Research paper

Risk factors for suicide in offspring bereaved by sudden parental death from external causes

Lisa Victoria Burrell*, Lars Mehlum, Ping Qin

National Centre for Suicide Research and Prevention, University of Oslo, Norway

ABSTRACT

Background: Parentally bereaved offspring have an increased suicide risk as a group, but the ability to identify specific individuals at risk on the basis of risk and protective factors is limited. The present study aimed to investigate to what degree different risk factors influence suicide risk in offspring bereaved by parental death from external causes.
Methods: Based on Norwegian registers, individual-level data were retrieved for 375 parentally bereaved suicide cases and 7500 parentally bereaved gender- and age-matched living controls. Data were analysed with conditional logistic regression.
Results: Bereaved offspring with low social support, indicated by offspring's single status and repeated changes in marital status and residence, had a significantly increased suicide risk compared to bereaved offspring with high social support. Moreover, low socioeconomic status, having an immigration background, having lost both parents and loss due to suicide significantly increased suicide risk.
Limitations: Several variables relevant to bereavement outcome, such as coping mechanisms and the quality of the parent-offspring relationship are impossible to examine by utilizing population registers. Moreover, the availability of data did not enable the measurement of marital stability and residence stability across the entire lifespan for older individuals.
Conclusions: Healthcare professionals should be aware of the additional risk posed by the identified risk factors and incorporate this knowledge into existing practice and risk assessment in order to identify individuals at risk and effectively target bereaved family and friends for prevention and intervention programs. Ideal follow-up for bereaved families should include a specific focus on mobilizing social support.

1. Introduction

Although the majority of people who have experienced sudden parental death return to their normal life functioning following a period of grief, research has consistently reported that bereaved offspring have an elevated risk of suicide (Agerbo et al., 2002; Gravseth et al., 2010; Guldin et al., 2015; Niederkrotenthaler et al., 2012; Wilcox et al., 2010) and suicide attempts (Jakobsen and Christiansen, 2011; Kuramoto et al., 2010; Mittendorfer-Rutz et al., 2012). Few studies, however, have investigated risk factors for completed suicide in parentally bereaved offspring, and no study has investigated several risk factors for suicide in combination in order to investigate their relative importance and potential interaction. In a recent review of risk factors for complicated grief in bereaved people (Burke and Neimeyer, 2012), low socioeconomic status (SES) in the form of low education and income was identified as a risk factor. Lack of social support has additionally been found to highly influence the development of depression and

complicated grief following bereavement (Burke and Neimeyer, 2012; van der Houwen et al., 2010). Similarly, a lack of family cohesion increased suicide risk in bereaved people (Burke and Neimeyer, 2012), and stigma has been reported to attenuate the association between bereavement and suicide (Pitman et al., 2016). A previous study by Garssen et al. (2011) investigated the influence of a limited number of bereavement-related risk factors on risk of completed suicide in bereaved offspring. They reported a larger suicide risk in sons and daughters whose parents died of suicide compared to offspring whose parents died of other causes, and in offspring who lost a mother compared to offspring who lost a father (Garssen et al., 2011).

The reasons for the variation in responses to loss are largely unknown, and the ability to identify individuals at risk of suicide on the basis of risk and protective factors is limited (Stroebe et al., 2006). It is postulated that the influence of parental loss on offspring's psychosocial wellbeing largely depends on the offspring's inter- and intrapersonal resources, as well as the nature of the bereavement (Stroebe et al.,

2006). The interpersonal resources, such as marital status and number of close friends, may reflect possible social support and community network. The intrapersonal factors, such as income, education and mental health problems, may indicate potential capacities in coping and recovery. Bereavement-related factors include for example the cause of death and the quality of the relationship to the deceased, and may reflect the severity of the loss. A better understanding of the relative effect of these factors has clinical importance in its ability to identify individuals at risk and pinpoint the targets of prevention and intervention programs.

In this national population study based on longitudinal registers, our main aim was to investigate to what degree different interpersonal, intrapersonal and bereavement-related factors influence suicide risk in offspring bereaved by parental death from external causes. We also wanted to examine whether the relative importance of these factors on risk of suicide differ by sex and age of the bereaved offspring. External causes of death refer to deaths where the cause is external to the body, such as accidents, suicide and homicide, and do not include death due to illness.

2. Methods

2.1. Data sources

We retrieved individual data from three Norwegian longitudinal registers and merged them by means of the personal identification number. Firstly, we retrieved data from the Central Population Register, which has been computerized since 1964 and contains demographic data and a personal identifier for all individuals residing in Norway, as well as their links to legal parents (biological parents and adoptive parents). These links were utilized in order to identify the mother and father of individuals in the register. Secondly, we used the Cause of Death Register, which has been computerized since 1969 and contains the cause and date of all deaths in Norway coded according to ICD-8 (International Classification of Deceases, Eight Revision) from 1969 to 1985, ICD-9 from 1986 to 1995 and ICD-10 from 1996 to 2012 (Statistics Norway, 2012). Finally, we used Statistics Norway's Events Database (the so-called FD-Trygd database, available since 1992), which contains demographic and socioeconomic data, such as information concerning marital status, education and income.

2.2. Study design and population

This study is based on the national cohort of all individuals who experienced parental death due to external causes (E800-E999 in ICD-8 and 9, V01-Y89 in ICD-10). External causes of death include suicide (ICD-8 and ICD-9: E95, ICD-10: X60-X84 and Y870), transport accidents, including land, water and air transport methods (ICD-8 and ICD-9: E80-E84 and E920, ICD-10: V01-V99), and 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). In this bereaved cohort, we identified the cases who died from suicide at an age of 12–65 years old between 1992 and 2012 from the Cause of Death Register by using codes E95 (ICD-8 and ICD-9), X60-X84 and Y870 (ICD-10). A total of 375 suicide cases were retrieved. A nested-case control design (Clayton and Hills, 1993) was applied to randomly select 20 live controls from the bereaved cohort for each suicide case, resulting in 7500 matched controls. Controls were matched for age, gender and the date of suicide.

2.3. Variables

Variables under study include the interpersonal factors marital status, marital stability and residence stability, the intrapersonal factors ethnicity, education, residence centrality and income, and the bereavement-related factors cause of parental death, gender of deceased

and age at bereavement. Marital status, marital stability, education and income were derived from the Statistics Norway's Events Database, while residence stability, ethnicity and residence centrality were derived from the Central Population Register. All bereavement-related factors were derived from the Cause of Death Register.

2.3.1. Interpersonal factors

Marital status at suicide or matching was classified as a) married, b) unmarried, c) separated, d) divorced, e) widowed and f) missing. *Marital stability* refers to the number of changes in marital status and was classified as a) no change in status, b) one change in status and c) two or more changes in status. *Residence stability* refers to the number of changes in residence address and was classified as a) no change in residence, b) one change in residence, and c) two or more changes in residence.

2.3.2. Intrapersonal factors

Ethnicity was classified as a) native Norwegian (born in Norway with two Norwegian-born parents), and b) persons with immigration background (born in Norway with one or two foreign-born parents, immigrants and foreign-born Norwegians). *Education* at time of suicide or matching was classified as a) high (bachelor, master and doctoral degree), b) intermediate (upper secondary and post-secondary non-tertiary education), and c) low (no education, preschool, primary and lower secondary education, missing). *Residence centrality* at suicide or matching is based on Statistics Norway's centrality classification of municipalities (Statistics Norway, 2016), where municipalities are classified according to travel time to populated areas of different sizes, and was classified as a) least central, b) less central, c) somewhat central, and d) highly central. *Income* was classified as a) 100 000 NOK or less, b) 100 001 – 200 000 NOK, c) 200 001 – 300 000 NOK, d) 300 001 – 400 000 NOK, e) 400 001 NOK or more, and f) missing. Information concerning income was based on registered status the year before the year of suicide or matching. Income data is only available from 1993, so people with a suicide or matching date before 1994 make up the majority of the missing category.

2.3.3. Bereavement-related factors

We classified *cause of parental death* as a) suicide, b) transport accident, and c) other external causes. *Gender of deceased parent* was classified into a) father deceased, b) mother deceased, and c) both parents deceased. Subjects were classified according to their *age at bereavement* into: a) up to 12 years, b) 13–24 years, c) 25–44 years, and d) 45–65 years. If both parents died at separate times or from different causes of death, age at bereavement and cause of death were classified according to the parent who died first.

2.4. Statistical analyses

All analyses were conducted using IBM SPSS Statistics, version 22 (IBMCorp, 2013). The outcome variable was completed suicide, and suicide risk was estimated by a conditional logistic regression analysis (Collett, 1991). Odds ratios (ORs) and 95% confidence intervals (95% CI) were estimated, and the Wald test was used to examine whether the odds ratios were significantly different from the reference. Univariate analyses yielded crude ORs adjusted for age, gender and calendar time through matching of cases and controls. A multivariate analysis yielded adjusted ORs further adjusted for all the variables in the study. Interactions between variables of study with sex and age were assessed with the log likelihood ratio test based on results from the multivariate analysis. Lastly, we assessed the interaction between marital status and education and the interaction between marital status and income, with marital status reclassified as a) married, b) single (unmarried, separated, divorced or widowed), and c) missing. The reference category was generally the value expected to be associated with the most favourable outcome (Gravseth et al., 2010). The study was approved by