



Sudden parental death from external causes and risk of suicide in the bereaved offspring: A national study



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ABSTRACT

Previous research has revealed an association between parental bereavement from external causes and risk of suicide in offspring. Few studies have however provided insights into specific influences of cause of death, gender of the deceased and bereaved, age at bereavement and suicide, and time since bereavement. The present nested case-control study was based on data from three longitudinal registers. Subjects comprised 19 015 persons who died from suicide at an age of 11–64 years during 1969–2012 (cases), and 332 046 live comparison individuals matched for gender and date of birth. Information about deceased parents' cause and date of death, and sociodemographic data was retrieved and merged. Data were analysed with conditional logistic regression. Losing a parent to suicide, transport accidents and other external causes of death was associated with an increased suicide risk in offspring. Parental suicide was associated with a substantially higher suicide risk than transport accidents and other external causes. These effects were equally strong for daughters and sons, and for the loss of a mother, father or both parents. Suicide risk was highest in younger bereaved offspring, and bereavement had both short and long-term impacts on suicide risk. In conclusion, all offspring exposed to parental death by external causes have an increased suicide risk, independent of factors related to the exposure. The consequences are long lasting, and offspring should be offered follow-up in primary healthcare. Younger offspring bereaved by parental suicide have the highest risk and may be targeted for prevention and intervention programs in specialist healthcare.

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1. Introduction

Every year, more than 3 million people die a sudden death due to accidents, suicide, homicide or other external causes of death worldwide (World Health Organization, 2015). Consequently, a considerable number of offspring suffer sudden parental loss due to external causes of death, and such loss is one of the most significant and traumatic life events that individuals can face (Bowlby, 1980). Among the most severe adverse outcomes that may arise in offspring from sudden parental death are increased risks of suicide (Agerbo et al., 2002; Cheng et al., 2014; Gravseth et al., 2010; Guldin et al., 2015; Niederkrotenthaler et al., 2012; Wilcox et al., 2010), suicidal ideation (Jeon et al., 2013), and suicide attempts (Jakobsen and Christiansen, 2011; Kuramoto et al., 2010; Mittendorfer-Rutz et al., 2012). The risk of suicide completion, for instance, is

reported to be at least two times higher among offspring bereaved by parental death by external causes compared to individuals who have not experienced such bereavement (Agerbo et al., 2002; Guldin et al., 2015; Niederkrotenthaler et al., 2012), and one study has even reported a fivefold risk (Gravseth et al., 2010).

It is evident that parental bereavement is associated with an increased suicide risk in offspring, however, findings from empirical studies are sparse and inadequate with respect to the potential effects of the specific cause of death, gender of the bereaved, gender of the deceased, age at bereavement and time since bereavement. This is information that may aid health personnel to identify individuals at high risk and better pinpoint the targets of prevention and intervention programs.

In particular, it is widely believed that offspring bereaved by parental suicide are at a greater risk of adverse psychosocial outcomes than offspring bereaved by other causes of death. An early comprehensive review concluded that no significant differences were evident between suicide survivors and other bereaved groups regarding general mental health, PTSD symptoms, depression,

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anxiety and suicidal behavior (Sveen and Walby, 2008). More recently, however, large scale population studies have suggested a somewhat higher risk of suicide associated with parental suicide than parental death by accidents or other causes (Agerbo et al., 2002; Guldin et al., 2015; Niederkrotenthaler et al., 2012; Wilcox et al., 2010).

Furthermore, previous studies have suggested that daughters may be more influenced by parental death than sons with respect to a higher risk of suicide attempts and completed suicide (Gravseth et al., 2010; Mittendorfer-Rutz et al., 2012), but previous register based studies have only performed separate analyses for daughters and sons and refrained from directly comparing suicide risk based on gender (Gravseth et al., 2010). Likewise, separate analyses of paternal and maternal bereavement suggested that maternal bereavement was associated with a somewhat higher suicide risk in offspring (Agerbo et al., 2002). When gender of the bereaved offspring and gender of the deceased parent was studied in combination in a recent study, however, loss of the same-sex parent seemed to have the greatest impact on suicide risk (Cheng et al., 2014). Because this study had a low sample size and suffered from a lack of statistical power, an analysis of the potential interaction between gender of the deceased and bereaved with a large sample is needed.

There is only a limited number of population studies that have investigated the effect of parental loss at different ages on suicide risk in offspring (Niederkrotenthaler et al., 2012; Wilcox et al., 2010), and no study has, to our knowledge, investigated parental bereavement from birth and until late adulthood. Time elapsed since bereavement may also influence suicide risk, and studies have suggested that the time period shortly following parental bereavement may be associated with the greatest risk of suicide attempt (Jakobsen and Christiansen, 2011; Mittendorfer-Rutz et al., 2012). The potential influence of time since bereavement on risk of completed suicide in offspring has, however, not yet been investigated in register studies.

In this national population study based on longitudinal registers, our aim was to assess the influence of sudden parental death by external causes on risk of completed suicide in offspring. Given the focus on death by external causes, parental bereavement by natural death was not studied. In particular, we aimed to study whether there is an increased suicide risk in offspring bereaved by parental death due to external causes in the Norwegian population, and especially to assess the specific effects of a) cause of parental death, b) gender of the deceased parent, c) age at bereavement and time since bereavement, and d) offspring's gender and age at suicide/matching.

2. Method

2.1. Data sources

We retrieved individual data from three Norwegian longitudinal registers and merged them by means of the personal identification number.

The first register is the Cause of Death Register which records the cause and date of all deaths in Norway and has been computerized since 1969. Cause of death has been recorded according to ICD-8 (International Classification of Diseases, Eight Revision) from 1969 to 1985, ICD-9 from 1986 to 1995 and ICD-10 from 1996 to 2012 (Statistics Norway, 2012).

The second register is the Central Population Register, computerized since 1964, which contains a personal identifier for all individuals residing in Norway and their links to parents and offspring. These links were utilized in order to identify the mother and father of individuals in the register. However, a proportion of

the population has no registered link to parents because a) the person was not living with a parent in 1964, b) the person immigrated to Norway as an adult, c) the parent died before 1964, or d) the parent had emigrated from Norway before 1964. In our dataset, 245 584 subjects (70.0%) had a link to their mother and 236 731 subjects (67.4%) had a link to their father. Of people with a casedate (date of suicide or matching) in 1969, 17.6% had a link to their mother and 15.0% had a link to their father. These proportions increased with time and reached 85.8% for mothers and 84.4% for fathers in 2012.

The third register is the Statistics Norway's events database (the so-called FD-Trygd database) which is available from 1992 and contains further demographic and socioeconomic data, such as information on marital status, education, income and ethnicity.

The study was approved by the Regional Ethics Committee South East Norway and owners of the relevant registers.

2.2. Study design and population

Suicide cases between 11 and 64 years old were identified from the Cause of Death Register using codes E95 (ICD-8 and ICD-9), X60-X84 and Y870 (ICD-10). We selected this age group because they were likely to have registered links to parents in the Central Population Register. A total of 19 015 suicide cases were retrieved for the period from January 1st 1969 to December 31st 2012. A nested-case control design (Clayton and Hills, 1993) was applied to select up to 20 live controls for each suicide case. Controls were matched for date of birth, gender and the date of suicide and were drawn from a 25% random sample of the national population registered in the Central Population Register at the date of the suicide. This procedure resulted in 332 046 matched controls.

2.3. Variables

The variable of interest in the study is exposure to parental death by external causes, referred to as parental DBEC and coded as E800-E999 in ICD-8 and 9 and V01-Y89 in ICD-10. For all subjects with a link to their parents, we retrieved data for both mother and father on DBEC from the Cause of Death Register by the date of suicide for cases or the date of matching for controls. For parents who had died from external causes, we grouped their causes of death into suicide (ICD-8 and ICD-9: E95, ICD-10: X60-X84 and Y870), transport accident, including land, water and air transport methods (ICD-8 and ICD-9: E80-E84 and E920, ICD-10: V01-V99), or other external causes of death such as other accidents, homicide and injury with unknown intent (ICD-8 and ICD-9: E85-E95, E96-E999, ICD-10: W00-W89, X00-X60, X85-Y09, Y10-Y30, Y30-Y90). If subjects had a link to only one parent, they were classified according to the status of that parent for all variables described below. Based on maternal and paternal bereavement status, subjects were classified into three main categories of *bereavement status*: a) no exposure to parental DBEC, b) exposure to parental DBEC, and c) no link to either parent.

Gender of deceased parent was classified as a) no exposure to parental DBEC, b) maternal DBEC, c) paternal DBEC, d) DBEC of both parents, and e) no link to either parent. We classified *cause of death* as a) no exposure to parental DBEC, b) suicide, c) transport accidents, d) other external causes, and f) no link to either parent. Subjects were classified according to their *age at bereavement* into a) no exposure to parental DBEC, b) 0–9 years (childhood), c) 10–17 years (adolescence), d) 18–24 years (young adulthood), e) 25–44 years (adulthood), f) 45–64 years (late adulthood), and g) no link to either parent. This classification was based on the United Nations standard age classifications (United Nations, 1982) and WHO's definition of adolescence (World Health Organization, 2016). *Time*

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