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# Killing the Mother of One's Child: Psychiatric Risk Factors Among Male Perpetrators and Offspring Health Consequences

Henrik Lysell, MD<sup>a,\*</sup>; Marie Dahlin, MD, PhD<sup>a</sup>; Niklas Långström, MD, PhD<sup>b</sup>;  
Paul Lichtenstein, PhD<sup>b</sup>; and Bo Runeson, MD, PhD<sup>a</sup>

## ABSTRACT

**Objective:** To study possible psychiatric and criminological risk factors of intimate partner femicide (IPF) as well as the bereaved offspring's psychiatric morbidity and premature death.

**Method:** We conducted a nested case-control study, based on Swedish national registries, including all perpetrators of IPF. We computed risk estimates relative to matched population controls, which were compared to those of non-IPF homicide offenders. Exposed children were matched to population controls and followed longitudinally up to 37 years. Offspring outcomes were psychiatric and substance use disorders (according to *ICD*) self-harm; violent crime; suicide; and premature, all-cause death.

**Results:** We identified 261 male IPF perpetrators and 494 bereaved children from 1973 through 2009. Multivariable logistic regression suggested that major mental disorder (adjusted odds ratio [OR]=5.9; 95% CI, 3.3–10.6) and violent crime convictions (adjusted OR=4.4; 95% CI, 2.7–7.2) were independent risk factors of IPF, but substance use disorders were not (aOR=0.4; 95% CI, 0.2–1.0). Children exposed to IPF before age 18 years had elevated risks of major mental disorder (adjusted hazard ratio [HR]=5.7; 95% CI, 3.0–10.6), substance use disorders (adjusted HR=5.8; 95% CI, 2.8–11.9) and self-harm (adjusted HR=5.7; 95% CI, 3.0–11.1). Offspring 18 years or older at the IPF had an increased risk of completed suicide (adjusted HR=4.3; 95% CI, 1.3–14.5).

**Conclusions:** Previous major mental disorder and violent behavior were strong independent risk factors for IPF. Bereavement caused by IPF had significant associations with the offspring's future life, especially for those below 18 years of age at exposure. Our findings demonstrate the need of direct support to the exposed offspring by health care providers and social services.

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<sup>a</sup>Department of Clinical Neuroscience, Karolinska Institutet, Centre for Psychiatry Research, Stockholm, Sweden

<sup>b</sup>Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden

\*Corresponding author: Henrik Lysell, MD, Karolinska Institutet, Department of Clinical Neuroscience/Stockholm County Council, Centre for Psychiatry Research, St Göran's Hospital, SE-112 81 Stockholm, Sweden (henrik.lysell@ki.se).

The most severe form of violence in intimate relationships is the killing of a partner; when that occurs, the victim is most commonly a woman.<sup>1</sup> If children are left behind, exposure to such trauma might be associated with long-term adverse effects on health and well-being. Globally, 39% to 47% of all homicides with female victims are committed by an intimate partner, and estimates are higher in high-income countries<sup>1</sup>—49% in Sweden and 40% to 50% in the United States.<sup>2,3</sup> In 90% of the intimate partner homicides in which the perpetrator also commits suicide, the homicide victim is female.<sup>4</sup>

## Perpetrator Risk Factors

A history of threats and violence—most importantly interfamilial,<sup>5</sup> but also extrafamilial<sup>3</sup>—are risk factors for intimate partner femicide (IPF). Further, perpetrator history of mental disorders, such as depression,<sup>6</sup> psychosis,<sup>7</sup> personality disorders,<sup>8</sup> and substance use disorders,<sup>7,9</sup> and also migration/acclulturation,<sup>10</sup> race (in American studies),<sup>5</sup> and access to guns<sup>5</sup> are identified risk factors. Perpetrators who also commit suicide, ie, IPF-suicide cases, are older, and concurrent depression is a known risk factor.<sup>11,12</sup> These cases, however, are often not included in studies of intimate partner homicide, since they are lost to further investigation.

It has been argued that men who kill their partners deviate less from the “normal” than do other homicide offenders. Mental disorders, previous convictions,<sup>9</sup> and substance use disorders<sup>13</sup> seem to be more common among the latter. There is still a scarcity of studies within this field, and research from different cultural settings with representative samples is needed to further inform of specific psychiatric and criminal risk factors among men who kill a female intimate partner.

## Offspring Consequences

Children who become deprived of their mother by IPF—or of both parents by IPF-suicide—are exposed to significant trauma, which is likely to affect them in the future. Research in offspring's bereavement of a parent caused by homicide is sparse,<sup>14</sup> and the few studies that are published are based on small samples.<sup>15</sup> It is known, however, that a parent's unnatural death, and particularly suicide, increases the risk of violent behavior, substance use disorders, serious mental disorders, and suicide in bereaved children.<sup>16,17</sup> Younger age at such exposure is associated with a higher risk of later suicide.<sup>17</sup> The risk of suicide and adverse events in children after the loss of one or both parents by IPF or IPF-suicide has, to our knowledge, not been studied.

We aimed to identify psychiatric and criminal risk factors that distinguish male perpetrators of IPF from other male homicide offenders. Further, we investigated the risk among IPF-exposed children of developing mental disorders, engaging in suicidal and criminal

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behavior, or facing premature death, with regard to their age at the time of trauma.

## METHOD

### Study Setting

We conducted a case-control study, nested within the Swedish population and identified through Swedish national registries, including all cases of femicide from 1973 through 2009, in which the perpetrator and the victim had mutual children (biological or adopted); these cases were defined as *intimate partner femicide* (IPF). Children were included in a matched cohort study with regard to the outcomes of mental disorder, suicidal/violent criminal behavior, and death by suicide or other cause. Identification was possible through the linkage of longitudinal, nationwide population-based registries by use of the unique personal identity numbers.<sup>18</sup>

### Identification of Perpetrators and Controls

We first identified deceased women whose cause of death was recorded as deadly violence inflicted by another person (*International Classification of Diseases [ICD]-8, -9: E96; ICD-10: X85–Y09*) (the Cause of Death Register). Deaths with uncertain intent were not included. Second, we identified a partner on the condition of a mutual child (the Multi-Generation Register). This procedure enabled identification of events in which a child was affected. Intimate partner femicide was considered when a partner had been convicted of murder, manslaughter, or involuntary manslaughter (the National Crime Register) or committed suicide (the Cause of Death Register) within 3 days of the death of the female victim. For each case, 10 controls, matched by birth year and gender, were randomly drawn from the population (the Total Population Register).

We also identified all male non-IPF homicide perpetrators (convicted for homicide or manslaughter) during the study period, who were likewise matched to general population controls.

### Identification of Children

Children of the killed woman and the perpetrating male were identified by the Multi-Generation Register and constituted the child cohort. To each child proband, we matched 10 population controls (the Total Population Register) on birth year and gender. Children were followed until outcome, emigration, or end of follow-up (December 31, 2009), whichever came first.

### Psychiatric Morbidity

Diagnoses were extracted from the National Patient Register from January 1, 1973, through December 31, 2009. The National Patient Register contains *ICD* codes from all inpatient care in Sweden, including the few private hospitals. Coverage and validity of diagnoses are fair to excellent.<sup>19–21</sup> The principal psychiatric diagnosis (except substance use disorders and personality disorders, which were included in any position) was recorded for cases and controls. *Major mental*

- Previous violent criminal behavior and mental illness, but not substance use disorders, are risk factors for men who kill a female partner.
- Children bereaved of their mother by their father's hand run an elevated risk of future mental disorder, self-harm, criminal behavior, and suicide.
- Support for bereaved children should be a high priority of health care providers and social services.

*disorder* included psychotic disorders, affective disorders, and personality disorders. *Substance use disorders* included alcohol and other drugs. *Any mental disorder* comprised all of the above-mentioned disorders, and, in addition, phobic disorder, anxiety disorder, obsessive-compulsive disorder, eating disorder, and adjustment disorder. Categorization followed previous work on intrafamilial violence.<sup>22</sup>

*Previous self-harm* was defined as hospitalization due to self-inflicted harm of determined and undetermined intent (*ICD-8, -9: E950–E959, E980–E989; ICD-10: X60–X84, Y10–Y34*). Completed suicide was obtained from the Cause of Death Register by similar diagnostic coding. We included both certain and uncertain suicides, consistent with many other studies, to avoid underestimation.<sup>23</sup>

### Criminal Offending

Conviction data were obtained from 1973 through 2009 from the National Crime Register. This register contains all convictions committed by perpetrators aged 15 years and older in Sweden regardless of the sentence; fines; or custodial, noncustodial, or compulsory forensic psychiatric care. *Any crime* comprised all convictions; *violent crime* included convictions for homicide, assault, robbery, illegal threats or intimidation, and sexual offenses (not including prostitution, the hiring of prostitutes, or possession of child pornography).<sup>24</sup> Convictions of attempted and aggravated forms of these offenses were included whenever applicable.

### Sociodemographic Factors

The highest level of education was collected from the Education Register and the National Census (Statistics Sweden). Information was available from 1970 and 1990–2009. *Low education* was defined as  $\leq 9$  years of completed education. *Immigrant status* was defined as being born outside of Sweden (the Total Population Register).

### Statistical Analyses

We used Student *t* test for means and  $\chi^2$  test or Fisher exact test for comparison of proportions between groups. Perpetrators of IPF and non-IPF homicide were compared to controls in separate analyses; we used conditional logistic regression analyses to take into account the dependence between cases and controls due to matching, which yielded odds ratios (ORs) with 95% confidence intervals (CIs) as estimates of risk for the studied factors for each perpetrator group compared to their controls. We initially performed bivariate analyses, then we adjusted for education and immigrant status; in the final models, all variables were

**Table 1. Socioeconomic, Psychiatric, and Violent Criminal History Characteristics Before the Index Killing Among Male Intimate Partner Femicide (IPF) and non-IPF Homicide Perpetrators Compared to Matched Population Controls**

Risk Factor <sup>a</sup>	IPF					Non-IPF Homicide						
	Cases N=261		Controls N=2,610		$\chi^2$	p Value	Cases N=3,439		Controls N=34,390		$\chi^2$	p Value
	n	(%)	n	(%)			n	(%)	n	(%)		
Low education <sup>b</sup>	127	(48.7)	1,010	(38.7)	10.9	<.001	2,136	(62.1)	11,477	(33.4)	1,119.1	<.001
Immigrant status <sup>c</sup>	112	(42.9)	329	(12.6)	143.0	<.001	1,184	(34.4)	7,903	(23.0)	221.8	<.001
Any mental disorder <sup>d</sup>	44	(16.9)	109	(4.2)	64.0	<.001	1,236	(35.9)	1,016	(3.0)	3,617.9	<.001
Major mental disorder <sup>e</sup>	33	(12.6)	46	(1.8)	76.3	<.001	682	(19.8)	511	(1.5)	2,024.6	<.001
Psychotic disorder	13	(5.0)	18	(0.7)	29.8	<.001	353	(10.3)	244	(0.7)	1,049.7	<.001
Affective disorder	15	(5.7)	26	(1.0)	29.6	<.001	169	(4.9)	219	(0.6)	402.7	<.001
Personality disorders	7	(2.7)	11	(0.4)	14.7	<.001	345	(10.0)	138	(0.4)	1,045.3	<.001
Substance use disorders	15	(5.7)	76	(2.9)	6.0	.014	933	(27.1)	588	(1.7)	2,854.4	<.001
Self-harm	13	(5.0)	32	(1.2)	18.4	<.001	462	(13.4)	274	(0.8)	1,407.9	<.001
Violent crime	43	(16.5)	83	(3.2)	80.7	<.001	1,632	(47.5)	1,124	(3.3)	4,924.6	<.001

<sup>a</sup>All risk factors were measured before the index killing among perpetrators and the corresponding time among controls matched on gender and birth year.

<sup>b</sup>Nine years of schooling or less.

<sup>c</sup>Born outside Sweden.

<sup>d</sup>All psychiatric diagnoses (F-section in ICD-10 and equivalent in ICD-8 and -9).

<sup>e</sup>Psychotic, affective, or personality disorders.

included. All covariates in the analyses were extracted as occurrences before the index event. Statistical analyses were performed using SAS software, version 9.4 (SAS Institute, Cary, North Carolina) with the proc logistic command for conditional logistic regression.

In the offspring cohort, we stratified analyses by age at exposure according to the Swedish age of majority (0–17 years,  $\geq 18$  years). We used Cox regression to compute hazard ratios (HRs) with 95% CIs for the outcomes of major mental disorder, substance use disorders, self-harm, conviction of a violent crime, suicide, and nonsuicidal death after exposure to IPF. Different covariates were entered in the adjusted models; for suicide, we used a history of self-harm in parent and child prior to exposure. For the remaining outcomes, we controlled for preexposure history of each outcome aspect present in the child and/or the child's parents. For the outcome of nonsuicidal death, we controlled for immigrant status and education in parents. SAS software, version 9.4 (SAS Institute), was used with the PROC PHREG command for conditional Cox regression.

## RESULTS

### Perpetrators

We identified 261 instances of IPF during the study period (1973–2009); thus, 261 men had killed a woman with whom they had children. Of these events, 80 (30.7%) were IPF-suicides. The mean age of perpetrators of IPF was 45.8 years (SD = 14.0). Previous hospitalization records for mental disorders were present among 44 (16.9%) of the perpetrators. The most common diagnoses among those hospitalized due to a mental disorder were affective disorder (n = 15, 5.7%) and substance use disorders (n = 15, 5.7%). Previous self-harm requiring inpatient observation and treatment was detected in 13 subjects (5.0%), and 43 (16.5%) had been convicted of a violent crime prior to the index event. The proportions of all studied variables differed between perpetrators and controls

(Table 1). IPF-suicide offenders were significantly older (53.3 vs 42.5 years,  $t = 6.17$ ,  $P < .001$ ) but less often born outside Sweden (20.0% vs 53.0%,  $\chi^2 = 24.7$ ,  $P < .001$ ) or convicted of a violent crime (1.2% vs 23.2%,  $\chi^2 = 19.4$ ,  $P < .001$ ), compared to IPF offenders who did not commit suicide (data not shown in table).

Among non-IPF homicide offenders, more than a third had a psychiatric history, with substance use disorders being the most common (n = 933, 27.1%). Almost half had a previous conviction for violent crime (Table 1).

Adjustment for educational level and immigrant status did not alter the associations substantially in any of the groups (data not shown for homicide offenders). In the full regression models, the strongest independent risk factor for being an IPF offender was major mental disorder (adjusted OR = 5.9; 95% CI, 3.3–10.6). Substance use disorders and previous self-harm did not remain as independent risk factors of IPF (Table 2). For non-IPF homicide offenders, prior conviction for a violent crime was the strongest independent risk factor, and psychiatric risk factors had independent associations with adjusted ORs ranging from 3.4 to 4.3

### Offspring

We identified 494 individuals deprived of their mother from IPF and included them in the offspring cohort. Another 32 children were killed in the same incident as their mother and, thus, were not included. The cohort was followed for 0.25 to 37 years (mean age = 18.2 years, SD = 10.8). Mean age at the time of bereavement was 8.6 years (SD = 5.1; range, 0–17 years) in the younger group (n = 308) and 31.0 years (SD = 9.8; range, 18–59 years) in the older group (n = 186). Offspring who lost both parents in IPF-suicide were older (n = 136, mean age = 26.4 years, SD = 12.0) than those whose father did not commit suicide (n = 358, mean age = 13.5 years, SD = 12.3,  $P < .001$ ).

Offspring exposed to IPF under age 18 years had a significantly higher incidence of mental disorders,

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**Table 2. Male IPF and Non-IPF Homicide Offender Risk Factors in Sweden From 1973 Through 2009, Computed With Multivariable Logistic Regression**

Risk Factor <sup>a</sup>	IPF (N = 261)								Non-IPF Homicide (N = 3,439)			
	Crude		Model 1 <sup>b</sup>		Model 2 <sup>c</sup>		Crude		Model 2 <sup>c</sup>			
	n	(%)	OR	(95% CI)	Adjusted OR	(95% CI)	Adjusted OR	(95% CI)	OR	95% CI	Adjusted OR	(95% CI)
Major mental disorder <sup>d</sup>	33	(12.6)	8.1	(5.0–12.9)	7.5	(4.5–12.4)	5.9	(3.3–10.6)	16.8	(14.9–19.1)	4.3	(3.6–5.2)
Substance use disorders	15	(5.7)	2.0	(1.1–3.6)	1.8	(1.00–3.3)	0.4	(0.2–1.0)	22.5	(20.1–25.2)	4.3	(3.7–5.1)
Self-harm	13	(5.0)	4.2	(2.2–8.1)	4.4	(2.2–8.8)	1.9	(0.8–4.3)	19.6	(16.8–22.9)	3.4	(2.7–4.3)
Any prior violent crime	43	(16.5)	6.6	(4.4–10.0)	5.2	(3.3–8.2)	4.4	(2.7–7.2)	28.9	(26.3–31.8)	15.3	(13.8–17.1)

<sup>a</sup>All risk factors were measured before the index killing for offenders and at the corresponding time among controls matched on birth year and gender.

<sup>b</sup>Model 1: adjusted for education and immigrant status with multivariable logistic regression modeling.

<sup>c</sup>Model 2: adjusted for the effects of all other tested covariates with multivariable logistic regression modeling, including education and immigrant status.

<sup>d</sup>Psychotic, affective, and personality disorders.

Abbreviations: CI = confidence interval, IPF = intimate partner femicide, OR = odds ratio.

**Table 3. Psychiatric Disorder, Suicidal Behavior, and Violent Criminal Behavior During Follow-Up and Before Index Among Offspring Exposed to IPF Compared to Unexposed Controls by Age Group at the Killing**

Characteristic	Offspring Aged 0–17 Years				Offspring Aged ≥ 18 Years			
	Exposed n = 308 n (%)	Unexposed n = 3,080 n (%)	$\chi^2$	P Value	Exposed n = 186 n (%)	Unexposed n = 1,860 n (%)	$\chi^2$	P Value
Any mental disorder								
During follow-up	40 (13.0)	65 (2.1)	83.2	<.001	16 (8.6)	117 (6.3)	1.5	.213
Before index	0 (0.0)	4 (0.1)	n/a	n/a	3 (1.6)	63 (3.4)	1.6	.200
Major mental disorder								
During follow-up	26 (8.4)	37 (1.2)	58.5	<.001	9 (4.8)	63 (3.4)	1.1	.303
Before index	0 (0.0)	1 (0.0)	n/a	n/a	2 (1.1)	33 (1.8)	0.5	.485
Substance use disorders								
During follow-up	23 (7.5)	28 (0.9)	55.9	<.001	7 (3.8)	66 (3.5)	0.02	.877
Before index	0 (0.0)	1 (0.0)	n/a	n/a	1 (0.5)	30 (1.6)	1.2	.275
Self-harm								
During follow-up	20 (6.5)	35 (1.1)	39.3	<.001	7 (3.8)	36 (1.9)	2.7	.100
Before index	1 (0.3)	2 (0.1)	1.7	.189	3 (1.6)	26 (1.4)	0.1	.812
Violent crime								
During follow-up	21 (6.8)	75 (2.4)	18.0	<.001	11 (5.9)	31 (1.7)	13.6	<.001
Before index	1 (0.3)	2 (0.1)	1.7	.189	7 (3.8)	49 (2.6)	0.8	.370
Suicide								
During follow-up	0 (0.0)	3 (0.1)	n/a	n/a	5 (2.7)	10 (0.5)	8.7	.003
Nonsuicidal death								
During follow-up	3 (1.0)	21 (0.7)	0.3	.563	10 (5.4)	51 (2.7)	4.0	.046

Abbreviation: IPF = intimate partner femicide, n/a = not applicable.

substance use disorders, violent crime, and self-harm than did comparison children during follow-up (Table 3). The risk of developing a major mental disorder was more than 7-fold compared to controls (HR = 7.4; 95% CI, 4.5–12.4) and remained essentially unchanged after adjustment (adjusted HR = 5.7; 95% CI, 3.0–10.6). Risk of substance use disorders was almost 6-fold (adjusted HR = 5.8; 95% CI, 2.8–11.9), and the same held for self-harm (adjusted HR = 5.7; 95% CI, 3.0–11.1) (Table 4).

For offspring who were 18 years of age or older at exposure, convictions for violent crime, death by suicide, and premature nonsuicidal death were more common than among unexposed controls during follow-up (Table 3); suicide risk was 4 times higher, with no difference between crude and adjusted point estimates (adjusted HR = 4.3, 95% CI 1.3–14.5). The adjusted risk of nonsuicidal death was 2.1 (95% CI, 1.0–4.1) (Table 4).

## DISCUSSION

We conducted a nationwide, nested case-control study of men who had killed a woman with whom they had 1

or more children; and, to our knowledge, this is the first large-scale study of offspring outcomes following such a killing. Previous hospitalization for mental disorder and convictions of violent crime were independent offender risk factors of IPF perpetration in multivariable analyses. In contrast, previous hospitalizations for self-harm or substance use disorders increased the risk for non-IPF homicide perpetration but were not significantly associated with IPF. Offspring younger than 18 years at the killing of their mother had clearly elevated risks to develop mental and substance use disorders, exhibit self-harming behavior, and be convicted of violent crime during follow-up. Offspring aged 18 years and above when exposed had elevated risks of violent crime, suicide, and premature death from other causes.

Our primary finding was that major psychiatric morbidity was an independent risk factor of IPF and non-IPF homicide. Previous studies confirm that perpetrators of deadly violence often suffer from mental disorders.<sup>22,25</sup> We found that a history of affective disorder was particularly common among IPF offenders, which may be considered in



**Table 4. Offspring Risk of Major Mental Disorder, Substance Use Disorders, Self-Harm, Violent Crime, Suicide and Nonsuicidal Death Following IPF Divided by Age at Exposure**

Characteristic	Offspring Aged 0–17 Years (n = 308)				Offspring Aged ≥ 18 Years (n = 186)			
	No. of Events	IR	Crude HR (95% CI)	Adjusted <sup>a</sup> HR (95% CI)	No. of Events	IR	Crude HR (95% CI)	Adjusted <sup>a</sup> HR (95% CI)
Major mental disorder <sup>b</sup>	26	4.6	7.4 (4.5–12.4)	5.7 (3.0–10.6) <sup>d</sup>	9	2.9	1.5 (0.7–3.0)	1.4 (0.7–2.8) <sup>e</sup>
Substance use disorders	23	4.0	8.6 (4.9–15.1)	5.8 (2.8–11.9) <sup>d</sup>	7	2.3	1.0 (0.5–2.2)	1.1 (0.5–2.5) <sup>e</sup>
Self-harm	20	3.5	6.2 (3.6–10.9)	5.7 (3.0–11.1) <sup>f</sup>	7	2.3	2.0 (0.9–4.6)	2.1 (0.9–4.9) <sup>f</sup>
Violent crime <sup>c</sup>	21	3.7	3.8 (2.2–6.3)	2.4 (1.2–4.5) <sup>g</sup>	11	3.7	4.1 (2.0–8.6)	3.2 (1.2–8.5) <sup>g</sup>
Suicide	0	0	n/a	n/a	5	1.6	4.3 (1.4–13.0)	4.3 (1.3–14.5) <sup>f</sup>
Nonsuicidal death	3	0.5	1.5 (0.4–4.9)	1.3 (0.4–4.7)	10	3.3	2.1 (1.0–4.1)	2.1 (1.0–4.1)

<sup>a</sup>Adjusted for parental immigrant status and mother's level of education.  
<sup>b</sup>Psychotic, affective, and personality disorders.  
<sup>c</sup>Conviction of violent crime.  
<sup>d</sup>Adjusted for parent's previous mental disorder.  
<sup>e</sup>Adjusted for parent's and offspring's previous mental disorder.  
<sup>f</sup>Adjusted for parent's and offspring's previous self-harm.  
<sup>g</sup>Adjusted for parent's previous violent crime and offspring's previous crime of any type.  
Abbreviations: IPF = intimate partner femicide, IR = incidence ratio (no. of events/1,000 person years), HR = hazard ratio (derived from Cox regression modeling), n/a = not applicable.

line with previous findings that depression is of particular importance to femicide in intimate relationships.<sup>4,26</sup> The prevalence of mental disorders among perpetrators varies in the literature<sup>7</sup> and is often higher than the prevalence in the present study; the same holds for previous self-harm.<sup>3</sup> These differences may be explained by our use of hospitalization-based diagnoses only. A history of substance use disorders was more common among IPF offenders than controls, as previously found,<sup>7</sup> but we found that substance use disorders were not an independent risk factor for IPF. Drug use is usually strongly correlated to violent crime in both correctional and psychiatric cohort studies,<sup>27–29</sup> and in line with this finding, substance use disorders (also including alcohol-related diagnoses) were a risk factor for non-IPF homicide in the present study. Our different results for the 2 offender groups are in line with previous findings.<sup>30</sup> We were not able to investigate the effects of alcohol intoxication at the time of the offense, which is a factor closely related to family violence.<sup>12</sup> Further, our estimates of substance use disorders were, again, based on hospital diagnoses, which should indicate an underestimation of the “true” prevalence. For the risk estimates, however, inference was made with general population controls, and we have no reason to assume that detection rates should differ between perpetrators and controls and, thus, affect statistical precision.

### Offspring Consequences

As expected, exposure to IPF was associated with poor long-term prognosis in offspring and significantly differed with age at the time of trauma. We found increased risks for hospitalization due to mental disorders (including substance use disorders) and self-harm and for convictions for violent crimes among those under age 18 years at exposure, but there were no suicides in this group. For those aged 18 years and older at the killing of their mother, elevated long-term risks for later suicide and conviction for a violent crime were found. We have not found any previous quantitative studies on bereavement caused by IPF, but the risk ratios might be compared to bereavement of a parent by suicide or other

death. In a recent study,<sup>17</sup> the risk of hospitalization for a suicide attempt was elevated in offspring after parental death by suicide, accident, or other cause, regardless of age at loss. The increased risks of suicide were found only in offspring aged below 18 years at loss and only after parental death by suicide or accidental death.<sup>17</sup> This may seem contradictory to our finding that no suicides occurred during follow-up in the younger group. For children bereaved by parental suicide at an early age, however, the risk of suicidal behavior does not commence to increase until some years after the loss of the parent and then increases for decades.<sup>31</sup> If a similar pattern would be assumed to follow bereavement by IPF or IPF-suicide, the limited follow-up time of the current study might have failed to capture late suicides. In line with our findings, the risk of being convicted for a violent crime is also elevated for offspring bereaved of a parent by any cause and regardless of age at loss.<sup>17</sup>

Previous research has demonstrated a high level of heritability in suicidal behavior,<sup>32</sup> and, therefore, we adjusted the analyses on suicide for earlier self-harm among parents and children. Likewise, mental disorders have a hereditary component of various degrees for different disorders.<sup>33,34</sup> Our results were adjusted for mental disorders present in parents and children before the index event. With these adjustments, the results were relatively unchanged, which points to a significant impact of the traumatic event and its immediate consequences.

### Strengths and Limitations

A major strength of this study is the national coverage, obtained by linkage of high-quality national registers. We were able to calculate unbiased estimates for risk factors of IPF perpetrators and adverse outcomes for exposed offspring by use of randomly selected controls drawn from the general population. The design enabled inclusion of IPF-suicides, an important group—quantitatively and etiologically—often absent in research within the field of IPF. A further strength is the use of an additional group of non-IPF homicide offenders in order to contextualize differences between cases

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and controls, which are not necessarily specific for deadly violence toward female partners.

There are several limitations. First, the modest sample size, with limited statistical power did not allow for calculations of separate estimates for IPF and IPF-suicides. Second, we had no knowledge of the status of the offender-victim relationship at the time of the killing; we were only able to identify dyads through a mutual child. By this design, the number of IPF cases was reduced, and a selection bias was introduced by which findings can be generalized to couples with children only. Further, we lacked information on possible ongoing mental disorder as well as on alcohol or drug intoxication at the time of the offense. Finally, it might have been relevant to single out offenses against women from the explaining variable “violent crime,” since such violence is a known risk factor of IPF.<sup>9</sup> Regrettably,

no information of the sex of the victim is recorded in the registry data.

## CONCLUSIONS

Previous violent criminal behavior and a history of mental illness, but not substance use disorders, are independent risk factors among men who kill a female intimate partner. Children who experience such trauma at an early age run the elevated risk of future mental disorder, self-harm, and criminal behavior. For offspring older at the time of loss, the risks of criminal behavior and death, including suicide, are increased. Although further research into the effects on offspring is warranted, children of victims of IPF should be offered direct support, and their psychosocial needs should be given priority by health care providers and social services.

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