

Generalising the Cinderella Effect to unintentional childhood fatalities

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Abstract

We investigated whether the repeatedly demonstrated increase in risk of child abuse and infanticide associated with living with a step parent generalized to cases of unintentional childhood fatal injury, the most common cause of death in children across the developed world. Reports were drawn from the Australian National Coroners' Information System (NCIS) on all cases of intentionally ($n=32$) and unintentionally ($n=319$) produced fatal injury in children aged under 5 years between 2000 and 2003. Even when using the most conservative possible analytic approach, in which all cases in which family type was unclear were classified as being from an 'intact biological family', step children under 5 years of age were found to be at significantly increased risk of unintentional fatal injury of any type, and of drowning in particular. Children from single-parented families were generally not found to be at significantly increased risk of intentional or unintentional fatal injury, while children who lived with neither of their biological parents were at greatest risk overall for fatal injury of any type.

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1. Introduction

Over the last 25 years, [Daly and Wilson \(1980, 2001\)](#) and others (e.g., [Flinn, 1988](#); [Kim & Ko, 1990](#); [Strang 1993](#)) have produced a body of work that has demonstrated repeatedly that, relative to children living with both biological parents, step children are at dramatically increased epidemiologic risk of being the victims of physical abuse and homicide. The phenomenon has often been referred to as the *Cinderella Effect* ([Daly & Wilson, 1998](#)). [Daly and Wilson \(1998\)](#) have argued that the Cinderella Effect is underpinned by the fact that the evolved parental psychological mechanisms that promote nurturing and protective behaviors in biological parents towards their young are only partially, if at all, activated in step parents. As such, higher rates of physical abuse by step parents are seen to be related to the fact that they are placed in the parental role without the same intrinsic level of commitment to the child's well being and tolerance for the inevitable and, often, substantial challenges of parenthood.

Of course, children do not just depend on their parents to do them no harm, but also to actively protect them from the many and varied dangers that are entailed in the complex physical and social environments that they inhabit. Accidental, or unintentional injury, which is about seven times more common than interpersonal violence as a cause of childhood fatality, is also the leading cause of death and disability in children across the developed world ([UNICEF, 2001](#)). Major causes of unintentional injury in children include road accidents, drowning, poisoning, falls, suffocation, and burns. As is the case with child homicide, death rates from injuries are considerably higher for infants (0–1 years) and young children (1–4 years) than for any other age group ([Al-Yaman, Bryant, & Sargeant, 2002](#)).

Parental supervision has been implicated as a fundamental contributing factor in the prevalence of unintentional childhood injuries ([Peterson & Stern, 1997](#); [Wills, Christoffell, & Lavigne, 1997](#)). Given that fatal accidents in childhood are unlikely to be an exclusively modern phenomenon, it is assumed that selective pressures would have favoured parental psychological sets that included propensities towards vigilance against such threats to the well-being of offspring. It would follow from theory of discriminative parental solicitude ([Daly & Wilson, 1980](#)) that such propensities would not be engaged to the same extent in step parents and, therefore, that step children may be at greater risk of morbidity and mortality from unintentionally produced injury.

While there have been studies that link family structure with some of the lesser forms of unintentional injury ([O'Connor, Davies, Dunn, Golding, & ALSPAC, 2000](#); [Wadsworth, Burnell, Taylor, & Butler, 1983](#)), there are no studies that we are aware of that have looked at childhood fatalities. Thus, in order to investigate whether the Cinderella Effect generalized to cases of unintentional childhood fatalities, we collected data from the Australian National Coroner's Information System (NCIS), which is an Internet accessible database of all coroners' files from all states and territories across Australia. We examined cases of both intentionally and unintentionally inflicted fatal injuries for overrepresentation of children from single- and step-parented families, as well as for children who lived with neither biological parent. Given that drowning is arguably the most clearly supervision related of unintentional deaths in children ([Peterson & Stern, 1997](#)), we also

analysed cases of drowning separately in order to more specifically test the reduced vigilance hypothesis.

2. Method

2.1. Participants

Data obtained from the NCIS included cases from all state coroner jurisdictions within Australia except for Western Australia. Access to Western Australian data was subject to additional procedural requirements that, for practical reasons, were not pursued. Thirty-two cases of intentionally produced fatal injury cases in children under 5 years of age were sampled from the NCIS online database. The sample consisted of 12 female and 20 male children with a mean age of 1.47 years (S.D.=1.32) at the time of their death. A further 319 cases of unintentional fatal injury to children under 5 years of age were sampled. The group comprised 185 male and 134 female cases. The mean age of the children at the time of death was 1.63 years (S.D.=1.20). In both of these samples, approximately 75% of children were aged 2 years or under.

2.2. Materials

Access to the NCIS is available to authorised individuals at the web address <http://www.vifp.monash.edu.au/ncis>. Case details available include basic demographic data as well as data related to the fatal incident itself, such as cause of death, intent type, and whether the death was product related. Each case on the database may also have any or all of the following four types of information: police investigation reports, autopsy reports, forensic reports, and coroner's finding reports.

2.3. Procedure

Approval for the study was obtained from the relevant ethics committees. A search was conducted on the NCIS for all documented cases of fatal injury whereby the intent type was classified as either *unintentional* or *interpersonal violence*. Cases were restricted to only include individuals aged less than 5 years in order to remain consistent with census data categorisation regarding the number of children in Australia living within various family structures from the Australian Bureau of Statistics (ABS) Family Characteristics publication (ABS, 2003). No other specifications were made. All available NCIS cases were assessed and, where possible, each child's living arrangements at the time that the fatal injury occurred were categorized as follows: (1) the child lived with both biological parents (Intact Biological Family), (2) the child lived with a single parent (Single-Parent Family), (3) the child lived with one biological parent and a step parent (married or de facto: Step Family), and (4) the child lived with neither biological parent (No Biological Parents Present or 'Other' family type). In the case of a blended family, the child was categorized as being from a Step Family

if he or she was the biological child of only one of the parents, or as being from an Intact Biological Family when he or she was the biological child of both parents. Since family structure is not a demographic variable automatically listed within the NCIS, the family type of each deceased child was established through the descriptions presented in police investigation reports or coronial finding reports. In order for cases to be classified, the relationship of the child to the parents had to be specifically and unequivocally stated in either the police or coroner's reports.

3. Results

Calculation of odds ratios was based on population estimates obtained from the Family Characteristics Australia survey (ABS, 2003). The numbers of child fatalities that fell into each cell (family type by fatality type) are presented in Table 1, along with the ABS estimate of the number of children under the age of 5 years from the Australian population who fall into each family type category.

Odds ratios calculated for each family type and fatality category are presented in Table 2. Odds ratios presented reflect the proportion of children in the sample from each of the alternative family types (single, step, and no biological parent families) relative to the way they are represented (in proportion to children from intact biological families) in the general population. As such, an odds ratio of 1 indicates that the ratio of stepchildren (for example) to children from biologically intact families in the sample is exactly proportionate to their ratio in the general population. An odds ratio of 2, however, would suggest that stepchildren were

Table 1

Number of preschool-aged children in each fatality-type category, and the relevant Australian population estimates that were used to calculate odds ratios

Family type	Fatality type	Number of child fatalities ^a
Intact biological families (Australian population estimate=1,022,700)	Violence	4 (25) ^b
	All unintentional	44 (288)
	Drowning	10 (53)
Single parent (Australian population estimate=198,900)	Violence	1
	All unintentional	16
	Drowning ^b	6
Stepparent (Australian population estimate=16,500)	Violence	5
	All unintentional	11
	Drowning ^b	4
No biological parents (Australian population estimate=2500)	Violence	1
	All unintentional	4
	Drowning ^b	2

^a Cases of drowning actually appear twice in the table as they are also included in the 'All unintentional' category.

^b Parenthesised figures indicate numbers when all cases in which family structure was unclear were coded as 'intact biological family'.

Table 2

Comparative risk estimates (odds ratios) of violence-related, drowning-related, and all unintentional fatal injuries for children from different family structures

	Child's family type ^a	Analytic approach	
		Excluding cases where family type was unclear ^b	Including cases where family type was unclear ^b
Violence-related fatalities	Single parent	1.29 (0.19–8.55)	0.29 (0.05–1.68)
	Stepparent	77.50 (22.54–266.45)***	17.22 (6.63–44.73)***
	No biological parents	102.31 (15.38–680.86)***	22.74 (3.86–133.86)*
All unintentional fatalities	Single parent	1.64 (0.90–2.96)	0.25 (0.02–0.43)***
	Stepparent	15.51 (8.01–29.68)***	2.37 (1.31–4.29)**
	No biological parents	37.25 (13.92–99.66)***	5.69 (2.20–14.67)**
Drowning	Single parent	3.09 (1.17–8.17)*	0.58 (0.27–1.32)
	Stepparent	24.80 (8.23–74.72)***	4.68 (1.76–12.42)**
	No biological parents	81.88 (20.17–332.52)***	15.45 (4.15–57.57)***

^a For each family type, comparative risk is calculated relative to children from intact biological families.

^b Values are odds ratio (confidence interval).

* $p < .05$.

** $p < .01$.

*** $p < .001$.

twice as common in the sample as they should have been, given their representation in the general population.

Because the family type of many children was not clearly stated in the NCIS database, two analytic strategies were pursued. The first approach included only the cases in which family type could be unequivocally established. As such, all cases where family type was unclear were excluded from the analysis. While this is the most straightforward approach, it is also vulnerable to reporting biases. It could be argued that, especially in the context of reporting circumstances around a child's death, coroners and other individuals who contributed to the records were more likely to take note of the alternative family types (single- or step-parented). In this context, any apparent overrepresentation of these families in the data may have as much, or more, to do with reporting issues than anything else. Thus, a second analytic strategy was employed whereby we coded all cases of child fatality in which family structure was not clearly identified in the case reports as if they were from an intact biological family. This is the most conservative possible analytic approach.

The information in Table 1 indicates that, for violence-related fatalities, step children, and children who lived with neither biological parent, were markedly overrepresented, regardless of the analytic approach used. Children from single-parented families were not overrepresented. Step children, and children who lived with neither biological parent, were also significantly overrepresented as cases of unintentional fatal injury, again regardless of the analytic strategy employed. For single-parented children, the less conservative analytic approach indicated no increased risk, while the most conservative approach actually suggested that single-parented children were underrepresented in the sample. Finally, for cases of drowning, step children, and children who lived with neither biological parent, were

again significantly overrepresented. Single-parented children were either overrepresented by a factor of 3 or not at all, depending on the analytic strategy employed.

4. Discussion

These results indicate that the repeatedly reported increase in risk of being a victim of fatal child abuse associated with having a step parent generalises to cases of unintentional fatality. Odds ratio calculations for intentional abuse fatalities are comparable to those found in previous studies in the area (Daly and Wilson, 1998) and reaffirm the much-repeated finding that step parenthood is a substantial risk factor for child homicide in preschool-aged children. The figures for unintentional fatalities followed a similar pattern: the risk of death due to any kind of unintentional injury was between 2 and 15 times greater for stepchildren than for those from intact biological families. This effect was magnified further when deaths from drowning were considered in isolation. Children who lived with neither of their biological parents were even more substantially overrepresented in all fatality categories.

Although the lower estimates outlined here are both statistically and epidemiologically significant, they are nevertheless likely to represent an underestimate of the true increase in risk to preschool-aged children living with non-biologically related carers. Firstly, the analytic strategy that produced the lower estimates assumed an absolute reporting bias. This is clearly unlikely, although impossible to resolve further given the nature of the data. Another significant conservative bias in the analysis relates to the fact that overrepresentation of step children in the coroners' database was calculated on the basis of ABS estimates of the number of stepchildren in the Australian population who were under 5 years of age. As noted, 75% of the fatalities that made up the sample were actually children aged less than 2 years. It is obvious that the chances of being a stepchild increase with age, and, therefore, the ratio of stepchildren relative to children in intact biological families under the age of 2 years in the Australian community would be substantially smaller than the same ratio calculated for all children under 5.

The striking feature of the data is that, for the most part, children from single-parent families were not significantly overrepresented as unintentional fatalities. The picture that the data imply overall is that if one biological parent is removed from the household, the risk of unintentionally produced fatal injury is perhaps only slightly increased. Add a nonbiological parent to the scenario and, despite the extra resources in terms of invigilation that the stepparent would be expected to provide to the single-parented family, the risk of unintentional injury increases dramatically.

In conclusion, the results of this work provide evidence that the Cinderella Effect generalises to cases of unintentional childhood fatal injury. While the findings are consistent with the related theories of inclusive fitness (Hamilton, 1964) and discriminative parental solicitude (Daly & Wilson, 1980), further work will be required, not only to test their replicability, but also to examine the role of situational factors associated with single- and step-family dynamics. Eventually, interventions such as awareness/education programs targeted specifically at step and blended families may contribute to reducing the harm

associated with the most prevalent yet preventable cause of morbidity and mortality in childhood.

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