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# Household Composition and Risk of Fatal Child Maltreatment

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**ABSTRACT.** *Objective.* Approximately 2000 children die annually in the United States from maltreatment. Although maternal and child risk factors for child abuse have been identified, the role of household composition has not been well-established. Our objective was to evaluate household composition as a risk factor for fatal child maltreatment.

*Methodology.* Population-based, case-control study using data from the Missouri Child Fatality Review Panel system, 1992–1994. Households were categorized based on adult residents' relationship to the deceased child. Cases were all maltreatment injury deaths among children <5 years old. Controls were randomly selected from natural-cause deaths during the same period and frequency-matched to cases on age. The main outcome measure was maltreatment death.

*Results.* Children residing in households with adults unrelated to them were 8 times more likely to die of maltreatment than children in households with 2 biological parents (adjusted odds ratio [aOR]: 8.8; 95% confidence interval [CI]: 3.6–21.5). Risk of maltreatment death also was elevated for children residing with step, foster, or adoptive parents (aOR: 4.7; 95% CI: 1.6–12.0), and in households with other adult relatives present (aOR: 2.2; 95% CI: 1.1–4.5). Risk of maltreatment death was not increased for children living with only 1 biological parent (aOR: 1.1; 95% CI: 0.8–2.0).

*Conclusions.* Children living in households with 1 or more male adults that are not related to them are at increased risk for maltreatment injury death. This risk is not elevated for children living with a single parent, as long as no other adults live in the home. *Pediatrics* 2002; 109:615–621; *epidemiology, injury, child abuse and neglect, fatalities, mortality, maltreatment, case-control study, death, risk factors, behavior.*

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ABBREVIATIONS. CFRP, Missouri Child Fatality Review Panel; SIDS, sudden infant death syndrome; aOR, adjusted odds ratio; CI, confidence interval.

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Maltreatment of children causes an estimated 2000 deaths annually in the United States.<sup>1</sup> Ninety percent of these deaths occur among children <5 years of age, making maltreatment the leading cause of injury fatality in this age group.<sup>1,2</sup> Reports of fatal child abuse and neglect as well as child homicide rates are rising steadily.<sup>3–5</sup> However, methodologic challenges in child maltreatment research have hampered identification of important risk factors and the development of effective prevention strategies.<sup>6</sup>

Several studies have identified the following maternal risk factors for fatal child maltreatment and child homicide<sup>3,5,7–13</sup>: young maternal age,<sup>3,5,8,9,12,13</sup> <12 years of maternal education,<sup>3,5,8,9</sup> late or no prenatal care,<sup>3,5,9,12,13</sup> unmarried parents,<sup>3,8,9,12</sup> black race,<sup>3,5,12,13</sup> and higher parity.<sup>13</sup> Child characteristics that are risk factors include male gender<sup>9,13</sup> and low birth weight.<sup>3,7,8,12</sup> Previously documented maltreatment is a strong risk factor for child homicide.<sup>10,11</sup> These studies are limited by their lack of information on household composition at the time of the child's death. Another limitation is their use of death certificate designation of homicide or intentional injury as the criterion for maltreatment. Because most maltreatment deaths are neither intentional nor homicide, studies that use those narrower terms to define maltreatment miss more than half of the cases.<sup>2,4</sup>

The association of household composition with child maltreatment has been studied for over 20 years. The earliest reports identified substantial proportions (35%–54%) of maltreated children in single-parent households and in stepfamilies.<sup>14–16</sup> Subsequent studies suggest an increased risk of maltreatment in such households.<sup>17–21</sup> However, these studies are descriptive, lack a nonabused comparison group, and do not control for confounding. To adequately determine risk factors for fatal child maltreatment, researchers need data on maternal, child, and family factors, including household composition.<sup>6,22</sup>

To better recognize fatal maltreatment of children, the state of Missouri in 1991 mandated the Missouri Child Fatality Review Panel (CFRP) system. This system ensures that child deaths (birth through age 17) are comprehensively reviewed and that standardized data are collected.<sup>23–25</sup> Because standard items include household composition—people living in the decedent child's household at the time of death and their relationships to the child—the CFRP data are uniquely suited to evaluate risk factors for maltreatment fatality, including household composition.

We report here a case-control study of household composition and risk of fatal child maltreatment using these CFRP data.

## METHODS

### Population and Data Sources

Our study population included all Missouri resident children <5 years of age who died in Missouri from January 1, 1992, to December 31, 1994. State law mandates that each county CFRP collect and record information on each deceased child. First, the county coroner or medical examiner and Chair of the Child Fatality Review Team systematically review each child death and complete a data Form 1. Then, a county-level interdisciplinary child fatality review team—including law enforcement, child protective services, public health, medicine, the coroner or medical examiner, and the county prosecuting attorney—convenes to further review deaths that meet any of 19 criteria (Table 1), and complete a data Form 2. Deaths not meeting these criteria may also be reviewed at the discretion of the panel chair. In addition to gathering detailed information on the circumstances of each death, data on household members and their relationship to the decedent children are gathered on all deceased children, regardless of cause of death, even if the county CFRP team does not review the death. These household composition data include the number of children in the household; the parent or guardian's marital status; the number of adults in the household; how the adults were related to the child decedent and to each other; their age and gender; plus the deceased child's age, race, gender, and county of residence. For each decedent, we obtained and linked the completed CFRP data forms, the computerized CFRP data file, documentation of substantiated child abuse and neglect, Medicaid eligibility status, birth certificate data, and death certificate data. All children with a Missouri death certificate had a matched CFRP form, and 95% had a matched birth certificate.

The study protocol was exempted from review by the institutional review board at the University of Missouri Health Sciences Center.

### Case Definition

Our case definition of maltreatment is based on the definition of the National Institute of Child Health and Human Development Working Group on Standard Definitions for Child Injury Data: "Child maltreatment is behavior directed toward a child, which is outside the norms of conduct, and entails a substantial risk of causing physical or emotional harm. Behaviors include both actions and omissions (failure to act), and may be intentional or unintentional."<sup>26</sup> We defined maltreatment injuries as those that were either inflicted directly by a parent or other adult caregiver responsible for the child at the time of injury, or that resulted when the parent or caretaker failed to protect the child

from a hazardous circumstance. These failure-to-protect deaths were considered maltreatment if the adult responsible for the child was not present at the time of the fatal injury event, failed to use legally mandated safety protective devices (car seats or water flotation devices), or was present but was not capable of protecting the child (intoxicated). Examples of hazardous circumstances include handling a loaded gun, playing with a cigarette lighter, or playing near a body of water or busy street.

Three authors (M.N.S., P.A., B.G.E.) manually reviewed all hard copy data sources on all children less than age 5 who died from an injury and whose death had been reviewed by the full CFRP ( $N = 291$ ). The investigators examined the injury circumstances and identified deaths meeting the maltreatment case definition. We included cases regardless of whether the death occurred in or out of the home, and regardless of the relationship of the person in charge of the child at the time of death. When the circumstances of a death were unclear, or when the files contained conflicting information, we obtained copies of the autopsy reports, reviewed the circumstances with the State Technical Assistance Team for the CFRP system, and/or consulted a forensic pathologist for a recommendation to guide our decision. We excluded deaths that remained undetermined or that lacked sufficient information to be classified as maltreatment.

### Selection of Controls

Children under age 5 who died of natural causes were eligible to serve as controls. We excluded natural cause deaths related to prematurity or congenital anomalies because the majority of these children died before hospital discharge and therefore were never members of a household in the same manner as cases. Deaths related to "unmet needs" were also excluded. We included sudden infant death syndrome (SIDS) deaths as natural-cause deaths. SIDS is a diagnosis of exclusion for the unexplained sudden death of an infant <1 year old after 1) thorough case investigation, including performance of an autopsy, 2) examination of the death scene, and 3) review of the clinical history.<sup>27</sup> Missouri's mandatory CFRP review of all unexplained deaths among children <1 year of age leaves little likelihood that a child abuse death could be misclassified as a SIDS death.

Controls were randomly selected from the eligible deaths and frequency-matched to cases by age at death. This matching was by month of age for children <12 months old and by year of age for children 1 through 4 years old. Our goal was to match 2 controls to each case. To ensure the deaths were in fact attributable to natural causes and that SIDS criteria were documented, we randomly selected and reviewed 10% of controls. This review confirmed that the random sample of controls died of natural causes or SIDS.

### Classification of Household Composition

We classified households into 5 mutually exclusive categories: households with 1) 2 biological parents of the deceased child and no other adults, 2) 1 biological parent and no other adults, 3) 1 or 2 biological parents and another adult relative resident (grandmother, aunt, etc), 4) at least 1 step, foster, or adoptive parent, and 5) 1 or 2 biological parents and another, unrelated adult resident (paramour, friend). Households in categories 3 through 5 with residents in >1 category were coded using the following hierarchy. Households with an unrelated adult present were classified in the last category, regardless of other household members. Households with a step, foster, or adoptive parent in addition to another relative were categorized in the step, foster, adoptive parent group. Households with 2 biological parents and no other adult residents were the reference group for analysis.

### Statistical Analysis

We examined univariate and bivariate distributions of the variables of interest. We calculated odds ratios using logistic regression. The odds ratio provides an estimate of the relative risk of maltreatment death associated with the particular household composition category.

Adjusted odds ratios (aORs) were calculated with logistic regression, controlling for confounding factors. Based on preliminary analyses, potential confounding variables (those related to both household composition and maltreatment death) were the child's sex, race, age, and Medicaid-eligibility status; mother's age,

**TABLE 1.** Criteria for Child Fatality Review by the Full, Multidisciplinary County Panel, Missouri, 1992-1994

Sudden unexplained death, age <1 y
Death unexplained/undetermined manner
Division of Family Services reports on the decedent or other persons in the residence
Decedent in Division of Family Services custody
Possible inadequate supervision
Possible malnutrition or delay in seeking medical care
Possible suicide
Possible inflicted injury
Any firearm injury
Injury not witnessed by person in charge at the time of injury
Death attributable to confinement
Bathtub or bucket drowning
Suffocation or strangulation
Any poisoning
Severe unexplained injury
Pedestrian vehicle/driveway injury
Suspected sexual assault
Death attributable to any fire injury
Other suspicious findings (in injuries such as electrocution, crush injury, or fall)

education, and late or no prenatal care; the presence of siblings under age 5 in the household, and a previous Division of Family Services substantiation of abuse. We considered a variable to be a confounder if inclusion in the logistic regression model resulted in a change in the effect estimate of 10% or more.<sup>28</sup> Missing data were imputed. Imputation is less biased than deleting records with missing values when developing multivariable models.<sup>29</sup> Missing data were coded to the low-risk or reference category for that variable. For example, "mother's education" was missing for 49 (10.4%) of the 471 study participants, and these were coded as "high school graduate."

### Subgroup Analyses

To evaluate whether the association between household composition and maltreatment death might differ for deaths caused by inflicted injuries versus deaths from exposure to hazards, we conducted 2 separate logistic regression analyses, 1 for each of these subgroups.

We conducted 2 additional subgroup analyses to determine whether the effects of household composition were different for homicide cases, and substantiated child abuse or neglect cases. Most studies of child maltreatment have used the homicide designation on the death certificate or substantiation of child abuse or neglect by the appropriate state agency to define maltreatment. Although we believe that these case definitions lead to substantial misclassification and missed cases, we performed these analyses so our findings could be compared with previous literature.

## RESULTS

There were 2591 Missouri resident children under age 5 that died in Missouri from 1992 through 1994. A total of 952 deaths related to congenital malformations (427), prematurity (259), and other or undetermined cause of death (266) were excluded, leaving 1639 deaths for study (Fig 1). Of the 291 injury deaths, 175 (60%) met the study definition of maltreatment; 296 controls were selected from the 1348 eligible noninjury deaths. We were unable to select 2 controls for each case because of a lack of eligible 2- and 3-year-old controls.

In 55 (31%) of the 175 maltreatment deaths, a parent or other caregiver directly inflicted the fatal injury. Of these, 39 (71%) were inflicted by shaking, dropping, or hitting the child; 11 (20%) involved the use of physical objects including firearms; and the method of injury for the remaining 5 (9%) inflicted injury deaths was unknown.

One hundred twenty (69%) maltreatment deaths

resulted when a parent or caregiver failed to protect the child from a hazard. These deaths resulted from fires (37, 31%), drowning (31, 26%), unsafe sleeping arrangements (17, 14%), motor vehicles (17, 14%), choking or strangulation (8, 7%), and other miscellaneous hazards, including falls from heights, poisons, and electrocution (10, 8%).

Select child, maternal, and household variables are presented in Table 2. Compared with controls, children who died of maltreatment were more likely to be male, black, and the third or later child born to their mother. Their mothers were more likely to have been unmarried, have had less than a high school education when the child was born, and to have sought prenatal care after the fourth month of pregnancy, or not at all. Case children also were more likely to have resided in households: 1) including another relative, step-parent, or unrelated adult resident, 2) where siblings <5 years old also lived, and 3) where abuse or neglect had been previously substantiated. Additional variables such as birth weight and gestational age were evaluated in the univariate and bivariate analyses but were not used in additional analyses because we found no differences between cases and controls. The age and education of the child's father had over 40% of missing values, and were not analyzed further.

### Household Composition and Risk of Maltreatment Death

Children residing in households with adults unrelated to them had the highest risk of maltreatment death compared with decedent children residing in households with 2 biological parents and no other adults (aOR: 8.8; 95% confidence interval [CI]: 3.6–21.5; Table 2). Children in households with step, foster, or adoptive parents also had an increased risk of maltreatment death (aOR: 4.7; 95% CI: 1.6–12.0) as did children in households with other relatives present (aOR: 2.2; 95% CI: 1.1–4.5).

The majority (83%) of households with at least 1 unrelated adult resident consisted of the child's biological mother and her boyfriend. Similarly, >70% of

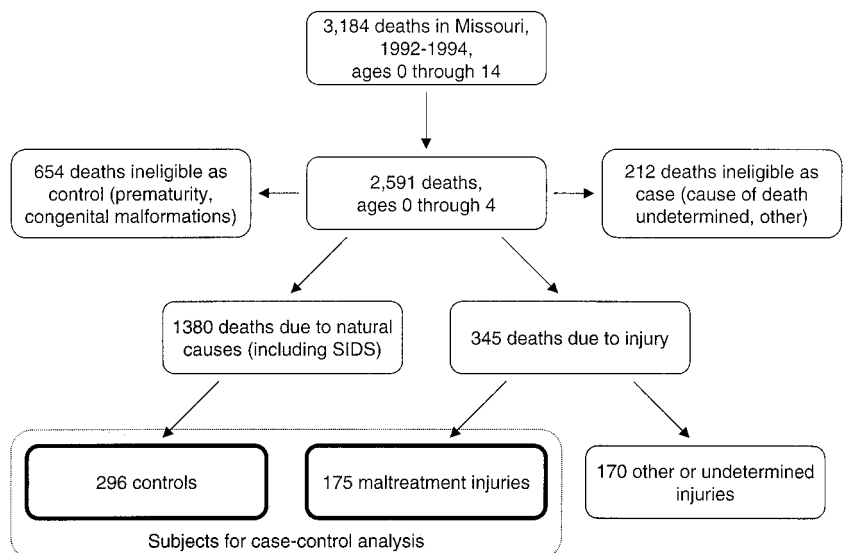


Fig 1. Selection of cases and controls from population of children who died in Missouri, 1992–1994.

**TABLE 2.** Distribution of Select Child, Maternal, and Household Variables for Cases and Controls

Variable (Number Missing)	Cases (%)	Controls (%)	Odds Ratio (95%CI)
<b>Child variables</b>			
<b>Sex</b>			
Male	117 (67)	162 (55)	1.7 (1.1–2.5)
Female	58 (33)	134 (45)	Reference
<b>Race</b>			
Black	63 (36)	78 (26)	1.6 (1.1–2.4)
White/other	112 (64)	218 (74)	Reference
<b>Age at death</b>			
<1 y old	65 (37)	115 (39)	1.5 (0.8–3.1)
1 y old	39 (22)	75 (25)	1.4 (0.7–3.0)
2 y old	33 (19)	38 (13)	2.3 (1.1–5.1)
3 y old	25 (14)	33 (11)	2.0 (0.9–4.6)
4 y old	13 (7)	35 (12)	Reference
<b>Medicaid eligibility</b>			
Eligible	96 (55)	147 (50)	1.2 (0.9–1.8)
Not eligible	79 (45)	149 (50)	Reference
<b>Birth order (24)</b>			
Third or subsequent	83 (47)	87 (29)	2.2 (1.4–3.5)
Second child	38 (22)	81 (27)	1.1 (0.6–1.9)
First child	48 (27)	110 (37)	Reference
<b>Maternal variables</b>			
<b>Age at child's birth (29)</b>			
<20 y old	44 (25)	60 (20)	1.2 (0.8–1.9)
≥20 y old	127 (73)	211 (71)	Reference
<b>Education at child's birth (49)</b>			
Less than high school	82 (47)	96 (32)	1.7 (1.1–2.5)
High school graduate	82 (47)	162 (55)	Reference
<b>Marital status at child's birth (46)</b>			
Not married	98 (56)	121 (41)	1.8 (1.2–2.6)
Married	65 (37)	141 (48)	Reference
<b>Month of first prenatal visit (49)</b>			
None	8 (5)	8 (3)	1.7 (0.6–5.2)
5th–9th month	35 (20)	35 (12)	1.7 (1.0–3.0)
1st–4th month	123 (70)	213 (72)	Reference
<b>Household variables</b>			
<b>Household composition*</b>			
One biological parent only	41 (23)	83 (28)	1.2 (0.8–2.0)
Other relative present	20 (11)	20 (7)	2.5 (1.3–4.9)
Step, other parent present	14 (8)	7 (2)	5.0 (2.1–12.0)
Other, unrelated adult present	29 (17)	7 (2)	10.3 (4.9–21.9)
Two biological parents only	71 (41)	177 (60)	Reference
<b>Siblings under the age of 5 (42)</b>			
Yes	102 (58)	92 (31)	3.1 (2.1–4.6)
No	62 (35)	173 (58)	Reference
<b>Previous Division of Family Services substantiation of abuse</b>			
Yes	19 (11)	5 (2)	7.1 (2.9–17.1)
No	156 (89)	291 (98)	Reference
<b>Residence</b>			
Urban	72 (41)	126 (43)	0.9 (0.7–1.4)
Nonurban	103 (59)	170 (57)	Reference

\* Two controls lived in institutions, not residences, at the time of their death so they were not included in the household composition classification.

the case households (and only 30% of control households) in the step, foster, and adoptive category contained a biological mother and stepfather. Therefore, the increased risk of maltreatment death we found occurs primarily in households including biologically unrelated adult males and boyfriends of the child's mother. Thirty-nine percent of our control children resided in households with only 1 biological parent. Risk was not increased for children in households with 1 biological parent and no other adult residents. Based on national data on household composition from the Federal Interagency Forum on Child and Family Statistics,<sup>30</sup> we calculated a population attributable risk of 12% for households with single mothers and their partners, and 8% for stepparent households. In our study, the partners were

mainly boyfriends; the identity of the partners were not specified in the Federal Interagency Forum on Child and Family Statistics data.

#### Subgroup Analyses

We considered subgroups of maltreatment deaths by inflicted injury and exposure to hazardous circumstances. aORs for each household category were similar to findings for all maltreatment deaths, except for households with an unrelated adult (Table 3). Nineteen (34%) of the 55 children who died of inflicted injuries lived in households with a stepparent<sup>4</sup> or another unrelated adult.<sup>15</sup> Most of these injuries (15 of 19) were inflicted by the mother's boyfriend or child's stepfather. The risk of death attributable to an inflicted injury among children in

**TABLE 3.** aOR for the Association Between All Maltreatment Deaths, Deaths Attributable to Inflicted Injuries, and Deaths Attributable to Exposure to Hazards, and the Relationship of the Deceased Child to the Adults in the Household (Household Composition)

Household Composition	aOR* (95% CI) for All Maltreatment Deaths (n = 175)	aOR† (95% CI) for Deaths Attributable to Inflicted Injury Only (n = 55)	aOR‡ (95% CI) for Deaths Attributable to Exposure to Hazards Only (n = 120)
Two biological parents only	Reference	Reference	Reference
One biological parent only	1.1 (0.8–2.0)	0.9 (0.3–2.1)	1.4 (0.8–2.4)
Other relative present	2.2 (1.1–4.5)	2.2 (0.7–6.7)	2.2 (1.0–4.9)
Step, foster, adoptive parent	4.7 (1.6–12.0)	5.0 (1.1–22.9)	5.1 (1.7–15.3)
Other, unrelated adults present	8.8 (3.6–21.5)	26.9 (7.2–100.2)	6.5 (2.3–18.1)

\* Adjusted for presence of siblings under age 5 in the household, and previous Division of Family Services substantiation of abuse.

† Adjusted for the decedent's age, race, and medicaid status, mother's age and month of first prenatal visit, presence of siblings under age 5 in the household, and previous Division of Family Services substantiation of abuse.

‡ Adjusted for the decedent's Medicaid status, mother's education, presence of siblings under age 5 in the household, and previous Division of Family Services substantiation of abuse.

households with another unrelated adult was 27 times the risk of natural death.

Two additional subgroup analyses considered the 52 (30%) maltreatment deaths recorded as homicides on death certificates and the 78 (45%) deaths substantiated as child abuse or neglect fatalities by the Missouri Department of Social Services (Table 4). The aORs for step, foster, and adoptive parent households were again somewhat higher, and they were markedly higher for households with unrelated adults than for our broader maltreatment case definition.

#### Perpetrators

We had perpetrator information for most of the 55 maltreatment deaths that resulted from an inflicted injury (Table 5). Of these 21 children, 38% sustained injuries inflicted by a biological parent (18% by the biological mother and 20% by the biological father). Fourteen of the children (25%) were injured by their mother's boyfriend, whereas only 1 child (2%) was injured by their father's girlfriend. The perpetrator was unknown or not identified for 7 children (13%). Table 5 also identifies the household composition category of the decedent child. It is worth noting, however, that perpetrators were not necessarily residents of the decedent child's household.

### DISCUSSION

Our study shows that Missouri children who died from maltreatment injury were more likely to reside in households with an unrelated adult, primarily an adult male, than were children who died of natural causes. This study also clarifies the role of single-parent households as a risk factor for maltreatment death. We found that children who died from mal-

treatment injury were no more likely than controls to live in households with a single biological parent—as long as there were no other adults in the household. Previous studies have not measured household composition or were unable to control for multiple variables. Our study design and unique data allowed us to determine that 2 key risk factors are living with a stepfather or the mother's boyfriend. This is the first population-based case-control study to document an increased risk of maltreatment death in households where men unrelated to the decedent child reside and the first to show that the increased risk in single-parent households is present only when other adults also reside in the house.

Our findings support previous studies and add important new information to this body of literature. A majority (58%) of our maltreated children resided in households with only 1 biological parent (with or without other adults). This proportion is similar to the 35% to 57% of abused children residing with single-parent families or stepfamilies cited in the literature.<sup>14–16,19</sup>

In contrast to past research, we found no increased risk of maltreatment death in households with a single biological parent and no other adult resident. This may be attributable to our ability to categorize households with only 1 biological parent separately from households that also had other adults. For example, the Third National Incidence Study of Child Abuse and Neglect reported that children living with single parents had 77% and 87% greater risk, respectively, of harm by physical abuse and physical neglect compared with children living with 2 parents.<sup>21</sup> No additional household composition data were reported. Our findings suggest that the National Incidence Study findings may reflect the increased risk

**TABLE 4.** aOR for Homicide Deaths and Substantiated Abuse and Neglect Deaths

Household Composition	aOR* (95% CI) for Homicide Deaths (n = 52)	aOR* (95% CI) for Substantiated Abuse and Neglect Deaths (n = 78)
Two biological parents only	Reference	Reference
One biological parent only	1.0 (0.4–2.5)	1.5 (0.7–3.1)
Other relative present	2.6 (0.8–8.2)	1.8 (0.6–5.1)
Step, foster, adoptive parent	6.1 (1.3–27.9)	8.3 (2.4–28.2)
Other, unrelated adults present	30.5 (8.1–115.1)	17.9 (5.5–58.8)

\* Adjusted for the decedent's age, race, and Medicaid status; mother's age and month of first prenatal visit; presence of siblings under age 5 in the household; and previous Division of Family Services substantiation of abuse.

**TABLE 5.** Household Composition Category and Perpetrator of Injury for Children Who Died of Inflicted Injuries, Missouri, 1992-1994

Perpetrator	Household Composition Category					Total
	2 Biological Parents	1 Biological Parent Only	Other Relative	Step/Foster/Adoptive	Other, Unrelated Adult	
Biological parent						
Biological mother	5	3	2			10
Biological father	8	1	1	1		11
Unrelated male						
Boyfriend of mother		1	1		12	14
Stepfather				2	1	3
Boyfriend/husband of babysitter		1	1			2
Male friend not living with mother		2				2
Related male						
Uncle			1			1
Unrelated female						
Girlfriend of father					1	1
Other						
Babysitter		1				1
Sibling/step-sibling/half-sibling <18 y old	3					3
Unknown perpetrator						
Child in care of						
Babysitter					1	1
Grandmother and aunt		1				1
Stepfather and mother				1		1
Biological mother and father	2					2
Unknown	2					2
Total	20	10	6	4	15	55

among single-parent households in which an unrelated adult male also resides.

Wilson and Daly<sup>19</sup> reported increased injury risk for children living with single mothers resulted most often from abuse, not by their mother, but by their mother's boyfriend. Our data show the same pattern. The reason children were more likely to die from maltreatment if an unrelated adult resided in the household is not clear. We suspect it may be the result of a combination of factors. Perhaps the presence of an unrelated adult in the home is a marker for instability in the household. It is also possible that unrelated adults are not as keenly involved in protecting children from harm as their biological parents. In any event, our data cannot establish cause-and-effect relationships, but it can identify associations and provide information for future avenues of research.

Our study's strengths are attributable primarily to the unique population-based CFRP data we used. These data permitted classification of injury deaths based on a definition of fatal maltreatment that was developed to guide research and prevention. This definition does not rely on knowledge of intent or on labels assigned by law enforcement, the medical examiner, or the state child protective services agency. Therefore, biases limiting much previous research—the underreporting of child abuse deaths and the misclassification of infant and child homicides as unintentional injury death—were virtually eliminated in this study.<sup>2,4,31-33</sup> The detailed CFRP data on household composition also made apparent the key role of the unrelated adult male. Although 53 children who died of SIDS served as controls, misclassification of an abuse death as SIDS would bias our results toward the null.

We view the ability to use this research definition

of maltreatment as a study strength. We believe it more accurately and completely identifies child maltreatment than the social or legal designation of child abuse and neglect. To make our findings comparable with other research or existing data, we have included subgroup analyses using the more traditional designations of substantiated child abuse or neglect and homicide.

Using a control group of children who died of natural causes is a limitation of this study. Although this design allows us to compare children who die of maltreatment with other children who die, it provides no insight on how fatally maltreated children may differ from children who lived. A second limitation is our inability to address risk factors for our reference population, the 41% of maltreatment deaths among children that resided in households with 2 biological parents and no other adults. Finally, the small number of study participants reduces the precision of effect estimates (especially in subgroup analyses) and limits analyses of other potential risk factors and interaction effects.

Maltreatment accounts for most injury deaths among young children, yet fatal maltreatment itself is relatively uncommon. Although the relative risk of fatal maltreatment is increased substantially if an unrelated adult male resides with a child, the absolute risk is relatively low. Therefore, most children in this circumstance will not die from maltreatment. Research is needed to show how household composition and other risk factors affect morbidity and mortality related to child maltreatment, and what interventions may reduce the risk. In the meantime, professionals concerned with protecting children should note the presence of unrelated adult males in the home as 1 of many factors to consider when assessing a child's risk for fatal maltreatment.

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## REFERENCES

1. McClain PW, Sacks JJ, Froehle RG, Ewigman BG. Estimates of fatal child abuse and neglect, United States, 1979 through 1988. *Pediatrics*. 1993;91:338-343
2. Ewigman B, Kivlahan C, Land G. The Missouri child fatality study: underreporting of maltreatment fatalities among children younger than five years of age, 1983 through 1986. *Pediatrics*. 1993;91:330-337
3. Brenner RA, Overpeck MD, Trumble AC, DerSimonian R, Berendes H. Deaths attributable to injuries in infants, United States, 1983-1991. *Pediatrics*. 1999;103:968-974
4. Herman-Giddens ME, Brown G, Verbiest S, et al. Underascertainment of child abuse mortality in the United States. *JAMA*. 1999;282:463-467
5. Overpeck MD, Brenner RA, Trumble AC, Trifiletti LB, Berendes HW. Risk factors for infant homicide in the United States. *N Engl J Med*. 1998;339:1211-1216
6. National Research Council. Panel on Research on Child Abuse and Neglect. *Understanding Child Abuse and Neglect*. Panel on Research on Child Abuse and Neglect, Commission on Behavioral and Social Sciences and Education, National Research Council. Washington, DC: National Academy of Sciences; 1993
7. Emerick SJ, Foster LR, Campbell DT. Risk factors for traumatic infant death in Oregon, 1973 to 1982. *Pediatrics*. 1986;77:518-522
8. Winpisinger KA, Hopkins RS, Indian RW, Hostetler JR. Risk factors for childhood homicides in Ohio: a birth certificate-based case-control study. *Am J Public Health*. 1991;81:1052-1054
9. Scholer SJ, Mitchel EF Jr, Ray WA. Predictors of injury mortality in early childhood. *Pediatrics*. 1997;100:342-347
10. Sorenson SB, Peterson JG. Traumatic child death and documented maltreatment history, Los Angeles. *Am J Public Health*. 1994;84:623-627
11. Sabotta EE, Davis RL. Fatality after report to a child abuse registry in Washington State, 1973-1986. *Child Abuse Negl*. 1992;16:627-635
12. Siegel CD, Graves P, Maloney K, Norris JM, Calonge BN, Lezotte D. Mortality from intentional and unintentional injury among infants of young mothers in Colorado, 1986 to 1992. *Arch Pediatr Adolesc Med*. 1996;150:1077-1083
13. Cummings P, Theis MK, Mueller BA, Rivara FP. Infant injury death in Washington State, 1981 through 1990. *Arch Pediatr Adolesc Med*. 1994;148:1021-1026
14. Baldwin JA, Oliver JE. Epidemiology and family characteristics of severely abused children. *Br J Prev Soc Med*. 1975;29:205-221
15. Smith SM, Hanson R, Noble S. Social aspects of the battered baby syndrome. *Br J Psychiatry*. 1974;125:568-582
16. Ebbin AJ, Gollub MH, Stein AM, Wilson MG. Battered child syndrome at the Los Angeles County General Hospital. *Am J Dis Child*. 1969;118:660-667
17. Wilson M, Daly M, Weghorst SJ. Household composition and the risk of child abuse and neglect. *J Biosoc Sci*. 1980;12:333-340
18. Daly M, Wilson MI. Some differential attributes of lethal assaults on small children by stepfathers versus genetic fathers. *Ethol Sociobiol*. 1994;15:207-217
19. Wilson M, Daly M. Risk of maltreatment of children living with step-parents. In: Gelles RJ, Lancaster JB, eds. *Child Abuse and Neglect: Biosocial Dimensions*. New York, NY: Aldine De Gruyter; 1987:215-232
20. Daly M, Wilson M. Child abuse and other risks of not living with both parents. *Ethol Sociobiol*. 1985;6:197-210
21. Sedlak AJ, Broadhurst DD. *Third National Incidence Study of Child Abuse and Neglect: Final Report*. Washington, DC: US Department of Health and Human Services, National Center on Child Abuse and Neglect; 1996
22. Wissow LS. Infanticide. *N Engl J Med*. 1998;339:1239-1241
23. Durfee MJ, Gellert GA, Tilton-Durfee D. Origins and clinical relevance of child death review teams. *JAMA*. 1992;267:3172-3175
24. Monteleone JA. Review process. In: Monteleone JA, Brodeur AE, eds. *Child Maltreatment: A Clinical Guide and Reference*. St Louis, MO: GW Medical Publishing, Inc; 1994:309-385
25. American Academy of Pediatrics, Committee on Child Abuse and Neglect and Committee on Community Health Services. Investigation and review of unexpected infant and child deaths. *Pediatrics*. 1999;104:1158-1160
26. Christoffel KK, Scheidt PC, Agran PF, Kraus JF, McLoughlin E, Paulson JA. Standard definitions for childhood injury research: excerpts of a conference report. *Pediatrics*. 1992;89:1027-1034
27. Anonymous. Sudden infant death syndrome—United States, 1983-1994. *MMWR Morb Mortal Wkly Rep*. 1996;45:859-863
28. Rothman KJ, Greenland S. *Modern Epidemiology*. Philadelphia, PA: Lippincott-Raven; 1998
29. Harrell FE Jr, Lee KL, Mark DB. Multivariable prognostic models: issues in developing models, evaluating assumptions and adequacy, and measuring and reducing errors. *Stat Med*. 1996;15:361-387
30. Federal Interagency Forum on Child and Family Statistics. *America's Children: Key National Indicators of Well-Being, 2000*. Washington, DC: The Forum; 2000
31. Winn DG, Agran PF, Anderson CL. Sensitivity of hospitals' E-coded data in identifying causes of children's violence-related injuries. *Public Health Rep*. 1995;110:277-281
32. Bonner BL, Crow SM, Logue MB. Fatal child neglect. In: Dubowitz H, ed. *Neglected Children: Research, Practice, and Policy*. Thousand Oaks, CA: SAGE Publications, Inc; 1999:156-173
33. Jason J, Carpenter MM, Tyler CW Jr. Underrecording of infant homicide in the United States. *Am J Public Health*. 1983;73:195-197

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