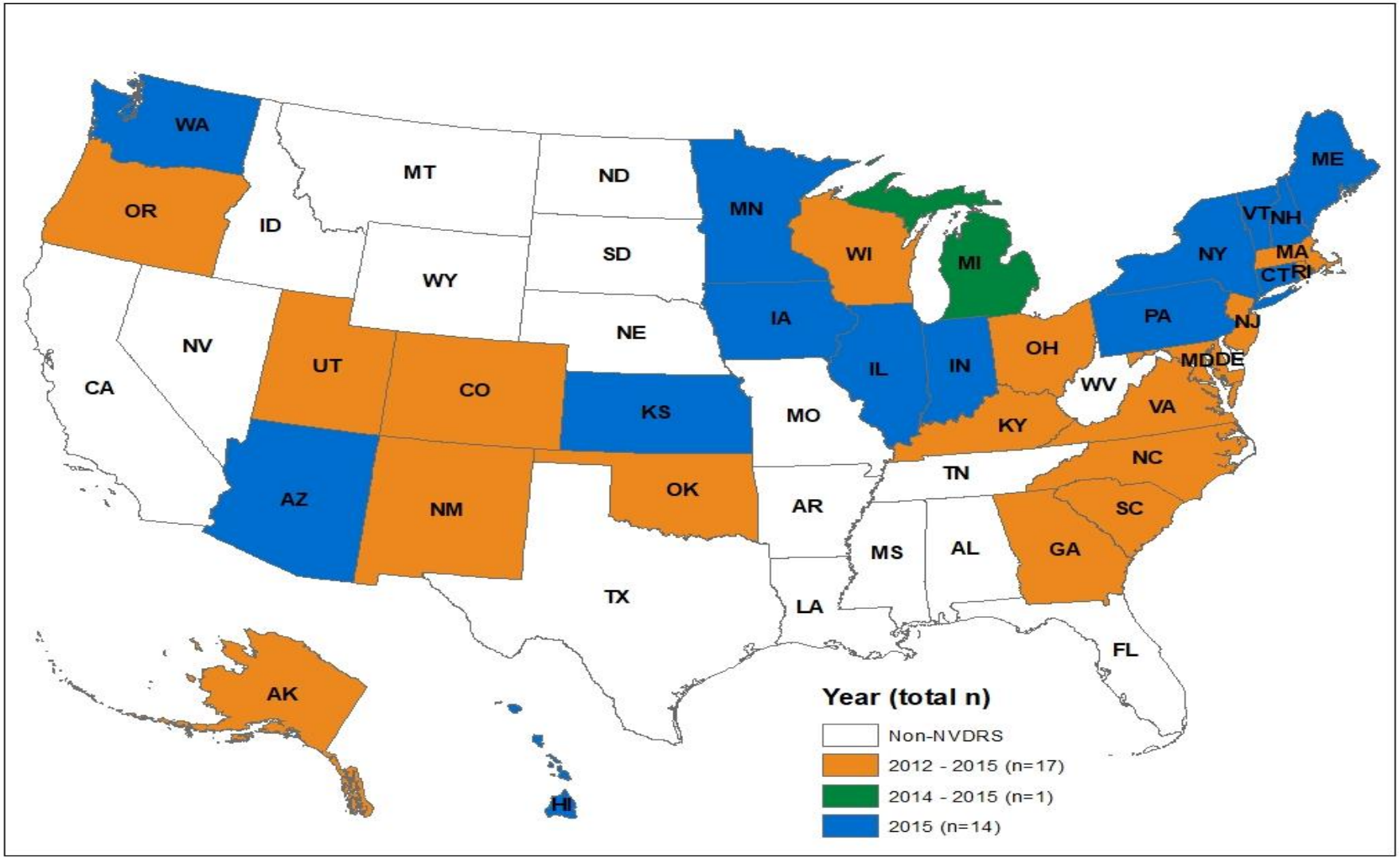
Table 4. Results for the final multinomial logistic regression model for method of lethality and predictors in child maltreatment-related homicides (*N* = 797)

	aOR (95% CI)			
	Abusive Head Trauma versus Other	**Abusive Head Trauma versus Gunshot**	**Abusive Head Trauma versus Beating/ Bludgeoning**	**Abusive Head Trauma versus Asphyxiation**
Victim-Perpetrator Relationship				
Biological Father	1.00	1.00	1.00	1.00
Mother's Male Companion	0.67 (0.30, 1.49)	0.23 (0.08, 0.70)**	1.98 (1.02, 3.88)***	0.49 (0.19, 1.29)
Mother	9.01 (3.35, 24.20)*	2.73 (0.76, 9.75)	1.78 (0.67, 4.76)	8.45 (2.94, 24.27)*
Other	1.12 (0.45, 2.81)	0.38 (0.10, 1.44)	1.68 (0.74, 3.82)	0.53 (0.16, 1.75)
Victim Age	1.39 (1.14, 1.69)*	1.86 (1.51, 2.29)*	1.33 (1.10, 1.62)**	1.39 (1.13, 1.62)**
Child's Crying Behavior (*Ref = No)*	0.18 (0.06, 0.52)**	--	0.14 (0.06, 0.32)*	0.76 (0.27, 2.16)
History of Abuse (*Ref = No)*	0.46 (0.24, 0.90)***	0.05 (0.02, 0.19)*	0.95 (0.53, 1.17)	0.34 (0.15, 0.74)**
Age of Perpetrator	1.02 (0.99, 1.06)	0.99 (0.95, 1.05)	0.97 (0.94, 1.00)	0.99 (0.95, 1.04)
Drugs/Alcohol Involved (*Ref = No)*	8.93 (2.85, 28.01)*	7.05 (1.90, 26.21)**	3.80 (1.23, 11.72)***	4.70 (1.37, 16.11)***
Intimate Partner Violence (*Ref = No)*	2.10 (0.71, 6.17)	8.67 (2.60, 28.91)*	0.53 (0.18, 1.59)	4.09 (1.30, 12.90)***
Parental Relationship Conflict (*Ref = No)*	1.98 (0.40, 9.77)	9.17 (1.78, 47.18)**	0.21 (0.03, 1.58)	4.38 (0.87, 22.02)
Argument (*Ref = No)*	3.69 (0.71, 19.21)	13.85 (2.51, 76.52)**	1.70 (0.34, 8.54)	3.44 (0.62, 19.25)
Bystander Effect (*Ref = No)*	2.51 (1.04, 6.04)	0.54 (0.09, 3.11)	2.31 (1.04, 5.14)***	1.01 (0.34, 3.01)
AIC: 2394.152				

Notes: --: No frequencies available; aOR- Adjusted Odds Ratio; AIC: Akaike Information Criterion; CI: Confidence Interval; Statistical Significance is indicated at *$p < 0.001$, **$p < 0.01$, ***$p < 0.05$, significance levels.

APPENDIX A

Map that depicts what year National Violent Death Reporting System (NVDRS) data are available for each state in the United States



APPENDIX B
Coding Manual for Child Maltreatment-Related Homicides in the National Violent Death Reporting System 2012-2015

Variable Name	Variable Definition	Valid Codes	Examples	Discussion/Notes
Child Maltreatment-Related Homicide	Child maltreatment-related homicide is defined as the death of a child, ages 0-17, caused by intentional injury resulting from abuse or neglect or where abuse or neglect was a contributing factor.	0 = no 1 = yes	**Include (1)** • Include incidents where abuse and/or neglect caused by a person serving in a caregiver role led to the fatal injury of the child victim, **and** manner of death assigned by the coroner/medical examiner is homicide. **Exclude (0)** • Incidents where manner of death assigned by the medical examiner or coroner is undetermined intent, suicide, or unintentional firearm. • Incidents whereby child was corollary victim of adult not serving in caregiver role. (e.g., child is killed by suspect during an attempted burglary)	Child maltreatment-related homicide can occur in a number of forms, including blunt force trauma, head injury, abusive head trauma, neglect, starvation, gunshot wound, shaking, drowning, poisoning, and violent physical abuse, to name a few.
Victim-Perpetrator Relationship	Description of the primary relationship of the victim to the suspect Alleged perpetrator(s) (suspects) associated with a given incident.		**Valid Codes** 1 Mother's male companion 2 Mother 3 Father 4 Other ((i.e., stepmother, father's girlfriend, grandparent, babysitter, uncle/aunt, foster or adoptive parent, family friend)	Suspect/victim relationship is identified whereby: • Law enforcement identified the suspect in law enforcement narrative • Suspect is identified in the coroner/medical examiner report

				• Narrative states that suspect was arrested as a perpetrator in this death • Narrative states that suspect was charged as a perpetrator in this death • Narrative states that suspect was prosecuted as a perpetrator in this death • Narrative states that suspect was convicted as a perpetrator in this death
Method of Lethality	The coroner/medical examiner's report or death certificate clearly identifies a method of lethality (cause of death)		1 Abusive Head Trauma 2 Other Nonspecific Physical Injury/Abuse 3 Gunshot wound 4 Bludgeoning/Beating 5 Asphyxiation	
Work		0 = no 1 = yes	**Yes (1)** Perpetrator tasked with the supervision of the child victim while the other parent (e.g., mother) was at work, and the fatal injury occurred during this time of supervision. **No (0)** • Perpetrator was not tasked with the supervision of the child victim while the other parent (e.g., mother) was at work, and the fatal injury did not occur during this time of supervision.	Narrative states that the perpetrator was left with the child while the other parent (e.g., mother) was at work.

Previous Nonfatal Injury	The child decedent has signs of nonfatal injury(ies)	0 = no 1 = yes	**Yes (1)** • Anatomical evidence of old or healing injuries (e.g., hospital examination, Coroner or Medical Examiner report). For example, use of the words "previous, old, or healing scars, fractures, tears, injuries, wounds" may be present in the narratives. **No (0)** • Situation where there is **no** use of the words "previous, old, or healing scars/fractures/tears/injuries/wounds " contained in the narratives.	
Bystander Effect	Family member or other adult(s) either witnessed the decedent being abused/neglected by the perpetrator in the present, past or were at least aware of existing abuse and failed to intervene.	0 = no 1 = yes	**Yes (1)** • The narratives state that a family member or other adult either witnessed the decedent being abused/neglected by the perpetrator in the past **or** were at least aware of abuse and failed to intervene. • The narratives state that a family member or other adult was aware of child being apprehensive or afraid of the perpetrator and they failed to intervene. • The narratives state that an adult (e.g., spouse, boyfriend, girlfriend) who either participated in abuse, failed to protect the child from abuse, or encouraged the abuse, was also charged as a suspect.	Below are a few examples of how to code this variable: Include situation where a family member or adult stated that they witnessed the suspect holding the child by the neck a month prior to the death and there is no mention of them intervening. Include situation where a family member or adult stated that the child had recently become afraid of being left alone with the perpetrator.

			No (0) • Situation where there is **no** mention of family member(s) or other adult(s) witnessing the decedent being abused/neglected by the perpetrator in the past in the narratives. • Situation where there is **no** mention of family member(s) or other adult(s) being aware of abuse described in the narratives. • The narratives do not state that a family member(s) or other adult(s) was aware of child being apprehensive or afraid of the perpetrator. • Situation where a bystander intervened to try to stop the violence or reported the abuse to a person in position of authority (e.g., law enforcement, Child Protective Services).	
Mental Illness	Situation where the perpetrator is being described as currently having a mental illness or mood disorder.	0 = no 1 = yes	**Yes (1)** • The narratives state that the perpetrator had a known mental illness diagnosis. • The narratives state that family member(s) or witness(es) describe the perpetrator as being mentally ill. • The narratives state that family member(s) or witness(es) describe the perpetrator as talking/thinking irrationally prior to inflicting the fatal injury.	Include even if the incident was not directly related to mental illness (mental illness was incidental) Below are a few examples of how to code this variable: Include situation where perpetrator threatened to shoot the homeowner with a bow and arrow, and indicated that this person had been in his head and telling him to kill his whole family.

			• Perpetrator was actively psychotic or evidencing psychotic symptoms (e.g., hallucinations, delusions, paranoia, mania) or had a known psychotic disorder that may explain their behavior. • Perpetrator had history of mental illness and this was seen as the primary cause of suspect's behavior (e.g., perpetration of the homicide). • Mental health problem is noted even if the timeframe is unclear (as in "history of depression"), or if the person was seeking mental health treatment or someone was seeking treatment on his or her behalf (e.g., "family was attempting to have him hospitalized for psychiatric problems"). **No (0)** • The narratives do not mention that the perpetrator had a known mental illness diagnosis. • The narratives do not state that family member(s) or witness(es) describe the perpetrator as being mentally ill. • The narratives do not state that family member(s) or witness(es) describe the perpetrator as talking/thinking irrationally prior to inflicting the fatal injury.	Include situation where perpetrator's actions could not be determined other than a possible psychotic break. Include situation where the perpetrator had a history of unspecified psychiatric problems including unreasonable suspicions of people wanting to steal her child, and had been to emergency room for the psychiatric issues, but had never followed up on appointments made with the outpatient psychiatrists.

Child Protectives Services	Family was known to Child Protective Services (CPS)/Child Welfare Services/Department of Children and Families – (DCF)/ Department of Children and Family Services (DCFS), Department Social Services/DSS, and Department of Family and Children Services (DFCS)	0 = no 1 = yes	**Yes (1)** • Family had an open case with CPS at the time of child's death. • Family had a closed case with CPS related to child abuse or neglect of decedent or siblings of decedent. **No (0)** • Family did not have an open case with CPS. • Family did not have a closed case with CPS case related to child abuse or neglect of decedent or siblings of decedent. • There is **no** mention contained within the narratives that the family was known to Child Protective Services (CPS)/Child Welfare Services/Department of Children and Families – (DCF)/ Department of Children and Family Services (DCFS), Department Social Services/DSS, and Department of Family and Children Services (DFCS)	Open case is defined as CPS is providing child protection and is responsible for investigating suspected incidents of child maltreatment. Incident does not have to be substantiated to be coded as "yes".
History of Abuse	This variable captures victim's experiences of abuse and neglect irrespective of its relationship to the violent death.	0 = no 1 = yes	**Yes (1)** • If the evidence of ongoing abuse is suspected, but not confirmed. • If autopsy or hospital examination evidence reported an indication of	

	The victim had a history of abuse (physical, sexual, or psychological) or neglect (physical, including medical/dental, emotional, or educational neglect; or exposure to violent environments or inadequate supervision) as a child. The child decedent has a documented or suspected history of abuse.		previous abuse (e.g., anatomical evidence of old or healing injuries). • Perpetrator was accused of prior abuse and/or neglect of the child victim. • Perpetrator was under investigation by CPS for suspected or substantiated abuse or neglect of the child victim. **No (0)** • Situation where there is **no** evidence or mention of prior or history of abuse.	
Drugs/Alcohol	Drug and alcohol involvement	0 = no 1 = yes	**Yes (1)** • Narratives mention perpetrator was high or drunk at the time of fatal injury. • Narratives mention toxicology report indicates perpetrator used some drug or substance during the commission of the alleged incident. • Narratives mention a history of perpetrator's drug use even if the perpetrator's was not high or drunk at the time of the incident • Narratives mention drugs and/or alcohol paraphernalia was found at the scene of the crime. • Narratives mention toxicology report indicates some drug or substance was found in the decedent.	Include even if the incident was not directly related to substance use (substance use was incidental)

			No (0) • Narratives do not mention alcohol or drugs.	
Crying	Situation where a perpetrator inflicted the fatal injury onto the child because the child was crying.	0 = no 1 = yes	**Yes (1)** • Perpetrator shook or struck the child because the child would not stop crying or because the child was crying. • Crying was the precipitating circumstance that led the perpetrator to inflict the fatal injury onto the child. **No (0)** • The narrative does not indicate that crying was the precipitating circumstance that led to the fatal injury. • Do not include incidents whereby someone heard the child crying, but it is not indicated in the narrative that crying is what led the perpetrator to inflict the fatal injury.	Include situations where the narratives state that the perpetrator shook or struck child due to child crying. (e.g., child crying inconsolably; thus, the perpetrator shook the child to get them to stop crying).
Intimate Partner Violence	Identifies cases in which the homicide is related to immediate or ongoing violence between current or former intimate partners. This includes all deaths where a victim is	0 = no 1 = yes	**Yes (1)** • A fatal incident in which an intimate partner kills their current or former intimate partner (e.g., husband kills wife) or where intimate partner conflict contributed to the death of the victim.	The term "intimate partner violence" describes physical violence, sexual violence, stalking and psychological aggression (including coercive acts) by a current or former intimate partner, defined as a person who is or has been in a relationship of a romantic or intimate nature with the suspect.

	killed by their current or former intimate partner. For all intimate partner-related variables intimate partner ±is defined as a current or former girlfriend/boyfriend, dating partner, ongoing sexual partner, or spouse.		• Situation where the narratives indicate domestic violence/intimate partner violence was present. • Cases in which one intimate partner kills their partner's new or former intimate partner (e.g., Ex-husband kills his ex-wife's new boyfriend), or the person the partner is having an affair with (e.g., husband kills the man his wife had an affair with). **No (0)** • Situation where the narratives do not indicate domestic violence/intimate partner violence was present.	
Argument	This variable identifies violent deaths where a specific argument was perceived as related to the death. There must be a specific argument or disagreement that is referenced in the narrative.	0 = no 1 = yes	**Yes (1)** • Narrative describes an argument between suspect and either child victim or other adult, which preceded the fatal event. **No (0)** • Narrative does not describe an argument between suspect and either child victim or other adult, which preceded the fatal event.	Example may include the husband has a bad argument with his estranged wife the day before he killed child victim.
Parental Relationship Conflict		0 = no 1 = yes	**Yes (1)** • In the narrative, suspect was described as having relationship issues with other adult e.g., wife, girlfriend, ex-girlfriend, ex-wife, husband, ex-husband, boyfriend, etc.) at the time of fatal event. Narrative must describe these	

			conflicts. Words to hone in on (estranged, separated, impending divorce, custody dispute, etc.) • If at the time of the incident the victim was experiencing problems with a current or former intimate partner, such as a divorce, break-up, argument, jealousy, conflict, or discord, and this appears to have contributed to the death. • Narrative indicates that the victim was "having relationship problems". • Custody disputes when the victim is a child because the relationship problem in these instances is typically not with a child or other non-intimate partner family member, but the custody dispute affects the relationship of the parent and child. • Narrative contains an explanation of the relationship problem and identifies the individual with whom the perpetrator or adult victim (e.g., mother of child victim) had a problem. **No (0)** • Situation where there is not mention of relationship conflict/relationship issues mentioned in the narrative.	
Homicide/Suicide	Situation where the perpetrator kills one or more other persons, including the child victim,	0 = no 1 = yes	**Yes (1)** • The narratives indicate the fatal injury of the child victim preceded	

	immediately before or at the same time as killing oneself.		or occurred at the same time the perpetrator killed him or herself. **No (0)** • Situation where there is only a child victim, and the perpetrator is not indicated as a suspect/victim in the narrative.	