Filicide in Offspring of Parents With Severe Psychiatric Disorders: A Population-Based Cohort Study of Child Homicide

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Objective: Although rare in absolute terms, risk of homicide is markedly elevated among children of parents with mental disorders. Our aims were to examine risk of child homicide if 1 or both parents had a psychiatric history, to compare effects by parental sex and diagnostic group, and to assess likelihood of child homicide being perpetrated by parents according to their psychiatric history.

Method: A prospective, register-based cohort study using the entire Danish population born between January 1, 1973, and January 1, 2007, was conducted. Follow-up of the cohort members began on their date of birth and ended on January 1, 2007; their 18th birthday; their date of death; or their date of emigration, whichever came first. We used the Danish national registers from 1973 to 2007 to study homicide risk between children whose parents were previously admitted to a psychiatric hospital, including diagnosis-specific analyses, versus their unexposed counterparts. In addition, we used police records during 2000 to 2005 to examine whether or not 1 of the parents was the perpetrator. Rates of homicide were analyzed using survival analysis.

Results: Children of parents previously admitted to a psychiatric hospital had an overall higher risk of being homicide victims (MRR = 8.94; 95% CI, 6.56–12.18). The risk differed according to parental sex and psychiatric diagnosis (*ICD-8* and *ICD-10* criteria). The absolute risk of homicide was 0.009% if neither parent had been admitted before the birth of their child and 0.051% if 1 of the parents had previously been admitted. During 2000 to 2005, 88% of the child homicide cases were filicide victims. This percentage was not significantly different for parents with a previous psychiatric admission versus those without such a history.

Conclusions: In the large majority of Danish child-homicide cases, a parent was the perpetrator, regardless of whether there had been parental admission to a psychiatric hospital. Children of parents previously admitted had a higher risk of being homicide victims, and risks were especially high in young children whose mothers were hospitalized with affective disorders or schizophrenia. However, the relative risks presented in the current study are based on extremely rare events, and the overwhelming majority of children whose parents have a psychiatric history do not become homicide victims.

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Parental mental disorders affect a broad range of child health outcomes, with the most disturbing being higher risk of death during infancy or childhood. During the 1930s, a German study by Kallmann[1] showed an increased risk of childhood death among offspring of parents with schizophrenia. Subsequent research has largely focused on links between maternal psychotic disorders and risk of all-cause mortality in the first year of life,[2] with much of the recent research conducted using national registers in Scandinavian countries such as Denmark[3] and Sweden.[4,5] We know of only 1 published study that estimated relative risk for child homicide in relation to parental mental illness. In that study, which was conducted by our group using Danish registry data, Webb et al[6] reported an increased risk of all unnatural causes of death (including homicide, suicide, and accidents) up to 25 years of age in offspring of parents admitted to psychiatric care. In that study, relative risk of homicide was markedly elevated among the children of the parents with mental disorders. Different reasons for this large excess risk of homicide were proposed, including growing up in more hazardous environments or direct harm by the parents as a consequence of their mental disorders. However, the perpetrators' identities were unknown, and it was not possible to examine potential mechanisms for increased homicide risk in that study. Furthermore, that study did not compare risk across different maternal and paternal diagnostic categories.

Child homicide is a sensitive issue, and filicide, defined as a child becoming a homicide victim by the hand of 1 or both of his or her parents, is a topic of great concern among health and social care professionals and the public at large. Parental mental disorders are a central element in published descriptions of parental perpetrators. For example, Resnick[7] examined the literature in 1969 and found that three-quarters of these parents showed psychiatric symptoms prior to committing filicide, while 4 in 10 had seen a psychiatrist shortly before their crime. In a study by d'Orbán[8] in the 1970s on mothers charged with filicide, 24 of 89 were categorized as mentally ill. Recently, Flynn et al[9] assessed a UK population-based case series and reported that one-quarter of perpetrators were recorded as having symptoms of mental illness at the time of the offense, and 91 of 112 (81%) cases of infanticide were perpetrated by parents.

As early as the 1960s, Resnick[7] proposed classification of the causes of filicide into 5 groups: psychosis, mercy killings, unwanted child, accident, and revenge from the spouse. Since then, the classification has been modified and

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refined,[10] but its core can still be used today, and we concentrated on examining parental psychosis or other mental disorder as a possible reason, or risk factor, for being a victim of child homicide or filicide.

Using Danish national registers, we were able to expand the follow-up time on the risk of child homicide according to parental psychiatric admission history previously examined by Webb et al.[6] By increasing the number of observed homicide cases in this way, we could estimate risk of filicide specific to history of parental mental illness. Most importantly, we could link our existing registry data to police records for years 2000–2005 in order to identify perpetrators of each child homicide committed during that period.

The objectives of this article were to compare homicide rates between children whose parents were previously admitted to a psychiatric hospital versus the general population, to examine the effect of specific parental diagnoses, and to assess how frequently the crime was perpetrated by a parent or parents according to their psychiatric history.

METHOD

We used 2 different approaches to meet our objectives. First, we used Danish national registers from 1973 to 2007 to study homicide risk between children whose parents were previously admitted to a psychiatric hospital, including diagnosis-specific analyses, versus their unexposed counterparts. Second, we used police records during 2000 to 2005 to examine whether or not 1 of the parents was the perpetrator. This study was approved by the Danish Data Protection Agency.

Danish National-Based Registers From 1973 to 2007

This study used information from the Danish Civil Registration System,[11] in which each citizen is assigned a personal identifier used in all national registers, to create a register-based follow-up study. The register holds records on vital status, sex, and date of birth and data on family members, and it is continuously updated with information on date of death, emigration, immigration, and internal migration. All citizens born in Denmark between January 1, 1973, and January 1, 2007, constituted the study population. Follow-up of the cohort members began on their date of birth and ended on January 1, 2007; their 18th birthday; their date of death; or their date of emigration, whichever came first. Maternal register links were present for 99.9% of all cohort members, while paternal links existed for 98.9%. Such linkage exists according to legal parenthood status, ie, the child is either the biologic offspring or an adoptee.

Police Records From 2000 to 2005

In addition to the Danish national registers, we had access to records that identified all child homicide victims and the perpetrators of these acts for years 2000 to 2005 inclusive. Thus, the examination of the identity of the perpetrator was restricted to this limited time period.

Assessment of Psychiatric Admission in Parents and Cause of Death in Cohort Members

Data from the Danish Civil Registration System were linked with the Danish Psychiatric Central Register,[12] which includes data on all psychiatric inpatient admissions in Denmark since April 1969 and outpatient contacts since January 1995. Until December 31, 1993, the Danish adaptation of the *International Classification of Diseases, Eighth Revision* (*ICD-8*)[13] classification system was used, with the *ICD-10*[14] classification used from January 1, 1994. Four diagnostic groups were used to categorize mental disorders in the parents: (1) schizophrenia and related disorders: *ICD-8* = 295, 296.8, 297, 298.39, 301.83; *ICD-10* = F20–F29; (2) affective disorders: *ICD-8* = 296.09, 296.19, 296.29, 296.39, 296.99, 298.09, 298.19, 300.49, 301.19; *ICD-10* = F30–F39; (3) alcohol or drug-related disorders: *ICD-8* = 291, 294.30, 294.38, 303, 304, 980.09; *ICD-10* = F10–F16, F18, F19; and (4) a miscellaneous ("other disorders") category that consisted of all admissions to psychiatric hospitals not listed above. This is a standard categorization using the *ICD-10*[14] main categories, with a translation to *ICD-8*[13] equivalent codes. Note that the 9th Revision, *ICD-9*, was never implemented in Denmark. The 4 diagnostic groups were categorized hierarchically, with schizophrenia and related disorders ranked as the most severe group, followed by affective disorders and then alcohol or drug-related disorders. The lowest in the hierarchy was the "other" group of miscellaneous mental disorders.

Parental psychiatric admission was treated as a time-dependent covariate, and parents were categorized as being diagnosed with any type of mental disorder from the first day of their first registered admission. When we examined the identity of the perpetrator (2000–2005), we also used the information on outpatient contacts to increase statistical power.

The underlying cause of death was identified from the Cause of Death Register.[15] The codes for homicide were *ICD-8* = E960–E969 and *ICD-10* = X85–Y09 and Y87.1. In the period 2000–2005, our register data were linked with police records to identify the perpetrators. The definition of being a child homicide victim was that a person (the perpetrator) had been convicted for the homicide and that the victim was below age 18 years when he or she died. In case the assumed perpetrator commits suicide before he or she is convicted, police records have been used. If the police consider the crime to be solved and the assumed perpetrator to be the actual perpetrator, we have used this information.

Statistical Analyses

In the prospective cohort study, rates of homicide were analyzed using Poisson regression with the GENMOD procedure in SAS version 9.1 (SAS Institute Inc, Cary, North Carolina). This method approximates a Cox regression.[16,17] Mortality rate ratios (MRRs) were estimated, stratified, and adjusted for sex, calendar time, and age of offspring. Mortality rate ratios were calculated by log-likelihood estimation, and Wald 95% confidence intervals (CIs) were used. The probability of being a homicide victim before reaching one's

Table 1. Mortality Rate Ratios for Homicide at 0–17 Years According to Parental Psychiatric Status

Psychiatric Status	No. of Deaths	Rate per 100,000 Person-Years	Mortality Rate Ratio (95% CI)
Both parents[a]			
No psychiatric admission (reference)	127	0.49	1.00 reference
Other mental disorders	17	2.63	6.01 (3.62–9.98)*
Alcohol or drug-related disorders	15	3.71	8.91 (5.20–15.27)*
Affective disorders	15	4.49	11.18 (6.53–19.14)*
Schizophrenia-like disorders	13	5.91	15.38 (8.67–27.27)*
Total parental psychiatric disorders	**60**	**3.74**	**8.94 (6.56–12.18)***
Maternal history[b]			
No psychiatric admission (reference)	149	0.56	1.00 reference
Other mental disorders	13	3.39	5.74 (3.23–10.17)*
Alcohol or drug-related disorders	3	2.27	3.04 (0.95–9.73)
Affective disorders	13	6.84	12.85 (7.24–22.80)*
Schizophrenia-like disorders	9	7.54	13.21 (6.62–26.36)*
Total maternal psychiatric disorders	**38**	**4.61**	**7.89 (5.45–11.43)***
Paternal history[b]			
No psychiatric admission (reference)	161	0.61	1.00 reference
Other mental disorders	6	1.94	2.82 (1.24–6.39)*
Alcohol or drug-related disorders	13	4.30	5.80 (3.24–10.39)*
Affective disorders	3	1.99	2.94 (0.93–9.26)
Schizophrenia-like disorders	4	3.80	4.60 (1.67–12.66)*
Total paternal psychiatric disorders	**26**	**2.99**	**4.02 (2.61–6.18)***

[a]At least 1 parent admitted to psychiatric hospital. [b]Mortality rate ratio (95% CI) mutually adjusted for maternal and paternal history of psychiatric admission, with further adjustment for sex, calendar period, and offspring age; hierarchical model.
*Significant difference compared to the reference group.

18th birthday was calculated as the cumulative incidence, using a recently derived SAS macro.[18]

Because of the low number of cases, significance testing of 2 × 2 cross-tabulations by perpetrators' identity, according to police records 2000–2005, was conducted using Fisher exact tests. We had insufficient information to conduct a survival analysis on these data.

RESULTS

In the study population of all births in Denmark from 1973, we identified 187 child homicide victims during the follow-up period 1973–2006. The total number of person-years at risk was almost 27.5 million, resulting in an overall rate of 0.68 child homicides per 100,000 person-years. Rates were 1.10 per 100,000 in the age group 0–4 years and 1.61 per 100,000 in the age group 0–365 days. A total of 60 homicide victims had a parent previously admitted to a psychiatric hospital before the crime occurred, and there was an excess homicide risk among these children (MRR = 8.94; 95% CI, 6.56–12.18) compared to children whose parents had not been admitted (Table 1).

Separate analyses of the mothers' and fathers' mental health statuses are also presented in Table 1: the relative risk of children being child homicide victims differed according to which parent had been admitted. The effect linked with maternal psychiatric history (MMR = 7.89; 95% CI, 5.45–11.43) was higher than with paternal psychiatric history (MMR = 4.02; 95% CI, 2.61–6.18). Four homicide victims had both a mother and a father admitted to a psychiatric hospital.

We categorized parental mental disorders into 4 diagnostic groups and found the highest mortality rate ratio among children with a mother previously admitted with either schizophrenia-like or affective disorders (Table 1). This difference was statistically significant in that children with mothers who had schizophrenia-like or affective disorders had significantly higher risk of homicide compared to children with a mother with "other" mental disorders. There were no statistically significant differences associated with specific paternal diagnoses.

Children aged younger than 5 years had an especially high relative risk of being homicide victims if the mother had a previous history of mental disorder. This indicates effect modification by child's age and by parent's sex. This interaction was not present among children whose fathers had been admitted (Table 2). The sex of the child did not influence the risk of being a homicide victim, overall, or stratified by sex of the parents (results not shown).

The absolute risk (or probability) of being a homicide victim before reaching one's 18th birthday was 0.051% (95% CI, 0.033–0.069) for children with at least 1 parent admitted to a psychiatric hospital before birth, and 0.009% (95% CI, 0.007–0.010) for children with neither parent admitted (Figure 1).

Identity of Perpetrators

Using police records during 2000 to 2005, we identified 38 homicide victims aged less than 18 years. Among the 33 victims with a known perpetrator, 29 (88%) were killed by either their father or their mother (Table 3).

A total of 7 (21%) perpetrators had previous contact with a psychiatric hospital, and all 7 (100%) of these were a parent of the victim. This was also the case for all but 4 (85%) of the 26 known perpetrators with no psychiatric contact. There was no significant difference between these 2 percentages

Table 2. Mortality Rate Ratios (MRRs) of Homicide According to Maternal or Paternal Psychiatric Status, Stratified by Child's Age

	0–4 Years		5–9 Years		10–17 Years	
Psychiatric Status	n	MRR (95% CI)[a]	n	MRR (95% CI)[a]	n	MRR (95% CI)[a]
No maternal psychiatric admission	85	1.00 reference	41	1.00 reference	23	1.00 reference
Maternal psychiatric admission	23	10.16 (6.29–16.42)	12	8.72 (4.52–16.85)	3	2.24 (0.66–7.65)
No paternal psychiatric admission	93	1.00 reference	48	1.00 reference	20	1.00 reference
Paternal psychiatric admission	15	4.62 (2.62–8.15)	5	2.16 (0.84–5.55)	6	6.27 (2.47–15.89)

[a]Mutually adjusted for maternal/paternal history of psychiatric admission, with further adjustment for sex and calendar period.

Figure 1. Cumulative Incidence of Being a Homicide Victim Before One's 18th Birthday, Stratified by Parental History of Psychiatric Admission at Time of Birth

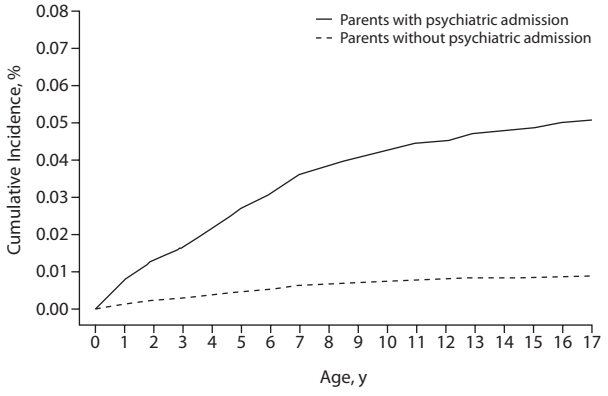

Table 3. Parental Status of Perpetrator With Respect to Homicide Victim[a]

Psychiatric Admission Status of Perpetrator	Mother or Father	Neither Parent	Total
Not admitted	22	4	26
Admitted before	7	0	7
Total	29	4	33

[a]In the 33 cases in which the police have homicide as the cause of death, 2000–2005. In 23 cases, the perpetrator was the father of the child. Fisher exact test used for difference between the fractions 22/26 and 7/7; $P = .37$.

Table 4. Multiple Homicide Victims of Crime: Proportion of Subsequent Suicide of Perpetrator, With Each Perpetrator Counted Only Once, 2000–2005[a]

Suicide of Perpetrator in Connection With Homicide	Yes	No	Total
Yes	4	3	7
No	3	13	16
Total	7	16	23[b]

[a]Fisher exact test used for difference between the fractions 4/7 and 3/16; $P = .08$. [b]In 7 cases, the perpetrator killed more than 1 child (2 to 4 children).

(Table 3). In 13 cases, the homicide victim was over 5 years old, and no mothers were among the perpetrators in this age group. In 77% (n = 10) of the cases, the father was the perpetrator in this age group, whereas 95% (n = 19) of the perpetrators were a parent in the younger age group. Four homicide victims were less than 1 month old (3 mothers and 1 father as the perpetrator).

Seven perpetrators became multiple homicide perpetrators, resulting in 23 different perpetrators. A total of 57% of perpetrators with multiple homicide victims committed suicide in connection with the homicides (the same day), as opposed to 19% of the perpetrators with only 1 victim ($P = .08$; Fisher exact test; Table 4).

Validations of Homicide in the Cause of Death Register 2000–2005 Versus Police Records

When we merged information from police records with our cohort of Danish-born children during 2000 to 2005, we found that 26 of 33 children also had homicide as the cause of death in the register, resulting in a sensitivity of 78.8%. Conversely, we found 4 children registered as homicide victims in the Cause of Death register, who were not in the police records as homicide victims, resulting in a positive predictive value of 86.7%. The positive predictive value and sensitivity percentage are lower than we expected, but the 4 children listed as such could indeed be homicide victims, where the perpetrator had not yet been found or convicted. The 7 children listed as homicide victims in police records, and not in the Cause of Death register, had the code "accidental death" or the code was missing.

DISCUSSION

Key Findings

Children of parents previously admitted to a psychiatric hospital had a higher risk of being homicide victims (MRR = 8.94; 95% CI, 6.56–12.18). Risks are especially high if young children have mothers previously hospitalized with affective disorders or schizophrenia. The absolute risk of being a homicide victim was 0.009% if none of the parents had a psychiatric admission before the child's birth, and 0.051% if 1 of the parents was previously admitted. During 2000 to 2005, 88% of the child homicide cases were filicide victims. This percentage was not significantly different between parents who had a previous psychiatric admission versus the unexposed group.

Incidence and Identity of Perpetrators

In the United Kingdom, rates of infant homicide are 4.5 per 100,000 live births,[9] and in a study from the United States, rates of child homicide in children aged 0–4 years

was 3.0 per 100,000 children.[19] The overall rate in the current study was 0.68 per 100,000 (1.10 per 100,000 in the age group 0–4; 1.61 per 100,000 in the age group 0–365 days), indicating that Denmark has a lower child homicide rate than the United States and United Kingdom. We found that for 95% of the child homicide victims less than 5 years old, the perpetrator was 1 of the parents. The corresponding number in the United States was 61%[20]; however, the majority of perpetrators in the United States were still the parents or friends with social relationships to the child.[19] In our study, if we include all age groups less than 18 years, parents committed the homicide in 90% of all cases. In the remaining cases, the perpetrator lived in very close proximity to the victim, indicating the presence of some kind of social relationship between perpetrator and the child homicide victim. These findings are also consistent with those from the United Kingdom,[9] where 91/112 (81%) cases of infanticide were perpetrated by parents.

Our historical register-based investigation was restricted largely to severe parental mental disorders that resulted in at least 1 admission prior to the infant's or child's death. The largest relative risks of homicide at ages 0–17 years were found among children whose mothers previously had been admitted with affective disorders or schizophrenia-like disorders. The risk in both of these exposure subgroups was approximately 13 times higher than in the general population, similar to the results found in reviews by Resnick[7] and Bourget et al.[10] In the UK study,[9] a third of mothers were diagnosed with affective disorder (compared to 11% with schizophrenia or a related disorder).

Resnick[7] suggested that parental psychosis or mental disorder was a reason for being a victim of child homicide, implying that the parent was the perpetrator. In our subgroup analyses, we found that it was mostly the parents who perpetrated child homicide, regardless of whether or not there was parental psychiatric history. If we assume that almost all perpetrators were parents throughout the entire follow-up period, the majority of parents (127 of 187) had no prior psychiatric history. A special case of mental disorder often mentioned in relationship to filicide is when onset of the mental disorder occurs in close proximity to childbirth. Approximately 1 per 1,000 mothers giving birth will experience a new onset of severe mental disorder necessitating psychiatric admission after childbirth.[21] These disorders, often termed "postpartum psychoses," are considered psychiatric emergencies.[22,23] Postpartum psychosis poses a risk to both mother and baby, and of great concern are the tragic cases resulting in maternal suicide and/or infanticide.[24,25] However, in the current study, only 3 children below the age of 1 month (in the period 2000–2005) were victims of maternal filicide, emphasizing the rarity of these events. There was not enough statistical power to examine characteristics of these cases separately.

Variation in Effects by Diagnosis

Previous admission with maternal schizophrenia conferred the highest relative risk of becoming a homicide victim among the children, although the effect estimate was virtually as high with inpatient-treated maternal affective disorders. It may be that mothers with schizophrenia have more psychotic episodes where the child is exposed to greater risk, either from the mother herself or from other adults, because the ill mother is less vigilant. Patients with schizophrenia have worse outcomes across a broad range of clinical measures, including the negative social consequences of having a mental disorder,[26] which could also result in an excess risk of homicide for the offspring.

Affective disorders treated through inpatient care represent a highly selected subgroup of severely ill people among all those who experience these disorders. In a UK mother and baby inpatient sample, harm to infants by their mothers was predicted by evidence of self-harm, thoughts of harming the infant, and the presence of depressive symptoms, all of which were most common in the mothers with affective disorder[27] compared to other diagnostic groups, including schizophrenia. Appleby and Dickens[28] have suggested that in cases of severe maternal depression, apathy may lead to neglect, irritability to physical harm or abuse, and depressive delusions to homicide.

Absolute Versus Relative Risk

Although we observed some high relative risks of being child homicide victims if parents had records of mental disorders, we found very low absolute risks of child homicide. Nonetheless, the stigma of psychiatric illness may encourage the general public to believe that the majority of mentally ill parents are liable to harm their children.[29] In line with the approach we have adopted in this article, it is our view that clinicians and researchers should present a more balanced picture by reporting both relative and absolute risks to avoid further stigmatization of mentally ill people.[30]

With such low absolute risks, knowledge that severe parental mental disorder is strongly associated with infant or child homicide risk may be of limited clinical utility. Should effective interventions exist, they may be impractical to implement in routine care. Furthermore, rarity of outcome, low positive-predictive values, and high numbers needed to treat may generate prohibitively high costs for potentially effective treatments. These concerns are widely acknowledged in relation to suicide prevention,[31–33] but homicide is rarer still and may be even harder to prevent. Even so, because the actual risks of homicide are extremely low, mental health professionals, policymakers, and the popular media must continue to emphasize that the overwhelming majority of mentally ill parents pose no threat to the survival of their children. Thus, while more common health problems affect these children more frequently than in the general population, the threat of homicide is minimal.

Strengths and Limitations

Child homicide is an extremely rare event, and the analysis from the period 2000–2005 was made on a limited number of cases. Despite having access to national Danish population registers, with follow-up over more than 3 decades, the numbers of observed cases in our investigation were sparse.

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This indicates that future research of this topic requires information on larger populations to conduct examinations with detailed subgroup analyses.

We assumed independence between the children in our calculation of MRR. This was, however, not the case, as some of the perpetrators committed homicide on multiple siblings within families. Furthermore, some of the parents admitted to a psychiatric hospital, as well as parents not admitted, had more than 1 child in the cohort. This lack of independence in the cohort could influence our confidence interval estimates to a small degree, but the point estimates of relative risk would be entirely unchanged.

CONCLUSION

Children of parents with psychiatric admission history have high relative risk of homicide, and especially so if young children have mothers previously hospitalized with affective disorders or schizophrenia. However, the relative risks presented in the current study are based on extremely rare events, and the overwhelming majority of children whose parents have a psychiatric history do not become homicide victims. In the large majority of these Danish cases, a parent was the perpetrator, whether or not the parent had been treated in a psychiatric hospital.

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