The Forgotten Grieving: A Nationwide Follow-up Study of Mortality Subsequent to the Death of a Sibling

Mikael Rostila*, Jan Saarela, and Ichiro Kawachi

*Correspondence to Dr. Mikael Rostila, Centre for Health Equity Studies, Stockholm University/Karolinska Institutet, Sveavägen 160, SE-106 91 Stockholm, Sweden (e-mail: mikael.rostila@chess.su.se).

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Previous findings have suggested that the loss of a family member is associated with mortality among bereaved family members. The least-studied familial relationship in the bereavement literature is that of siblings, although loss of a sibling may also involve health consequences. The authors conducted a follow-up study based on data from the Swedish total population register, covering the period 1981–2002. Using Cox regression, mortality risk ratios for bereaved and nonbereaved persons aged 18–69 years were estimated. All-cause mortality and cause-specific mortality (unnatural causes, natural causes, cardiovascular disease, cancer, suicide, accidents, and all other causes) were examined. In men, the mortality risk for bereaved persons versus nonbereaved persons was 1.26 (95% confidence interval: 1.22, 1.30), and in women it was 1.33 (95% confidence interval: 1.28, 1.39). An elevated mortality risk associated with a sibling’s death was found in all age groups studied, but the association was generally stronger at younger ages and could be observed predominantly after more than 1 year of follow-up. There was also an increased mortality risk if the sibling had died from a discordant main cause, which may strengthen the possibility that the association observed is not due to confounding alone.

Abbreviation: CI, confidence interval.

People linked through social ties have interdependent health. Illness or death in one person may consequently influence the health of another person to whom he or she is connected (1). Studies have found that the loss of a spouse, parent, or child is associated with health status and mortality among bereaved family members (2–5). The most conclusive evidence on this matter concerns the so-called widowhood effect (1), which is thought to demonstrate the health consequences of grief and isolation. In general, bereavement is suggested to adversely affect health through both acute psychophysiological mechanisms, which have been observed to follow episodes of intense psychogenic shock (2, 6–8), and longer-term mechanisms involving changes in health-related behaviors, such as smoking, increased alcohol consumption, and poor diet and exercise habits (2, 3, 8).

The least-studied familial relationship in the bereavement literature is that of adult siblings (9–11). Surviving siblings can consequently be considered “forgotten grievers,” whose loss and pain are insufficiently acknowledged (12, 13). To the extent that siblings are also beloved and provide companionship or behavioral norms, one would expect that loss of an adult sibling, just as loss of a spouse, would be associated with mortality. In fact, the death of a sibling often represents the loss of one of the longest and most intimate relationships of a person’s lifetime (14). The level of grief following sibling loss might therefore be as severe as grief associated with other types of loss, such as losing a parent (11, 15).

There is an extensive body of literature on the impact of sibling loss during childhood on behavioral problems, emotional disturbances, depression, and sleeping difficulties (16, 17), as well as on somatic symptoms such as abdominal pain, stomachaches, headaches, hysterical pain, asthma, convulsive states, and ulcerative colitis (17–19). By contrast, the health consequences of sibling loss during adulthood have been largely overlooked (20), which is surprising considering that the loss of a sibling is much more
frequent among adults. It could be that losing an adult sibling has less of an impact than the death of other family members (spouse, children), since adult siblings normally do not live together (21). The adult sibling relationship is also characterized by lower frequency of contact when compared with other familial relationships (11). Some evidence suggests that mortality risk is elevated after the loss of an adult twin (22), that bereaved adult siblings report lower overall health and life satisfaction (23), and that they have higher risks of hospitalization and disablement (23).

The potential health consequences following the death of a sibling are expected to vary across the life course. The significance of the sibling relationship presumably weakens as the siblings grow older and other relationships become relatively more significant (24). Hence, the association between the death of a sibling and the mortality risk of remaining siblings might be weaker at older ages than at younger ages. The association may depend on the nature of the death and the amount of time elapsed since the death, reflecting the intensity of bereavement (5), and maladaptive coping behaviors can take a longer time to develop compared with acute psychophysologic reactions.

An important threat to causal inference is the possibility that the death or ill health of two or more persons in the same sibling group has a common prior cause—that is, that there is confounding of the relation by an unobserved third variable. For example, if a sibling dies of a chronic disease with a strong genetic component (e.g., lung failure caused by cystic fibrosis) and another sibling dies shortly thereafter, this may be a marker of genetic or biologic similarity. Another possibility is that the deaths of both siblings originated from factors related to shared childhood environment and living conditions (e.g., material circumstances, lifestyle, parental education, etc.). One method of getting closer to causal inference is to examine deaths due to specific causes among pairs of siblings. Separating natural and unnatural deaths and dissecting these deaths further according to the main cause of death may assist us in distinguishing causation from confounding.

Our aim was to conduct a large-scale study on health consequences following the loss of a sibling in adulthood, using intergenerational linked data from nationwide Swedish registers. We postulated that the association between loss of a sibling and mortality among bereaved siblings would depend on the age at which a person experienced a sibling’s death, the time interval since the sibling’s death, and the nature of the death. We also aimed to get closer to causal inference by studying whether siblings died of the same specific cause or discordant causes.

MATERIALS AND METHODS

The data came from the Swedish Work and Mortality Data. The Swedish Work and Mortality Data contain multiply linked data from routinely kept national Swedish registers. The data linkage and use of the data for research purposes was approved by the regional ethical review board of the Karolinska Institutet. All persons born in Sweden during the period 1932–1962 and alive at the end of 1980 were linked to the mother, provided that she was born in Sweden and alive at the end of 1980. Hence, sibling groups were identified through the mother. Persons born to mothers with only 1 child were excluded from the analysis. Individuals were stratified into 5 different groups consisting of people who experienced sibling loss at ages 18–29 years, 30–39 years, 40–49 years, 50–59 years, and 60–69 years. We included individual-level information about basic sociodemographic variables (age, socioeconomic status, marital status, number of children, number of siblings, region of residence, and calendar year), as well as the month and cause of death for all persons who died during the period 1981–2002. We distinguished natural deaths from unnatural deaths. The former category was further divided into deaths from cardiovascular disease, cancer, and other diseases, whereas the latter category consisted of suicide, accidents, and other external causes. The International Classification of Diseases codes are provided in the footnotes of Table 1.

In conformity with the death of a sibling, which was the key variable of interest, age and calendar year were time-varying. The latter two factors were used as continuous variables, but alternative categorizations did not affect the results reported here. All other variables were measured at the end of 1980, which was before any sibling’s death had occurred. The socioeconomic status variable distinguished between blue-collar workers, white-collar workers, self-employed persons, and persons outside of the labor market. Marital status consisted of the categories married, previously married, and never married. Number of children and number of siblings were treated as categorical variables. Region of residence referred to each person’s county of residence and consisted of 26 different categories.

All persons in the mentioned cohorts were observed over time with regard to a sibling’s death and their own death. At the point in time at which a person died, the surviving sibling changed status from being a nonbereaved person to being a bereaved person. The death of a sibling referred to the first death of any person in a sibling group. Hence, in a group with 3 siblings where 1 died in August 1983, for example, the 2 surviving siblings became bereaved persons from that date onward, and they were subsequently observed with regard to their own deaths. All persons who experienced a sibling’s death during the study period (1981–2002) were included in the analyses, whereas those who did not experience a sibling’s death comprised a 10% random sample. In the data presentation and statistical estimations, people in each of these two groups were weighted according to their sampling proportion, and all confidence intervals were calculated from corrected t statistics. Using Cox regression, we estimated mortality risk ratios for bereaved and nonbereaved persons.

RESULTS

A total of 80,888 men and 79,700 women experienced the death of a sibling (Table 1). The total number of sibling deaths was 72,949. The crude mortality rate (number of deaths in relation to number of person-years) was notably higher (more than twice as high) in bereaved persons compared with nonbereaved persons. The relative difference was
higher than that of bereaved men, which was con-

However, the mortality rate of bereaved women was slightly

increased over age groups, because of an overall increase in

the difference between bereaved and nonbereaved persons

smaller at older ages than at younger ones. In absolute terms,

difference between bereaved and nonbereaved persons

increased over age groups, because of an overall increase in

mortality rate among bereaved siblings could not be considered

statistically significant, except in the age group 50–59

years. Both natural and unnatural causes of death in sib-

lings raised the mortality risk of the surviving sibling, with

the exception of unnatural deaths experienced by people in

the oldest age group. At the youngest ages, unnatural

sibling deaths had a stronger association with mortality

among bereaved siblings than did natural sibling deaths,

while the strengths of associations were relatively similar in

other age groups.

The associations between the death of a sibling and mor-

tality among bereaved siblings were substantially stronger

in the longer term than in the short term (Table 3). At ages

30–39 years, for instance, the mortality risk of bereaved

men during the first year after sibling loss was 1.18 (95% CI:

1.08, 4.41), while the risk ratios were generally lower at older ages (i.e., 30–69 years). Results of analyses in which data on both

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than did natural sibling deaths, irrespective of whether natural or unnatural deaths in the index persons were studied. In addition, natural sibling deaths raised the risk of mortality from both natural and unnatural causes. This association between discordant causes of death among siblings makes confounding by biologic similarity and shared social conditions less likely.

A more detailed categorization, in which we pooled age groups to obtain reasonable levels of statistical power, revealed that there were associations with regard to practically all combinations of main causes of death (Table 5). A strong association was naturally found for concordant causes. Bereaved men whose siblings died of cardiovascular disease had a risk of dying from cardiovascular disease of 1.64 (95% CI: 1.49, 1.81) in comparison with nonbereaved men. The corresponding estimate for discordant causes was 1.25 (95% CI: 1.13, 1.37) for cancer, 2.08 (95% CI: 1.83, 2.36) for other diseases, 2.42 (95% CI: 1.85, 3.17) for suicide, 1.30 (95% CI: 0.87, 1.95) for accidents, and 2.33 (95% CI: 1.25, 4.35) for other external causes. The pattern for women was similar. However, there were also associations between most discordant causes, suggesting that the association was unlikely to be due to confounding alone.

**DISCUSSION**

This large-scale follow-up study based on the Swedish population register found that the death of a sibling was associated with overall increased mortality among surviving siblings but that the strength of the association was dependent on the age of the bereaved person, the duration of follow-up, and partly the cause of the sibling’s death.

In adulthood, the death of a sibling may have a significant impact when it involves the loss of a companion, a source of emotional support, and practical aid. It may serve as a vivid and disturbing marker of one’s own mortality, with implications for health (23). Because the death of a sibling has been considered to have less impact than the death of other family members, the social support system may be unprepared to respond appropriately to the grieving sibling’s needs (11, 14).

Our findings suggest increased mortality following the death of a sibling in all adult age groups studied. The associations are comparable and, in some instances, stronger than those for child and parental deaths (5, 25). The present findings are consistent with studies indicating that the level of grief following the loss of a sibling is comparable to, or even exceeds, that associated with other types of familial loss (11).

At younger ages in particular (ages 18–39 years), there was a notable elevation in mortality associated with the death of a sibling. Because there is little expectation of the death of a sibling at these ages, it may involve high immediate stress levels, strong feelings of grief, greater difficulty in accepting the death, and fewer available coping strategies (26, 27). The excess mortality risk at younger ages may also reflect grief processes occurring within the family. Parents who lose a child often become preoccupied and absorbed with their own grief and posttraumatic stress. Under such circumstances, they may be unprepared to respond to the needs of the remaining children (14). The fact that the

<table>
<thead>
<tr>
<th>Type of Death</th>
<th>Age Group, years</th>
<th>RR (95% CI)</th>
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<tr>
<td>All sibling deaths</td>
<td>All Ages</td>
<td>1.26* (1.22, 1.30)</td>
<td>1.83* (1.16, 2.88)</td>
<td>1.55* (1.31, 1.82)</td>
<td>1.45* (1.34, 1.56)</td>
<td>1.19* (1.13, 1.25)</td>
<td>1.19* (1.12, 1.26)</td>
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<tr>
<td>Natural</td>
<td>1.26*</td>
<td>1.22, 1.31</td>
<td>1.49*</td>
<td>0.71, 3.13</td>
<td>1.37*</td>
<td>1.09, 1.72</td>
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<td>Unnatural</td>
<td>1.25</td>
<td>1.17, 1.34</td>
<td>2.11</td>
<td>1.19, 3.73</td>
<td>1.79</td>
<td>1.42, 2.26</td>
<td>1.55</td>
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<tr>
<td>All sibling deaths</td>
<td>Men</td>
<td>1.33* (1.28, 1.39)</td>
<td>2.19*</td>
<td>1.08, 4.41</td>
<td>1.83*</td>
<td>1.48, 2.26</td>
<td>1.45*</td>
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<tr>
<td>Natural</td>
<td>1.32*</td>
<td>1.26, 1.39</td>
<td>1.76*</td>
<td>0.56, 5.49</td>
<td>1.93*</td>
<td>1.47, 2.53</td>
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<td>Unnatural</td>
<td>1.37</td>
<td>1.26, 1.49</td>
<td>2.56</td>
<td>1.06, 6.18</td>
<td>1.68</td>
<td>1.20, 2.35</td>
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social support system primarily focuses on the bereaved parents may leave remaining siblings unsupported in their grief process. Such circumstances might lead to adverse health consequences for bereaved siblings at younger ages, especially in the longer term (15).

We generally found stronger associations between the death of a sibling and mortality among bereaved siblings over longer-term follow-up (>1 year) than in the short term (the first year after a sibling’s death). Adult siblings normally live separate lives and have their own families. It is possible that their primary network (spouse and children) can help them cope with grief in the immediate aftermath of a sibling’s death and therefore postpone the appearance of the association for some years. Maladaptive coping behaviors may also emerge over a period of some years, leading to a time lag in the association between sibling loss and mortality among the bereaved siblings. Accordingly, some previous research has found adverse mortality consequences only after the first year subsequent to the death of a twin (22).

Sibling deaths from natural causes and from unnatural causes had fairly similar consequences for bereaved persons in the older age groups (40–69 years). At younger

Table 3. Risk of All-Cause Mortalitya Among Persons Who Lost a Sibling in Adulthood, by Age Group, Sex, Type of Sibling’s Death, and Time Since Sibling’s Death, Sweden, 1981–2002b

<table>
<thead>
<tr>
<th>Time Since Sibling’s Death, years</th>
<th>All Ages</th>
<th>18–29</th>
<th>30–39</th>
<th>40–49</th>
<th>50–59</th>
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<td>1</td>
<td>1.01*</td>
<td>0.93, 1.09</td>
<td>1.71*</td>
<td>0.85, 3.43</td>
<td>1.18*</td>
<td>0.84, 1.68</td>
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<td>2–5</td>
<td>1.34</td>
<td>1.27, 1.41</td>
<td>2.02</td>
<td>1.05, 3.91</td>
<td>1.69</td>
<td>1.32, 2.18</td>
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<td>1.32</td>
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<td>1</td>
<td>0.98*</td>
<td>0.90, 1.07</td>
<td>1.80*</td>
<td>0.67, 4.79</td>
<td>1.03*</td>
<td>0.65, 1.64</td>
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<td>2–5</td>
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<td>1.87</td>
<td>1.37, 2.54</td>
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<td>1.05*</td>
<td>0.95, 1.16</td>
<td>1.21</td>
<td>0.30, 4.85</td>
<td>1.24*</td>
<td>0.77, 2.01</td>
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<tr>
<td>2–5</td>
<td>1.42</td>
<td>1.32, 1.52</td>
<td>3.14</td>
<td>1.30, 7.61</td>
<td>2.04</td>
<td>1.48, 2.81</td>
</tr>
<tr>
<td>&gt;5</td>
<td>1.40</td>
<td>1.32, 1.49</td>
<td>2.45</td>
<td>0.34, 17.51</td>
<td>2.06</td>
<td>1.47, 2.89</td>
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<td>Natural sibling deaths</td>
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<td>1.06*</td>
<td>0.96, 1.18</td>
<td>1.25</td>
<td>0.18, 8.90</td>
<td>1.02*</td>
<td>0.53, 1.95</td>
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<td>2–5</td>
<td>1.41</td>
<td>1.31, 1.52</td>
<td>2.74</td>
<td>0.68, 11.00</td>
<td>2.35</td>
<td>1.59, 3.46</td>
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<tr>
<td>&gt;5</td>
<td>1.39</td>
<td>1.30, 1.49</td>
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<td>NA</td>
<td>2.34</td>
<td>1.50, 3.64</td>
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<td>Unnatural sibling deaths</td>
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<td></td>
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<tr>
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<td>0.96</td>
<td>0.73, 1.26</td>
<td>1.17</td>
<td>0.16, 8.31</td>
<td>1.67</td>
<td>0.83, 3.34</td>
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<td>2–5</td>
<td>1.44</td>
<td>1.23, 1.70</td>
<td>3.49</td>
<td>1.12, 10.88</td>
<td>1.59</td>
<td>0.90, 2.80</td>
</tr>
<tr>
<td>&gt;5</td>
<td>1.43</td>
<td>1.28, 1.60</td>
<td>4.21</td>
<td>0.59, 30.15</td>
<td>1.78</td>
<td>1.07, 2.96</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; NA, not applicable; RR, risk ratio.
* P < 0.005.
a Risk of mortality among bereaved persons versus nonbereaved persons, adjusted for the effects of all control variables. Control variables included were age, calendar year, socioeconomic status, marital status, number of children, number of siblings, and region of residence.
b The P value is for the Wald statistic of the joint significance of all parameters tested.
c P = 0.04.
d P = 0.29.
There are obvious strengths of this study, such as the use of total population register data, longitudinal follow-up, reliable information on mortality, and other included variables. However, some limitations should be noted. More detailed individual information is required to uncover the actual causal mechanisms that link siblings’ mortality risks, which could minimize the possibility of omitted variable bias. Ideally, one would like to have access to biologic and genetic data, detailed information on diseases from medical records, and more information on shared childhood social environment and family characteristics—information that unfortunately is not included in the registers. Another shortcoming was the lack of indicators on the quality of the relationship and the frequency of contact between siblings, which might relate to the risk of adverse health outcomes.

As a proxy measure, we included information on whether siblings were of same sex, were close in age, and lived in geographic proximity to each other. These variables, to some extent, showed associations in the expected directions (associations were somewhat stronger when siblings were of the same sex, were close in age, and lived in geographic proximity to each other) but were left out of the final results presented here, since they did not improve the fit of
### Table 5. Risk of All-Cause Mortality\(^a\) Among Persons Who Lost a Sibling in Adulthood, According to the Main Cause of the Sibling’s Death and the Main Cause of the Index Participant’s Death, Sweden, 1981–2002\(^b\)

<table>
<thead>
<tr>
<th>Main Cause of Sibling’s Death</th>
<th>CVD</th>
<th>Cancer</th>
<th>Other Disease</th>
<th>Suicide</th>
<th>Accident</th>
<th>Other External Cause</th>
<th>All Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RR</td>
<td>95% CI</td>
<td>RR</td>
<td>95% CI</td>
<td>RR</td>
<td>95% CI</td>
<td>RR</td>
</tr>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVD</td>
<td>1.64*</td>
<td>1.49, 1.81</td>
<td>1.00*</td>
<td>0.88, 1.14</td>
<td>1.41*</td>
<td>1.23, 1.63</td>
<td>1.14*</td>
</tr>
<tr>
<td>Cancer</td>
<td>0.91</td>
<td>0.82, 1.02</td>
<td>1.25</td>
<td>1.13, 1.37</td>
<td>1.15</td>
<td>1.01, 1.30</td>
<td>1.08</td>
</tr>
<tr>
<td>Other disease</td>
<td>1.20</td>
<td>1.06, 1.37</td>
<td>1.10</td>
<td>0.96, 1.27</td>
<td>2.08</td>
<td>1.83, 2.36</td>
<td>1.01</td>
</tr>
<tr>
<td>Suicide</td>
<td>1.03</td>
<td>0.84, 1.26</td>
<td>1.01</td>
<td>0.82, 1.25</td>
<td>1.50</td>
<td>1.22, 1.85</td>
<td>2.42</td>
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<tr>
<td>Accident</td>
<td>0.74</td>
<td>0.57, 0.96</td>
<td>1.10</td>
<td>0.88, 1.38</td>
<td>1.51</td>
<td>1.21, 1.90</td>
<td>1.19</td>
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<tr>
<td>Other external cause</td>
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<td>1.01, 1.73</td>
<td>1.01</td>
<td>0.73, 1.40</td>
<td>1.81</td>
<td>1.37, 2.39</td>
<td>1.83</td>
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<tr>
<td>All causes</td>
<td>1.16*</td>
<td>1.09, 1.23</td>
<td>1.12*</td>
<td>1.05, 1.19</td>
<td>1.49*</td>
<td>1.39, 1.60</td>
<td>1.29*</td>
</tr>
<tr>
<td><strong>Women</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVD</td>
<td>1.71*</td>
<td>1.44, 2.02</td>
<td>1.16*</td>
<td>1.03, 1.31</td>
<td>1.39*</td>
<td>1.15, 1.68</td>
<td>1.29*</td>
</tr>
<tr>
<td>Cancer</td>
<td>0.99</td>
<td>0.83, 1.19</td>
<td>1.21</td>
<td>1.11, 1.33</td>
<td>1.35</td>
<td>1.15, 1.58</td>
<td>1.00</td>
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<tr>
<td>Other disease</td>
<td>1.34</td>
<td>1.08, 1.66</td>
<td>1.27</td>
<td>1.11, 1.44</td>
<td>2.24</td>
<td>1.89, 2.64</td>
<td>1.81</td>
</tr>
<tr>
<td>Suicide</td>
<td>1.30</td>
<td>0.95, 1.78</td>
<td>1.01</td>
<td>0.83, 1.24</td>
<td>1.48</td>
<td>1.11, 1.97</td>
<td>3.72</td>
</tr>
<tr>
<td>Accident</td>
<td>1.82</td>
<td>1.35, 2.44</td>
<td>1.15</td>
<td>0.93, 1.41</td>
<td>1.50</td>
<td>1.09, 2.06</td>
<td>1.54</td>
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<tr>
<td>Other external cause</td>
<td>1.67</td>
<td>1.07, 2.59</td>
<td>0.86</td>
<td>0.61, 1.21</td>
<td>2.02</td>
<td>1.37, 2.97</td>
<td>2.49</td>
</tr>
<tr>
<td>All causes</td>
<td>1.35*</td>
<td>1.22, 1.49</td>
<td>1.17*</td>
<td>1.11, 1.25</td>
<td>1.58*</td>
<td>1.44, 1.74</td>
<td>1.66*</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; CVD, cardiovascular disease; RR, risk ratio.

\(^a\) Risk of mortality among bereaved persons versus nonbereaved persons, adjusted for the effects of all control variables. Control variables included were age, calendar year, socioeconomic status, marital status, number of children, number of siblings, and region of residence.

\(^b\) In cases where 6 parameters were tested, the P value is for the Wald statistic of their joint significance.
the models and had practically no impact on the estimates. We also checked that maternal mortality during follow-up was not a plausible cause of 2 siblings’ deaths. We reduced heterogeneity in the study population by restricting the analyses to people born in Sweden, with parents born in Sweden. At the same time, this delimitation excluded the possibility of drawing conclusions about the immigrant population residing in Sweden. Associations between the death of a sibling and mortality among bereaved siblings may differ among foreign-born people, due for instance to cultural differences in coping behavior. Another drawback with the data used is that sibling groups could be constructed only if the mother was alive at the beginning of the observation period. Based on official vital statistics, we estimate that approximately 80% of mothers of the relevant birth cohorts were alive at that time. If sibling groups with a deceased mother (i.e., those who could not be observed in our data set) differed greatly from those analyzed here, we would have an inference problem. We do not think that this is a major impediment with regard to the association between the death of a sibling and mortality among remaining siblings, but we still aim to overcome the problem in future studies by adopting additional data linkage to include information about deceased parents as well.

Although we found associations between the loss of a sibling and mortality among bereaved siblings from discordant main causes of death, there remains a possibility of residual confounding. For example, if a person dies of liver cirrhosis and the surviving sibling dies shortly thereafter in a car accident, the siblings are coded as having died from discordant causes; yet, it could be that the siblings shared a genetic vulnerability to alcoholism and that this (rather than bereavement per se) contributed to the death of both siblings. These results indicate that the health-care system should encompass broader collateral health effects when dealing with terminally ill patients and their families (1). Most discussion has been on bereavement after the death of a spouse or a parent, while siblings could be considered “forgotten grievers.” Our findings illustrate that a sibling’s death can also have adverse health consequences for adult siblings. A caring and emotional attitude displayed by health-care professionals can have positive effects on recovery from grief (30) and should also be of significance for bereaved siblings. It seems important that psychological support be provided not merely for parents but also for siblings during end-of-life care, as well as after the death. Considering that their loss and pain are often insufficiently acknowledged by the parents and the informal social support system (11, 14), it is important that physicians and health-care professionals acknowledge bereaved siblings. Our findings also conform to the view that it is important for health-care workers to follow and support bereaved siblings over time and from a longer-term perspective (31). The assessment of medical interventions and medical care might be altered substantially if benefits and costs incorporated collateral health effects (1). However, more research is required on the specific types of efforts that are needed in order to support bereaved siblings. An especially important task for future research is also to determine the relative importance of underlying mechanisms linking sibling deaths and mortality in bereaved siblings, such as deterioration of health behaviors and onset of acute psychophysiological stress mechanisms. Such information could give health-care professionals guidance in how to effectively mitigate adverse health by bereavement. Testing such mechanisms would require data with much more detailed longitudinal information than was available here.

To our knowledge, this study provides the first large-scale evidence for an increased mortality risk associated with the death of a sibling at adult ages. Considering the substantial adverse impact of sibling loss we have found here, more research on the health consequences and underlying mechanisms of this association is suggested.

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Author affiliations: Centre for Health Equity Studies, Stockholm University/Karolinska Institutet, Stockholm, Sweden (Mikael Rostila); Department of Social Sciences, Division for Social Sciences, Åbo Akademi University, Vasa, Finland (Jan Saarela); and Department of Society, Human Development, and Health, Harvard School of Public Health, Boston, Massachusetts (Ichiro Kawachi).

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Conflict of interest: none declared.

REFERENCES


