

ORIGINAL ARTICLE

# Hospitalization for Mental Illness among Parents after the Death of a Child

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ABSTRACT

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**BACKGROUND**

The loss of a child is considered one of the most stressful events in the life of a parent. We hypothesized that parental bereavement increases the risk of hospital admission for a psychiatric disorder, especially for affective disorders.

**METHODS**

We studied a cohort of 1,082,503 persons identified from national registers in Denmark who were born between 1952 and 1999 and had at least one child under 18 years of age during the follow-up period, from 1970 to 1999. Parents who lost a child during follow-up were categorized as “bereaved” from the date of death of the child.

**RESULTS**

As compared with parents who did not lose a child, parents who lost a child had an overall relative risk of a first psychiatric hospitalization for any disorder of 1.67 (95 percent confidence interval, 1.53 to 1.83). Bereaved mothers had a higher relative risk of being hospitalized for any psychiatric disorder than bereaved fathers (relative risks, 1.78 [95 percent confidence interval, 1.60 to 1.98] and 1.38 [95 percent confidence interval, 1.17 to 1.63], respectively; P value for interaction, 0.01). The relative risks of hospitalization specifically for affective disorders were 1.91 (95 percent confidence interval, 1.59 to 2.30) and 1.61 (95 percent confidence interval, 1.15 to 2.27) for bereaved mothers and fathers, respectively. Among mothers, the relative risk of being hospitalized for any psychiatric disorder was highest during the first year after the death of the child but remained significantly elevated five years or more after the death.

**CONCLUSIONS**

The risk of psychiatric hospitalization was increased among parents, especially mothers, who lost a child.

**T**HE DEATH OF A CHILD IS ONE OF THE most stressful events in a parent's life.<sup>1,2</sup> Several small cross-sectional and follow-up studies have suggested high rates of symptoms of anxiety and depression in parents who have lost a child.<sup>2-6</sup> However, prospective data are lacking to support an association between the death of a child and subsequent clinical psychiatric disease in those parents,<sup>2,3</sup> although it has been proposed that parental bereavement is more difficult to cope with than any other type of bereavement.<sup>2,7</sup> The loss of a parent during childhood or the loss of a spouse has been shown to increase the risk of clinical mental illness later in life.<sup>8-12</sup> Depression and other affective disorders are considered to be particular risks after the loss of a family member.<sup>13-15</sup> We hypothesized that the loss of a child would increase the risk of subsequent psychiatric illness in a parent, in particular for affective disorders. We expected the effect to be strongest shortly after the death of the child and the risk to be affected by the sex of the parent, the age of the deceased child, and the number of children in the family.<sup>2,3,16</sup>

Even an extremely stressful life event affects people in different ways.<sup>2,3,16</sup> If life events carry a risk of severe health problems for only a small fraction of the population, a large study is needed to detect such associations. We thus assessed the association between parental bereavement and psychiatric hospitalization with the use of data from large national registries in Denmark.

METHODS

**STUDY DESIGN, FOLLOW-UP, AND DATA COLLECTION**

We conducted our study by linking records from the Danish Civil Registration System<sup>17</sup> and the Danish Psychiatric Central Register.<sup>18</sup> The registration system included 1,082,503 persons who were born in Denmark between January 1, 1952, and January 1, 1999, and had at least one child under 18 years of age before January 1, 1999. The Danish Psychiatric Central Register has been computerized since April 1, 1969, and includes information on all psychiatric hospitalizations in Denmark and the associated diagnoses. For all cohort members, the follow-up started on the date of birth of the first child or on April 1, 1970 (for 0.2 percent), whichever came last. We chose April 1, 1970, as the start date for follow-up because some of the information we needed was not complete during the first year of

**Table 1. Relative Risk of a First Psychiatric Hospitalization among Bereaved Parents, Stratified According to the Parent's Sex.\***

Parent, Diagnosis, and Bereavement	No. of Admissions	Person-Years	Relative Risk (95% CI)†
<b>Mothers</b>			
All mental disorders			
≥2 children‡	025	4,036	3.35 (2.26–4.97)
1 child	356	111,506	1.73 (1.55–1.92)
None	11,333	6,538,730	1.00§
Total	11,714	6,654,272	
Affective disorders			
Bereaved	125	120,747	1.91 (1.59–2.30)
Not bereaved	3,523	6,692,558	1.00§
Schizophrenia			
Bereaved	73	121,571	1.89 (1.48–2.40)
Not bereaved	2,311	6,709,890	1.00§
Substance abuse			
Bereaved	151	120,201	2.16 (1.82–2.56)
Not bereaved	3,584	6,687,760	1.00§
<b>Fathers</b>			
All mental disorders			
≥2 children‡	7	1,613	2.39 (1.14–5.03)
1 child	139	58,126	1.35 (1.14–1.61)
None	8,707	4,837,699	1.00§
Total	8,853	4,897,438	
Affective disorders			
Bereaved	35	61,954	1.61 (1.15–2.27)
Not bereaved	1,539	4,970,850	1.00§
Schizophrenia			
Bereaved	23	62,099	1.76 (1.15–2.67)
Not bereaved	1,270	4,972,181	1.00§
Substance abuse			
Bereaved	88	61,124	1.43 (1.15–1.77)
Not bereaved	5,233	4,919,412	1.00§

\* During follow-up, we registered 1,211,634 births and a total of 11,895 deaths of children who were under 18 years of age. A total of 17,033 parents were subsequently included in the bereaved cohort.

† Relative risks were adjusted for calendar period, age of parents at bereavement, number of children in the family (including the child who died), and parents' age at first birth. CI denotes confidence interval.

‡ These parents lost more than one child during follow-up.

§ This group served as the reference group.

registration in the Danish Psychiatric Central Register. We registered 1,211,634 births during follow-up. The follow-up ended on the date of a first psychiatric diagnosis, the date of death, the date of emigration, or January 1, 1999, whichever came first. Altogether, 19,124 persons did not contribute to the person-years count owing to the fact that they died, left the country, disappeared, were diagnosed

**Table 2.** Relative Risk of First Psychiatric Hospitalization among Bereaved Parents According to the Age of the Child at the Time of Death, Stratified According to the Parent's Sex.

Diagnosis, Parent, and Age of Deceased Child	No. of Hospital Admissions	Person-Years	Relative Risk (95% CI)*
<b>Affective disorders</b>			
Mothers			
Child ≥6 yr	12	6,781	2.72 (1.54–4.81)
Child 1–5 yr	17	16,083	1.93 (1.19–3.11)
Child ≤1 yr	96	97,883	1.84 (1.49–2.27)
Trend†			1.06 (0.97–1.15)
Fathers			
Child ≥6 yr	3	3,592	1.85 (0.59–5.75)
Child 1–5 yr	12	10,079	3.32 (1.88–5.89)
Child ≤1 yr	20	48,283	1.21 (0.78–1.90)
Trend†			1.13 (0.98–1.30)
<b>Schizophrenia</b>			
Mothers			
Child ≥6 yr	3	6,839	1.09 (0.35–3.40)
Child 1–5 yr	15	16,184	2.79 (1.67–4.65)
Child ≤1 yr	55	98,548	1.80 (1.37–2.37)
Trend†			0.99 (0.87–1.13)
Fathers			
Child ≥6 yr	0	3,604	
Child 1–5 yr	4	10,118	1.81 (0.68–4.84)
Child ≤1 yr	19	48,377	1.90 (1.20–3.01)
Trend†			0.83 (0.59–1.16)
<b>Substance abuse</b>			
Mothers			
Child ≥6 yr	7	6,749	1.36 (0.65–2.87)
Child 1–5 yr	19	16,024	1.99 (1.27–3.14)
Child ≤1 yr	125	97,428	2.26 (1.88–2.72)
Trend†			0.93 (0.84–1.03)
Fathers			
Child ≥6 yr	3	3,497	0.78 (0.25–2.42)
Child 1–5 yr	13	10,007	1.27 (0.74–2.20)
Child ≤1 yr	72	47,620	1.51 (1.19–1.91)
Trend†			0.91 (0.79–1.06)

\* Relative risks were adjusted for calendar period, age of parents at bereavement, number of children in the family (including the child who died), and parents' age at first birth. The reference group was parents who did not lose a child. CI denotes confidence interval.

† The trend estimate expresses the change in risk associated with an increase of one year in the child's age.

with a mental illness before April 1, 1970, or were hospitalized for a mental illness before they had a child. Parents who lost a live-born child under 18 years of age contributed observation time to the bereaved group from the date the child died. We reg-

istered a total of 11,895 deaths of children under 18 years of age. For the 593 parents who lost more than one child, the date of death of the first child was set as the start of exposure. Twenty-nine parents lost two children on the same day. The bereaved cohort consisted of 17,033 parents.

Outcomes of interest included all first admissions due to mental illness (*International Classification of Diseases, 8th Revision* [ICD-8], codes 290 to 315 for the period from 1970 through 1993, and *International Classification of Diseases, 10th Revision* [ICD-10], codes F00 through F99 for the period from 1994 through 1999). We were particularly interested in hospitalizations for affective disorders (ICD-8 codes 296.09 through 296.99, 298.19, 300.19, and 300.49, and ICD-10 codes F30 through F39), because grief may cause a clinical picture dominated by depressive symptoms. However, we also analyzed substance abuse (ICD-8 codes 291.xx, 303.xx, and 304.xx, and ICD-10 codes F10 through F19) and schizophrenia and related disorders (ICD-8 codes 295.xx, 296.8x, 297.xx, 298.39, and 301.83, and ICD-10 code F2x). Separate analyses were performed for each diagnostic group. In these analyses, follow-up ended on the date of admission of a parent who was given the diagnosis of the disorder under study. We also examined a possible modifying effect of parental sex and age, the age of the deceased child, the time since the death of the child, and the number of children in the family on the relative risks of psychiatric admission.

The study was approved by the Danish Data Protection Agency, whose role is to ensure that the privacy and integrity of the individual subjects recorded in the registries are protected. No informed consent was required for the study.

#### STATISTICAL ANALYSIS

Data were analyzed in a log-linear Poisson regression model (SAS Genmod procedure, version 8.1). We fitted data with the use of generalized linear models and by treating observations as independent Poisson variables, with the number of person-years serving as an offset variable.<sup>19,20</sup> We adjusted for the calendar period of follow-up (1970 to 1973, 1974 to 1978, 1979 to 1983, 1984 to 1988, 1989 to 1993, or 1994 to 1999), the age of the parents at the time of the child's death (<20 years, 20 to 24 years, 25 to 29 years, 30 to 34 years, 35 to 39 years, 40 to 45 years, or >45 years), the age of the parents when the first child was born (<20 years, 20 to 29 years, or ≥30 years), and the number of children in the

family at the time of the death, including the child who died (one, two, three, or more).

The parent's age, the calendar period, the current number of children, and the number of children who died were treated as time-dependent variables. All reported P values are two-sided. We used the likelihood-ratio test to test for a trend in the analyses according to the age of the deceased child. We used weights of 0.5 in the group of children who were younger than 1 year of age, 3.0 in the group 1 to 5 years of age, and 7.0 in the group 6 years of age or older. A trend in the time since the death of the child was assessed with weights of 0.5 in the group for which less than 1 year had passed since the loss, 2.5 in the group for which 1 to 4 years had passed, and 6.0 in the group for which 5 or more years had passed. A trend in the number of children was assessed with weights of 1, 2, and 3.

RESULTS

During 11,551,710 person-years of follow-up (4,897,438 for fathers and 6,654,272 for mothers), there were 20,567 first psychiatric admissions (8853 among fathers and 11,714 among mothers) (Table 1). There were 11,376,429 person-years of follow-up for parents who did not lose a child, and 175,281 person-years for the bereaved group (0.6 percent of the person-years in the nonbereaved group came from the bereaved parents before they lost a child). A total of 9241 parents died, and their data were censored during follow-up before any psychiatric admission.

The relative risk of hospitalization for any psychiatric disease among parents who lost a child was 1.67 (95 percent confidence interval, 1.53 to 1.83), after adjusting for calendar period, sex and age of the bereaved parents, number of children in the family, and parents' age at first birth. Bereaved mothers had a higher relative risk of being admitted for any mental disorder than bereaved fathers (relative risks, 1.78 [95 percent confidence interval, 1.60 to 1.98] and 1.38 [95 percent confidence interval, 1.17 to 1.63], respectively; P value for interaction, 0.01). Mothers who had lost two or more children had a relative risk of a first hospitalization for any psychiatric disorder of 3.35 (95 percent confidence interval, 2.26 to 4.97), and fathers had a relative risk of 2.39 (95 percent confidence interval, 1.14 to 5.03), as compared with nonbereaved mothers and fathers, respectively.

The relative risk of hospitalization for each psy-

**Table 3. Relative Risk of First Psychiatric Hospitalization among Bereaved Parents According to the Time since the Death of the Child, Stratified According to the Parent's Sex.**

Diagnosis, Parent, and Time since Death	No. of Hospital Admissions	Person-Years	Relative Risk (95% CI)*
<b>Affective disorders</b>			
Mothers			
<1 yr	34	10,279	6.83 (4.86–9.59)
1–4 yr	33	36,640	1.86 (1.32–2.63)
≥5 yr	58	73,828	1.33 (1.02–1.75)
Trend†			0.82 (0.77–0.88)
Fathers			
<1 yr	10	6,402	5.83 (3.13–10.88)
1–4 yr	10	21,890	1.57 (0.84–2.94)
≥5 yr	15	33,662	1.09 (0.65–1.82)
Trend†			0.82 (0.72–0.93)
<b>Schizophrenia</b>			
Mothers			
<1 yr	13	10,318	4.53 (2.62–7.82)
1–4 yr	20	36,836	2.02 (1.30–3.15)
≥5 yr	40	74,417	1.52 (1.10–2.10)
Trend†			0.88 (0.81–0.97)
Fathers			
<1 yr	4	6,410	2.68 (1.00–7.16)
1–4 yr	8	21,937	1.80 (0.89–3.61)
≥5 yr	11	33,751	1.53 (0.84–2.80)
Trend†			0.94 (0.80–1.10)
<b>Substance abuse</b>			
Mothers			
<1 yr	14	10,254	2.93 (1.73–4.95)
1–4 yr	53	36,516	3.15 (2.40–4.15)
≥5 yr	84	73,431	1.72 (1.37–2.15)
Trend†			0.90 (0.84–0.95)
Fathers			
<1 yr	10	6,354	1.48 (0.80–2.76)
1–4 yr	28	21,701	1.34 (0.92–1.94)
≥5 yr	50	33,069	1.47 (1.11–1.93)
Trend†			0.74 (0.47–1.16)

\* Relative risks were adjusted for calendar period, age of the parents at bereavement, number of children in the family (including the child who died), and parents' age at first birth. The reference group was parents who did not lose a child. CI denotes confidence interval.

† The trend estimate expresses the change in risk associated with an increase of one year in the time since the child's death.

chiatric diagnostic group we assessed was increased among both mothers and fathers who lost a child as compared with mothers and fathers who did not (Table 1). The age of the child at the time of death

**Table 4. Relative Risk of First Psychiatric Hospitalization among Bereaved Parents According to the Age of the Parents, Stratified According to the Parent's Sex.**

Diagnosis, Parent, and Age of Parent at Child's Death	No. of Admissions	Person-Years	Relative Risk (95% CI)*	P Value†
<b>Affective disorders</b>				
Mothers				0.45
<30 yr	100	100,694	1.85 (1.51–2.27)	
≥30 yr	25	20,054	2.19 (1.47–3.25)	
Fathers				0.66
<30 yr	24	42,398	1.70 (1.13–2.56)	
≥30 yr	11	19,556	1.45 (0.80–2.64)	
<b>Schizophrenia</b>				
Mothers				0.23
<30 yr	57	101,323	1.76 (1.35–2.31)	
≥30 yr	16	20,247	2.51 (1.53–3.56)	
Fathers				0.50
<30 yr	15	42,513	1.60 (0.95–2.67)	
≥30 yr	8	19,585	2.16 (1.07–4.36)	
<b>Substance abuse</b>				
Mothers				0.66
<30 yr	128	100,262	2.13 (1.77–2.55)	
≥30 yr	23	19,941	2.35 (1.56–3.56)	
Fathers				0.11
<30 yr	72	41,872	1.56 (1.23–1.98)	
≥30 yr	16	19,252	1.02 (0.62–1.67)	

\* Relative risks were adjusted for calendar period, age of the parents at bereavement, number of children in the family (including the child who died), and parents' age at first birth. The reference group was parents who did not lose a child. CI denotes confidence interval.

† The P value is for the difference between age groups.

did not significantly change the risk of hospitalization for any of the diagnostic groups (Table 2). Among mothers, the relative risk of being hospitalized for any of the psychiatric disorders was highest during the first year after the death of the child (Table 3). The elevated relative risk of each of these disorders declined significantly with time since the loss but remained significantly elevated after five years or more. Among fathers, a trend toward a decline in the relative risk over time since the loss was observed for affective disorders only, and only the risk of hospitalization for substance abuse remained significantly elevated after five years. However, statistical power was limited by the smaller number of events among fathers than among mothers.

The risk of hospitalization for psychiatric dis-

orders among mothers or fathers 30 years of age or older was not significantly different from the risk among mothers or fathers less than 30 years of age (Table 4). Among mothers, the relative risk of hospital admission for any of the three diagnostic groups significantly decreased with an increase in the number of children in the family (Table 5). Among fathers, the relative risk of admission for affective disorders was similarly reduced with an increase in the number of children in the family, but there was no significant trend toward a reduced risk of admission for other psychiatric disorders with an increase in the number of children in the family.

## DISCUSSION

We found an increased risk of first psychiatric hospitalization among parents, especially mothers, who lost a child less than 18 years of age. Among mothers, the relative risks of all types of psychiatric hospitalization were highest during the first year after bereavement, remained significantly increased five years or more after the loss, and decreased in accordance with an increase in the number of children in the family. Among fathers, the trend in relative risks according to time since the loss and the number of children in the family seemed similar to the trend among mothers, but the numbers of events were smaller among fathers.

Previous findings on the association between the loss of a first-degree relative and the risk of psychiatric illness have been inconsistent. One hospital-based case-control study found no excess frequency of loss of a first-degree relative in the six months preceding the admission,<sup>14</sup> but an association was reported in three other hospital-based case-control studies.<sup>8,21,22</sup> A follow-up study found that a widowed population had more psychiatric admissions during the first year of bereavement than nonbereaved women.<sup>9</sup> Information on the effect of parental bereavement has been sparse.<sup>2,3</sup> One small study indicated that bereavement due to the death of a child was more frequent than other types of bereavement in psychiatric patients.<sup>22</sup>

Some have suggested that bereavement may be more closely associated with depression than with other psychiatric disorders.<sup>13,15</sup> Other psychiatric diagnoses, however, have not been well studied.<sup>3</sup> In our data, the association between the loss of a child and psychiatric hospitalization was not restricted to affective disorders.

Grief is often most intense shortly after bereave-

ment.<sup>2,3</sup> Thus, the observation of a greater relative risk of hospitalization among some parents during the first year after a loss is not surprising.

One possible explanation for these findings is that the threshold for psychiatric hospitalization might be lower among persons who have lost a child. However, in this case, we would expect that the relative risks would decline over time to protective levels (below 1.0), since parents would be hospitalized at an earlier stage of psychiatric illness and, therefore, removed from the population at risk. In contrast, the relative risks remained significantly increased in some analyses even five years or more after the loss.

It is also possible that “reverse causation” might contribute to the association between the loss of a child and psychiatric hospitalization, particularly in bereaved mothers who lost a child less than one year of age. Infants of schizophrenic mothers, for example, have twice the risk of death by sudden infant death syndrome.<sup>23</sup> However, the relative risk of hospitalization for schizophrenia (or any of the other mental disorders we studied) was not higher among mothers who lost a child less than one year of age than among those who lost a child between one and five years of age.

Studies have shown that mothers often have more physical, somatic, and mental problems, including suicide,<sup>24</sup> after the loss of a child than do fathers.<sup>16,25</sup> The higher relative risk of psychiatric hospitalization among bereaved mothers in our study is in line with those observations, since the rate of hospitalization for mental disorders in the nonbereaved population was of the same magnitude for fathers and mothers. Parents who lost their only child had the greatest risk of psychiatric admission. This suggests that having other children in the family may mitigate the effects of the loss of a child on a parent’s mental health, although we cannot rule out that having a large family may elevate the threshold for hospitalization.<sup>26</sup>

Unfortunately, we have no longitudinal data on cohabitation and are unable to assess the risk of hospitalization among single parents as compared with married parents. Neither can we assess the effect of psychiatric hospitalization in one parent on the risk of hospitalization in the other parent.

Our study has several strengths. We used documented psychiatric admissions, rather than self-reported data, as the end point. We had access to a large population-based sample and had a long follow-up period; virtually all bereaved parents in Den-

**Table 5. Relative Risk of First Psychiatric Hospitalization among Bereaved Parents According to the Number of Children in the Family, Stratified According to the Parent’s Sex.**

Diagnosis, Parent, and No. of Children*	No. of Admissions	Person-Years	Relative Risk (95% CI)†
<b>Affective disorders</b>			
Mothers			
1	29	13,272	3.79 (2.62–5.48)
2	38	33,188	2.32 (1.68–3.20)
≥3	58	74,288	1.35 (1.03–1.77)
Trend‡			0.58 (0.45–0.79)
Fathers			
1	9	7,534	4.01 (2.08–7.75)
2	11	17,486	2.29 (1.26–4.16)
≥3	15	36,935	0.99 (0.59–1.67)
Trend‡			0.48 (0.31–0.76)
<b>Schizophrenia</b>			
Mothers			
1	18	13,372	3.22 (2.02–5.14)
2	17	33,497	1.84 (1.14–2.98)
≥3	38	74,702	1.56 (1.11–2.18)
Trend‡			0.72 (0.52–0.99)
Fathers			
1	7	7,558	2.75 (1.31–5.79)
2	8	17,476	2.33 (1.16–4.70)
≥3	8	37,064	1.09 (0.52–2.22)
Trend‡			0.68 (0.40–1.16)
<b>Substance abuse</b>			
Mothers			
1	38	13,232	3.96 (2.87–5.46)
2	45	32,962	3.00 (2.23–4.04)
≥3	68	74,008	1.43 (1.11–1.84)
Trend‡			0.59 (0.47–0.73)
Fathers			
1	18	7,387	1.76 (1.11–2.80)
2	22	17,200	1.51 (0.99–2.30)
≥3	48	36,537	1.29 (0.96–1.73)
Trend‡			0.85 (0.64–1.14)

\* The number of children in the family includes the child who died.

† Relative risks were adjusted for calendar period, age of the parents at bereavement, number of children in the family (including the child who died), and parents’ age at first birth. The reference group was parents who did not lose a child. CI denotes confidence interval.

‡ The trend estimate expresses the change in relative risk when the number of children is increased by one.

mark during the period under study were enrolled. In addition, all data used in our study were extracted from high-quality databases that were compiled independently of the research hypothesis, and we were able to examine each of the main diagnostic subgroups of mental illness.

Our study also has limitations. We could not adjust for a family history of psychiatric illness<sup>27-29</sup> or socioeconomic status.<sup>25,30</sup> However, previous studies have indicated that the loss of a child affects the various social strata with similar frequencies.<sup>16</sup> Even if less-educated parents (who have a higher risk of psychiatric hospitalization) were overrepresented in the bereaved group, it is implausible that this could account for the entire observed increase in relative risks for psychiatric hospitalization. Confounding might also be possible if a shared genetic predisposition led to both the death of the child

and psychiatric hospitalization in the parent (e.g., if schizophrenia and sudden infant death syndrome share common genes). In addition, we included only patients who were hospitalized, which would have underestimated incidence rates for overall psychiatric illness.

Our results are based on earlier hypotheses and are not adjusted for the multiple comparisons performed. Some of these comparisons were based on small numbers, especially for fathers. In conclusion, we found an increased risk of first psychiatric hospitalization after the loss of a child, especially among mothers, that in many cases remained increased five years or more after the loss.

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