BMJ Open

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Journal:	*BMJ Open*
Manuscript ID	bmjopen-2022-064379
Article Type:	Original research
Date Submitted by the Author:	03-May-2022
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Keywords:	Adult psychiatry < PSYCHIATRY, OCCUPATIONAL & INDUSTRIAL MEDICINE, Suicide & self-harm < PSYCHIATRY, PUBLIC HEALTH

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Employment status and bereavement after parental suicide: A population representative cohort study

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Word count: 4 099 words

ABSTRACT

Objectives: To examine employment status among adults bereaved by parental suicide at the time of bereavement and two and five years after the loss and to explore the importance of the gender of the adult child and the deceased parent.

Design: Population-based register study.

Setting: Norwegian population-based registries linked using unique personal identifiers.

Participants: Norwegian residents aged 25-49 years in the period 2000-2014. Participants were divided into three groups: bereaved by parental suicide, bereaved by parental death of other causes, and nonbereaved population controls.

Main outcome measures: Odds ratios for the risk of non-employment at the time of bereavement and two and five years after the loss.

Results: Those bereaved by parental suicide had a higher risk of non-employment already at the time of bereavement (OR 1.12, 95% CI 1.03 to1.21). Stratified analyses showed that women accounted for this difference (OR 1.20, 95% CI 1.09 to 1.33), while no difference was found for men (OR 0.98, 95% CI 0.86 to 1.10). Looking at the gender of the parent there was only a significant association of non-employment when losing a mother (OR 1.22, 95% CI 1.06 to 1.40), while not for losing a father (OR 1.07, 95% CI 0.98-1.18). Among those working at the time of bereavement, offspring bereaved by suicide were more likely to be non-employed at both two (OR 1.19, 95% CI 1.02 to 1.37) and five (OR 1.29, 95% CI 1.09 to 1.54) years after the loss compared to the general population.

Conclusions: Women bereaved by parental suicide and those losing a mother to suicide were found to have a weaker attachment to the labor market already before losing their parent. Those who were employed when bereaved by suicide were somewhat more likely to be non-employed five years after the event.

STRENGHTS AND LIMITATIONS OF THE STUDY

- The study minimizes the risk of selection bias by using data from population representative national registries.
- The large study sample allowed for stratified analyses exploring gender differences among the bereaved and the deceased.
- The observational design of the study does not allow for causal interpretations.
- The study was bound to use data already existing in the registries and hence includes no other data on occupational functioning than binary employment status.

INTRODUCTION

Suicide is a global public health problem causing more than 800 000 deaths each year[1] and it is one of the leading causes of premature death[2]. Estimates show that 4-7 % of individuals are impacted by a suicide each year[3 4] and over a lifetime as many as one fifth[3] to one third[5] of the population will become affected. An increasing body of research has documented a negative relationship between suicide bereavement and a range of mental health outcomes[6 7] including increased risk of psychiatric care admission[8]. For many, physical health and sleep is also affected[8].

Aspects of suicide bereavement that go beyond mental health and psychological well-being such as work participation are far less studied. Most of the studies looking on the association between bereavement and work participation so far have focused on either the experiences when returning to work[9], the impact of postventions on work participation[10] or on occupational functioning after bereavement[11].

To our knowledge only two studies have investigated the association between suicide bereavement and employment status[8 11]. In the first of these studies the authors investigated the association between bereavement and risk of occupational drop-out[11] . The study included more than 3000 young bereaved with varying relations to the deceased and time since loss, and the authors reported of an 80% increased risk of post-bereavement occupational drop-out among those bereaved by suicide compared to those bereaved by natural deaths. In the other study, a Danish nationwide registry-based study that included more than 15 000 suicide bereaved spouses they found an increased risk of sick leave, unemployment and disability pension 5 years after the loss in both men and women losing their spouse to suicide[8].

An important question is, however, whether those bereaved by parental suicide are less likely to be employed already before the loss. There are several reasons why those bereaved by suicide might differ from the general population (and from those bereaved by other causes)[6]. First, a significant proportion of the suicide bereaved may have lived with the strain of worrying and caring for a troubled or suicidal person over time. Some findings indicate that this could be the case for many of those bereaved by suicide[12]. Second, shared genetic factors and shared environment with the deceased[6] that can impact the likelihood of being employed are possible pre-existing risk factors. Further, findings are inconsistent as to whether the negative consequences associated with bereavement are stronger among those bereaved by suicide compared to those bereaved by other causes[8 6 13]. Certain features, however, seem to be specific for suicide bereavement, such as experiences of rejection and stigma[6 13] and an increase in suicidal behavior and increased suicide risk[6 8 14 15].

The consequences of suicide bereavement can also differ depending on the family relation to the deceased[6]. For instance an increased risk of suicide has been found in mothers bereaved by suicide and an increased risk of depression has been found in offspring losing a parent to suicide[6]. The association between kinship and negative mental health outcomes after suicide bereavement have been explored in a range of groups such as bereaved spouses, mothers and offspring[6 13], but studies with a focus on adults losing a parent to suicide are scarce. Given the median age of 47 years for death by suicide, a large proportion of affected offspring would be young adults[2]. The consequences of losing a parent in young adulthood is also of interest as

this is the phase in life when most people acquire a stable job, establish a family and also need to provide for them economically. In addition unemployment may also negatively affect quality of life[16] and the productivity loss for the society might be substantial.

Also the gender of the bereaved and the deceased could be of importance. Several studies have found that suicidal behavior among mothers have a greater impact on suicidal behavior in the offspring compared to if it is the father who displays suicidal behavior[17]. Moreover, grieving is more strongly linked to mental health problems in women than men[18]. However, no studies have so far explored whether the gender of the deceased parent impact on the risk of unemployment among adult bereaved offspring. Gender specific effects of bereavement on work participation could be especially important to explore because employment rates[19] and certain vulnerability factors such as overall care burden[20] are not evenly distributed between the genders even among the general population.

Finally, because non-representativeness is often a problem in research on suicide bereavement[6], large studies with a design that minimize the risk of selection bias are especially welcomed.

The current study has three main aims.

First, to uncover the potential differences in employment rates between adults bereaved by parental suicide, those bereaved by other causes, and the general population.

Second, to examine how the rate of employment among adults bereaved by parental suicide compares to that of those bereaved by other causes and the general population two and five years after bereavement among those who were employed at the time of bereavement.

Third, to examine the gendered pattern of parental suicide bereavement on young adults employment status by examining the impact of the suicide bereaved gender and the gender of the deceased parent.

METHODS

This is a cohort study covering all Norwegian residents aged 25-49 years between 2000-2014 (born between 1951 and 1989). In this study we link data from several population-based registries by unique deidentified personal identifiers. The identifiers also enable the linking of information across registries between offspring and their parents. The study is part of a larger project on welfare and health care use among suicide victims and suicide bereaved, funded by the Research Council of Norway (project number 288731). The project is ethically approved by the Regional Committee for Medical and Health Research Ethics (2014/1970). The project was also evaluated and approved by the different registry owners through the data access application process.

Data sources

Information on employment status came from the National Welfare Database (FD-Trygd). Cause and year of parental death were obtained from the Norwegian Cause of Death Registry (DÅR). Sociodemographic data (year of birth, gender) as well as the link between parents and offspring were obtained from the Norwegian Population Registry (DSF). Data on education for parents and offspring came from the National Education Database (NUDB).

Study variables

Death of a parent

The exposure variable was parental death. Participants were classified as either bereaved by suicide, bereaved by other causes, or as population controls (i.e., non-bereaved). An individual was considered as bereaved if he or she had lost a parent for the first time in the period between 2000 and 2014. Individuals losing a second parent in the study period were also considered bereaved if the death of the first parent happened more than ten years earlier. Individuals who lost a second parent during the study period with less than ten years since the death of the first parent were excluded. Individuals losing both parents during the study period were excluded from the year they lost the second parent and onwards. Individuals with no registered parents were also excluded. The registered cause of death of the parent was used to further classify bereaved individuals as bereaved by suicide (ICD-10 codes X60-X84 and Y87.0) or bereaved from other causes (all other).

Year of parental death was registered for the bereaved participants to determine employment at time of parental death and at given time points after bereavement. Because the population controls had no such temporal starting point (as they had not lost a parent) a random starting point had to be given to conduct the analyses. Each of the non-bereaved controls were thus given a reference year that was randomly picked from one of the years they were registered in the study.

Employment status

The outcome variable was employment status in the calendar year prior to parental death, and two- and five-years post bereavement. The data from the National Welfare Database (FD-

Trygd) contained information on an annual level (measured at the reference time of the third week of November). An individual was considered employed if registered as a wage earner or self-employed and had an expected average weekly workload of 20 hours or more.

Statistical analysis

The association between suicide bereavement and employment status was examined with logistic regression analyses using Stata version 16.0. The results are presented as crude and adjusted odds ratios (OR) with corresponding 95% confidence intervals (CI).

In the analysis of employment status at the time of parental death/reference year, the whole sample was included. In the analyses of employment status at two and five years after parental death/reference year the population was restricted to those employed the year prior to parental death/reference year. In addition an interaction term was included in the fully adjusted models (bereavement * gender of the bereaved). In order to further explore the potential interaction effect of gender, separate stratified analyses by gender of both the participants and the deceased (i.e. mother vs. father) were performed.

Adjusted analyses controlled for gender of the bereaved offspring and the deceased parent, the offspring's age in the year of parental death/reference year, the offspring's and both parents' educational attainment, measured in the year of parental death/reference year, and the offspring's marital status in the year of parental death/reference year.

Patient and public involvement

There was no direct involvement of either patients or the public in planning, implementation, interpretation or reporting of this research. The study is part of an overarching study project which collaborates with user groups for those bereaved by suicide in Norway (the union of suicide bereaved, LEVE; the union of young suicide bereaved, Unge LEVE).

RESULTS

The total sample comprised 2 264 837 Norwegian residents aged between 25 and 49 in the period 2000-2014 where at least one parent could be identified. Among these, 3 862 (0.2%) were bereaved by parental death by suicide. This group had a somewhat lower age (mean=35.4 years) than the population controls (mean=36.6 years) (table 1). A total of 415 934 (18.4%) subjects were bereaved by parental death of other causes, and they were somewhat older (mean=40.8 years, SD=6.3) than the population controls. There was a fairly balanced gender distribution in all three groups (the proportion of women ranged between 48.8% and 50.7%). A majority of the bereaved had lost a father, 68.5% among the suicide bereaved and 64.5% among those bereaved by other causes.

With regards to level of education both the suicide bereaved (33%) and those bereaved by other causes (31%) had lower levels of higher education compared with the population controls (37%). A larger proportion of those bereaved by suicide were unmarried (57%) compared to those bereaved by other causes (39%) and the population controls (52%). The proportion of separated/divorced was relatively similar for those bereaved by suicide (9.5%) and the population controls (9.2%) whereas among those bereaved by other causes the proportion was higher (13%). For further details regarding the demographic variables see Table 1.

Table 1 Descriptives

	Population (n=1 845 077)	Bereaved by other causes (n=415 934)	Bereaved by suicide (n=3 862)	Total (n=2 264 837)
Gender n (%)				
Female	900 140 (48.8)	204 061 (49.1)	1 940 (50.7)	1 106 141 (48.8)
Age* (years) mean (SD)	36.6 (8.5)	40.8 (6.3)	35.4 (6.8)	37.4 (8.3)
Education* n (%)				
None/ primary education only	11 767 (0.6)	2 612 (0.6)	18 (0.5)	14 397 (0.6)
Lower secondary	368 016 (20.0)	97 984 (23.6)	950 (24.8)	466 950 (20.6)
Upper secondary or tertiary	778 444 (42.2)	184 556 (44.4)	1 606 (42.0)	964 606 (42.6)
Higher	686 850 (37.2)	130 782 (31.4)	1 252 (32.7)	818 884 (36.2)
Marital status* n (%)				
Unmarried	955 287 (51.8)	162 236 (39.0)	2 171 (56.7)	1 119 694 (49.4)
Married	713 766 (38.7)	198 143 (47.6)	1 283 (33.5)	913 192 (40.3)
Separated/divorced	169 191 (9.2)	53 551 (12.9)	362 (9.5)	223 104 (9.9)
Widow/widower	6 798 (0.4)	2 002 (0.5)	10 (0.3)	8 810 (0.4)
Kinship to the deceased n (%)				
Mother		147 487 (35.5)	1 250 (31.5)	
Employed* n (%)	1 069 552 (73.2)	283 087 (74.5)	2 333 (69.4)	1 354 972 (73.5)

* At reference time/time of bereavement

Employment at time of bereavement

First, we examined employment status in the full sample. Among those bereaved by parental suicide, 69.4% were registered as working 20 hours/week or more in the year of bereavement

(table 1). This proportion was lower than for those bereaved by other causes (74.5%) and for the population controls (73.2%).

Table 2 shows the crude and adjusted associations between suicide bereavement and employment status at the time of bereavement. In the fully adjusted model, controlling for gender, age, educational attainment, marital status and parental education, we found an increased odds of 1.12 (95% CI 1.03 to 1.21), for non-employment in the suicide bereaved group compared to the population controls (see table 2). This was significantly higher for those bereaved by suicide compared to both the general population and those bereaved by other causes. We also included an interaction term in the fully adjusted model in order to examine whether there was a gender difference in odds of non-employment at the time of bereavement (not shown). This revealed a significant stronger relationship between suicide bereavement and employment status for women than for men (OR 1.23, 95% CI 1.05 to 1.44).

Table 2 Logistic regression analyses showing the associations between bereavement and non-employment at the reference year/time of bereavement

	Unadjusted		Adjusted	
	OR	**(95% CI)**	**OR**	**(95% CI)**
Group				
Population	1.00	(reference)	1.00	(reference)
Bereaved by other causes	0.94**	(0.93-0.94)	1.02**	(1.01-1.03)
Bereaved by suicide	1.21**	(1.12-1.30)	1.12**	(1.03-1.21)
Gender				
Men			1.00	(reference)
Women			2.23**	(2.21-2.24)
Age			0.98**	(0.97-0.98)
Education				
None/ primary education only			1.00	(reference)
Lower secondary			0.75**	(0.73-0.78)
Upper secondary or tertiary			0.68**	(0.66-0.70)
Higher			0.85**	(0.82-0.87)
Marital status				
Unmarried			1.00	(reference)
Married			0.67**	(0.66-0.67)
Separated/divorced			0.95**	(0.94-0.97)
Widow/widower			1.24**	(1.18-1.31)
Mothers education				
None/ primary education only			1.00	(reference)
Lower secondary			0.75**	(0.73-0.78)
Upper secondary or tertiary			0.68**	(0.66-0.70)
Higher			0.85**	(0.82-0.87)
Fathers education				
None/ primary education only			1.00	(reference)
Lower secondary			0.78**	(0.76-0.81)
Upper secondary or tertiary			0.74**	(0.72-0.77)
Higher			0.89**	(0.86-0.92)

* $p < .05$
** $p < .01$

The statistically significant interaction effect of gender identified in the fully adjusted model was further examined in stratified analyses together with the effect of gender of the deceased parent. Results are presented in Table 3. First, we report the result from the separate analysis of the suicide bereaved. For women, we see that a lower proportion of women bereaved by parental suicide were employed (61.0%) compared to women bereaved by other causes (67.4%) and the non-bereaved (66.8%). In the fully adjusted model, suicide bereaved women had a significantly higher odds of being non-employed both compared to the non-bereaved and women bereaved by other causes. Among the men we did not find any significant differences between those bereaved by suicide, other causes, or the population controls (78.1%, 81.3% and 79.3% respectively).

Second, the results from the analyses stratified on the gender of the deceased parents showed a substantial lowered proportion of employment among those bereaved by maternal suicide (66.4%) compared to those bereaved by other maternal death (73.4%) and population controls (73.2%) (see table 3). We found no significant difference among those bereaved by the suicide of a father with regards to proportion in employment (70.7%) compared to those bereaved by paternal death of other causes (75.1%) and population controls (73.2%).

Table 3 Logistic regression analyses of the association between bereavement and non-employment at the reference year/time of bereavement in different strata.

Group	Women		Men		Deceased mother		Deceased father	
	Crude OR (95% CI)	Adjusted OR[a] (95% CI)	Crude OR (95% CI)	Adjusted OR[a] (95% CI)	Crude OR (95% CI)	Adjusted OR[b] (95% CI)	Crude OR (95% CI)	Adjusted OR[b] (95% CI)
Population	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Bereaved by other causes	0.97** (0.96-0.98)	1.02** (1.01-1.04)	0.88** (0.87-0.89)	1.02** (1.01-1.03)	0.99 (0.98-1.00)	1.07** (1.06-1.09)	0.91** (0.90-0.92)	1.00 (0.99-1.01)
Bereaved by suicide	1.29** (1.17-1.42)	1.20** (1.09-1.33)	1.08 (0.96-1.21)	0.98 (0.86-1.10)	1.38** (1.22-1.57)	1.22** (1.06-1.40)	1.13** (1.04-1.24)	1.07 (0.98-1.18)

[a] Adjusted for age, education, marital status, parental education

[b] Adjusted for gender, age, education, marital status, parental education

* $p < .05$

** $p < .01$

Employment status two and five years after bereavement

Next, we examined changes in employment status two, and five, years following bereavement in the subsample that were working at the time of bereavement. The logistic regression analyses show that those bereaved by suicide had a somewhat higher, but not statistically significant, odds of non-employment (OR 1.13, 95% CI 0.99 to 1.29) compared to the population controls after two years (Table 4). Five years after bereavement those bereaved by suicide had a significantly higher odds of non-employment than the population controls (OR 1.20, 95% CI 1.02 to 1.40). The difference between the suicide bereaved group and the control group was thus larger after five years than after two years. Those bereaved by other causes had a small, but significant, increased of non-employment compared to the population controls both two and five years after bereavement.

Additional analyses stratified by gender were also performed and they showed that men had an increased odds of non-employment both two years (OR 1.36, 95% CI 1.12 to 1.64) and five years (OR 1.31, 95% CI 1.05 to 1.64) following bereavement compared to the population controls. A similar pattern was not found for women. These findings should be interpreted with caution though due to a low number of observations included in the analyses which limits the statistical power.

Table 4 Logistic regression analyses showing the association between bereavement and non-employment two and five years after the loss

	Employed[b] n (%)	Crude OR (95% CI)	Adjusted[a] OR (95% CI)
Two years			
Population	647 250 (88.3)	1.00 (reference)	1.00 (reference)
Bereaved by other causes	186 237 (88.9)	0.95** (0.93-0.96)	1.03** (1.02-1.05)
Bereaved by suicide	1 616 (86.4)	1.18** (1.04-1.36)	1.13 (0.99-1.29)
Five years			
Population	364 267 (87.3)	1.00 (reference)	1.00 (reference)
Bereaved by other causes	106 335 (86.9)	1.04** (1.02-1.06)	1.06** (1.04-1.08)
Bereaved by suicide	1 060 (84.5)	1.26** (1.08-1.47)	1.20* (1.02-1.40)

[a] Adjusted for gender, age, education, marital status, parental education

[b] Subsample containing only those registered as employed at time of bereavement/reference time

* $p < .05$

** $p < .01$

DISCUSSION

Employment at time of bereavement

In this study we found that the rate of employment was lower among suicide bereaved offspring prior to the loss. This adds to previous research that has reported pre-existing differences between those bereaved by suicide and non-bereaved such as higher rates of mental disorders[6]. Even though we are unable to draw any causal conclusions from our study there are several possible explanations for our findings.

Firstly, bereaved offspring will be expected to share some genetic and environmental risk factors with their parent that suicided. Both psychiatric disorders[21] and physical illness are associated with suicide, as is non-employment and disability[22 23]. Second, the event of a suicide may for many be preceded by a period of time with increased stress, worry and strain for those who are left behind[12]. Contact with mental health services the last year before a suicide is common[24] and indicates that many of the deceased have had a period of psychological problems prior to death. For some of the bereaved, the load in this period might reach such magnitudes that it could interfere with working life in a severe manner.

The gender stratified analyses further revealed that the difference in employment status we found was specific for women. We found no such difference for the men bereaved by suicide. There are several possible explanations for this gender specific finding. Women are found to carry more of the burden of caring for elderly parents[25 26] and mentally ill family members[27], so one hypothesis might be that adult suicide bereaved daughters are more affected by their parents potential afflictions prior to the suicide. Women also in general score higher than men on the trait of neuroticism[28], which is associated with psychopathology and diminished coping capacities in the face of stressors. It might therefore be that the stress and strain from having a suicidal parent affects women more.

Another interesting finding from the stratified analyses was that a heightened risk of non-employment was only observed for offspring who lost a mother to suicide. Those losing a father to suicide were employed at the same rate as the general population. This finding is in line with previous research showing that exposure to suicide related behavior in mothers is more strongly associated with suicide related behavior in offspring[17]. It is difficult to find good explanations for why only subsequent maternal suicide was associated with an increased risk of non-employment. Studies that have found a more pronounced effect of mothers psychopathology on the offspring's mental health could be of relevance[29].

Another potential explanation could be gender differences in number of suicide attempts prior to suicide[30] or gender differences in mental disorders such as bipolar disorder[31] that is especially stressful to cope with for the relatives. Unfortunately, we did not have access to diagnostic data allowing us to further explore these hypotheses. Finally, another reason might be that mothers in general tend to have closer contact with their adult offspring[32] so that a mothers psychopathology or suicidal behavior might affect the offspring more.

Employment two and five years after bereavement

To get an impression of how the suicide of a parent affects employment in adult offspring we also looked at employment rates two and five years after the loss of a parent. To factor out some of the expected baseline differences between suicide bereaved and the control groups only those employed at time of bereavement/reference time were included. Potential differences are thus more likely to be attributable to the event of losing a parent to suicide.

We found that adults bereaved by suicide of a parent did not have a significant increased risk of non-employment compared to the population controls two years after losing a parent to suicide. At five years there was a somewhat increased proportion of non-employed among the suicide bereavement group compared to the general population. In other words, we did not find a strong association between parental suicide bereavement and falling out of employment and most of those who are employed when losing a parent to suicide manage to stay employed after both two- and five-years' time. The mechanisms behind why some fall out of work after suicide bereavement is not clear, but the effects of suicide bereavement on mental and physical health[6 8 13] is one potential explanation.

It is worth noting that the difference in proportion of non-employment between those bereaved by suicide and the population was higher after five years than after two years. This could point to a small, but long-lasting negative effect on employment status after the suicide of a parent among those previously employed. Acute difficulties related to grief and depression typically subside over time after losing someone close to suicide[33], and previous research has pointed to a turning point around three years after the loss when such problems are less pronounced[34 35]. Our results indicate that the loss of a parent to suicide might create occupational problems for some individuals that last beyond this period.

Interestingly, the stratified analyses by gender revealed that the increased proportion of non-employment was mostly due to men falling out of employment and this gender pattern is the opposite of non-employment at baseline. Gender differences in coping strategies could be one potential explanation for these observations. In general, men are more inclined to use problem focused coping skills whereas women tend to use more emotion focused coping skills[36]. Most often a problem focused coping strategy such as removing oneself from the stressor is beneficial with regards to mental health outcomes but not when the stressor cannot be changed or escaped from. A loss of a loved one is a typical stressor that cannot be changed and therefore is less effectively coped with by problem focused coping skills. In contrast, prior to the loss a problem focused strategy in form of helping the distressed relative or even distancing for periods in order to recover could prove effective. As there were relatively few observations in these analyses, this observation should be interpreted with caution.

In this study we used a dichotomous occupational outcome, classifying individuals as employed vs. not employed. It is important to keep in mind that between these states there are a range of occupational problems that might be present, such as diminished work performance due to cognitive and emotional aspects of grief[11] and extended periods of sick leave[8]. In Norway employees are to a certain extent protected from being laid-off during the first year of sick leave. Many of those transferring out of employment first go through a period of sick leave, and because of this one would expect a lag between when an occupational problem begins and when a person is being registered as non-employed.

Strengths and limitations

By using data from large national registries covering the entire population this study limits some methodological weaknesses typically present in research on suicide bereavement, namely small, non-representative and/or selective samples, loss to follow-up and recall bias[6]. These data allow for a large sample of suicide bereaved, which is of great value when studying the relatively low frequent event of losing a parent to suicide. In addition to increased statistical power to detect even small differences, the large sample size allows for examination of smaller sub-groups such as gender both in the deceased parent and for the suicide bereaved. To our knowledge, there is a lack of studies reporting pre-bereavement measures for men and women separately, so we cannot state if the gender difference found in this study can be linked to other pre-bereavement gender differences in health related, social, or demographic characteristics. Unfortunately, our sample of adult suicide bereaved offspring was not large enough for even more fine masked sub-group analyses such as interactions between the gender of the offspring and the parent.

As discussed above, our chosen outcome measure of employment versus non-employment does not illuminate many of the occupational problems suicide bereaved offspring might face, but the fact that we see an association with employment status indicates that these problems may be substantial. Furthermore, our data do not reveal the reasons for not being employed (e.g. being unemployed, receiving disability pension, being a student). The choice to only include those employed at time of bereavement in the follow-up analyses means that the findings for differences in employment after two and five years are more likely to be attributable to the event of losing a parent to suicide. On the other side, this also means that the findings can only tell us something about the subgroup that exhibit a given level of occupational functioning in the first place. The design of the study does not allow for causal inferences and the effect of unmeasured confounders cannot be excluded.

Implications and future research

This study shows that adult suicide bereaved offspring already prior to bereavement are a more vulnerable group with respect to non-employment, and that this is especially true for women and for those losing a mother. With regards to staying employed after the loss of a parent to suicide, our results indicate that men are more vulnerable to falling out of employment in the long term. Our findings also illustrate the importance of taking in account both the gender of the bereaved and of the deceased when exploring the impact on work participation. Future studies are needed to further explore the mechanisms underlying these gender specific effects.

The results from this study shows that increased attention to the difficulties faced by those bereaved by suicide is warranted. To better accommodate the needs of this group, further insights into what kind of occupational problems they face and the reasons for falling out of employment are needed.

CONCLUSION

Women bereaved by parental suicide and those losing a mother to suicide have a weaker attachment to the labor market already before losing their parent. In addition, those who were employed at the time of the loss were somewhat more likely to be non-employed five years after the event.

Contributions. LJH, KS, AR and SGC initiated the overarching study project. The concept and design of the specific study was developed by SMB, LJH and KS. Data preparation and handling were performed by LJH and SMB with valuable input from Carine Øien-Ødegaard. Analyses were conducted by SMB. All authors contributed to interpretation of the findings. The manuscript was drafted by SMB and KS and critically revised by LJH, AR, SGC and PM. All authors have read and approved the final version of the manuscript. The authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Funding. This work was supported by the Research Council of Norway (project number 288731).

Competing interests. None declared.

Patient consent for publication. Not applicable.

Ethics approval. Ethical approval from the Reginal Committee for Medical and Health Research Ethics (2014/1970). Ethical evaluation and approval from all data providers.

Data availability statement: The data used in this research was obtained from a third party and are not publicly available. The researchers received the data from the registry holders as deidentified data files. The data is available upon request to the registry holders, given legal and ethical approval.

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STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1, 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up (*b*) For matched studies, give matching criteria and number of exposed and unexposed	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5, 6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5, 6
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5, 6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding (*b*) Describe any methods used to examine subgroups and interactions (*c*) Explain how missing data were addressed (*d*) If applicable, explain how loss to follow-up was addressed (*e*) Describe any sensitivity analyses	6, 9
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	7
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) Summarise follow-up time (eg, average and total amount)	7
Outcome data	15*	Report numbers of outcome events or summary measures over time	8, 9, 10

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (*b*) Report category boundaries when continuous variables were categorized (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	8, 9, 10
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	9, 10
Discussion			
Key results	18	Summarise key results with reference to study objectives	11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11, 12
Generalisability	21	Discuss the generalisability (external validity) of the study results	13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	15

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

BMJ Open

Employment status and bereavement after parental suicide: A population representative cohort study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2022-064379.R1
Article Type:	Original research
Date Submitted by the Author:	24-Aug-2022
Complete List of Authors:	Bélanger, Sissel; Norwegian Institute of Public Health, Mental Health and Suicide Stene-Larsen, Kim ; Norwegian Institute of Public Health, Department of Mental Health and Suicide Magnus, Per; Norwegian Institute of Public Health, Centre for Fertility and Health Reneflot, Anne ; Norwegian Institute of Public Health, Department of Mental Health and Suicide Christiansen, Solveig; Norwegian Institute of Public Health, Department of Alcohol, Tobacco and Drugs Hauge, Lars Johan ; Norwegian Institute of Public Health, Department of Mental Health and Suicide
Primary Subject Heading:	Public health
Secondary Subject Heading:	Mental health, Occupational and environmental medicine, Sociology
Keywords:	Adult psychiatry < PSYCHIATRY, OCCUPATIONAL & INDUSTRIAL MEDICINE, Suicide & self-harm < PSYCHIATRY, PUBLIC HEALTH

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Employment status and bereavement after parental suicide: A population representative cohort study

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Word count: 4 662 words

ABSTRACT

Objectives: To examine employment status among adults bereaved by parental suicide at the time of bereavement and two and five years after the loss and to explore the importance of the gender of the adult child and the deceased parent.

Design: Population-based register study.

Setting: Norwegian population-based registries linked using unique personal identifiers.

Participants: Norwegian residents aged 25-49 years in the period 2000-2014. Participants were divided into three groups: bereaved by parental suicide, bereaved by parental death of other causes, and nonbereaved population controls.

Main outcome measures: Odds ratios for the risk of non-employment at the time of bereavement and two and five years after the loss.

Results: Those bereaved by parental suicide had a higher risk of non-employment already at the time of bereavement (OR 1.14, 95% CI 1.05 to1.23). Stratified analyses showed that women accounted for this difference (OR 1.20, 95% CI 1.09 to 1.33), while no difference was found for men (OR 1.00, 95% CI 0.88 to 1.13). Looking at the gender of the parent there was only a significant association of non-employment when losing a mother (OR 1.24, 95% CI 1.08 to 1.42), while not for losing a father (OR 1.09, 95% CI 0.99-1.20). Among those working at the time of bereavement, offspring bereaved by suicide were more likely to be non-employed at both two (OR 1.13, 95% CI 0.99 to 1.30) and five (OR 1.20, 95% CI 1.02 to 1.40) years after the loss compared to the general population.

Conclusions: Women bereaved by parental suicide and those losing a mother to suicide were found to have a weaker attachment to the labor market already before losing their parent. Those who were employed when bereaved by suicide were somewhat more likely to be non-employed five years after the event.

STRENGHTS AND LIMITATIONS OF THE STUDY

- The study minimizes the risk of selection bias by using data from population representative national registries.
- The large study sample allowed for stratified analyses exploring gender differences among the bereaved and the deceased.
- The observational design of the study does not allow for causal interpretations.
- The study was bound to use data already existing in the registries and hence includes no other data on occupational functioning than binary employment status.

INTRODUCTION

Suicide is a global public health problem causing more than 800 000 deaths each year[1] and it is one of the leading causes of premature death[2]. Estimates show that 4-7 % of individuals are impacted by a suicide each year[3 4] and over a lifetime as many as one fifth[3] to one third[5] of the population will become affected. An increasing body of research has documented a negative relationship between suicide bereavement and a range of mental health outcomes[6 7] including increased risk of psychiatric care admission[8]. For many, physical health and sleep is also affected[8].

Aspects of suicide bereavement that go beyond mental health and psychological well-being such as work participation are far less studied. Most of the studies looking on the association between bereavement and work participation so far have focused on either the experiences when returning to work[9], the impact of postventions on work participation[10] or on occupational functioning after bereavement[11].

To our knowledge only two studies have investigated the association between suicide bereavement and employment status[8 11]. In the first of these studies the authors investigated the association between bereavement and risk of occupational drop-out[11] . The study included more than 3000 young bereaved with varying relations to the deceased and time since loss, and the authors reported an 80% increased risk of post-bereavement occupational drop-out among those bereaved by suicide compared to those bereaved by natural deaths. In the other study, a Danish nationwide registry-based study that included more than 15 000 suicide bereaved spouses they found an increased risk of sick leave, unemployment and disability pension 5 years after the loss in both men and women losing their spouse to suicide[8].

An important question is, however, whether those bereaved by parental suicide are less likely to be employed already before the loss. There are several reasons why those bereaved by suicide might differ from the general population (and from those bereaved by other causes)[6]. First, a significant proportion of the suicide bereaved may have lived with the strain of worrying and caring for a troubled or suicidal person over time. Some findings indicate that this could be the case for many of those bereaved by suicide[12]. Second, shared genetic factors and shared environment with the deceased[6] that can impact the likelihood of being employed are possible pre-existing risk factors. Further, findings are inconsistent as to whether the negative consequences associated with bereavement are stronger among those bereaved by suicide compared to those bereaved by other causes[8] [6 13]. Certain features, however, seem to be specific for suicide bereavement, such as experiences of rejection and stigma[6 13] and an increase in suicidal behavior and increased suicide risk[6 8 14 15].

The consequences of suicide bereavement can also differ depending on the family relation to the deceased[6]. For instance an increased risk of suicide has been found in mothers bereaved by suicide and an increased risk of depression has been found in offspring losing a parent to suicide[6]. The association between kinship and negative mental health outcomes after suicide bereavement have been explored in a range of groups such as bereaved spouses, mothers and offspring[6 13], but studies with a focus on adults losing a parent to suicide are scarce. Given the median age of 47 years for death by suicide, a large proportion of affected offspring would

be young adults[2]. The consequences of losing a parent in young adulthood is also of interest as this is the phase in life when most people acquire a stable job, establish a family and also need to provide for them economically. In addition unemployment may also negatively affect quality of life[16] and the productivity loss for the society might be substantial.

Also the gender of the bereaved and the deceased could be of importance. Several studies have found that suicidal behavior among mothers have a greater impact on suicidal behavior in the offspring compared to if it is the father who displays suicidal behavior[17]. Moreover, grieving is more strongly linked to mental health problems in women than men[18]. However, no studies have so far explored whether the gender of the deceased parent impact on the risk of unemployment among adult bereaved offspring. Gender specific effects of bereavement on work participation could be especially important to explore because employment rates[19] and certain vulnerability factors such as overall care burden[20] are not evenly distributed between the genders even among the general population.

Finally, because non-representativeness is often a problem in research on suicide bereavement[6], large studies with a design that minimize the risk of selection bias are especially welcomed.

The current study has three main aims.

First, to uncover the potential differences in employment rates between adults bereaved by parental suicide, those bereaved by other causes, and the general population.

Second, to examine how the rate of employment among adults bereaved by parental suicide compares to that of those bereaved by other causes and the general population two and five years after bereavement among those who were employed at the time of bereavement.

Third, to examine the gendered pattern of parental suicide bereavement on young adults employment status by examining the impact of the suicide bereaved gender and the gender of the deceased parent.

METHODS

This is a cohort study covering all Norwegian residents aged 25-49 years between 2000-2014 (born between 1951 and 1989). This age range was chosen as it represents an age period with high employment rate in the population as it goes from the point where most of those who acquire higher education have completed[21] until some years prior to employment rate decline begins[22]. In this study we link data from several population-based registries by unique deidentified personal identifiers. The identifiers also enable the linking of information across registries between offspring and their parents. The study is part of a larger project on welfare and health care use among suicide victims and suicide bereaved, funded by the Research Council of Norway (project number 288731). The project is ethically approved by the Regional Committee for Medical and Health Research Ethics (2014/1970). The project was also evaluated and approved by the different registry owners through the data access application process.

Data sources

Information on employment status came from the National Welfare Database (FD-Trygd). Cause and year of parental death were obtained from the Norwegian Cause of Death Registry (DÅR). Sociodemographic data (year of birth, gender) as well as the link between parents and offspring were obtained from the Norwegian Population Registry (DSF). Data on education for parents and offspring came from the National Education Database (NUDB).

Study variables

Death of a parent

The exposure variable was parental death. Participants were classified as either bereaved by suicide, bereaved by other causes, or as population controls (i.e., non-bereaved). An individual was considered as bereaved if he or she had lost a parent for the first time in the period between 2000 and 2014. Individuals losing a second parent in the study period were also considered bereaved if the death of the first parent happened more than ten years earlier. Individuals who lost a second parent during the study period with less than ten years since the death of the first parent were excluded. Individuals losing both parents during the study period were excluded from the year they lost the second parent and onwards. Individuals with no registered parents were also excluded. The registered cause of death of the parent was used to further classify bereaved individuals as bereaved by suicide (ICD-10 codes X60-X84 and Y87.0) or bereaved from other causes (all other).

Year of parental death was registered for the bereaved participants to determine employment at time of parental death and at given time points after bereavement. Because the population controls had no such temporal starting point (as they had not lost a parent) a random starting point had to be given to conduct the analyses. Each of the non-bereaved controls were thus given a reference year that was randomly picked from one of the years they were registered in the study.

Employment status

The outcome variable was employment status in the calendar year prior to parental death, and two- and five-years post bereavement. The data from the National Welfare Database (FD-Trygd) contained information on an annual level (measured at the reference time of the third week of November). An individual was considered employed if registered as a wage earner or self-employed and had an expected average weekly workload of 20 hours or more.

Demographic variables

Gender was included in all analyses either as a covariate or in the form of gender stratified analyses in order to explore potential gender differences. Gender of the deceased parent was explored in stratified analyses (by excluding those losing either a mother or father). Gender of the bereaved parent could not be included in the other analyses as all population controls have missing values on this variable. Age, gender, education level, marital status and whether the participants had at least one child under the age of twelve are included as these variables can be expected to be associated with employment status[22-25] and in some cases differed between groups.

Statistical analysis

The association between suicide bereavement and employment status was examined with logistic regression analyses using Stata version 16.0. The results are presented as crude and adjusted odds ratios (OR) with corresponding 95% confidence intervals (CI).

In the analysis of employment status at the time of parental death/reference year, the whole sample was included. In the analyses of employment status at two and five years after parental death/reference year the population was restricted to those employed the year prior to parental death/reference year. In addition an interaction term was included in the fully adjusted models (bereavement * gender of the bereaved). In order to further explore the potential interaction effect of gender, separate stratified analyses by gender of both the participants and the deceased (i.e. mother vs. father) were performed.

Adjusted analyses controlled for gender of the bereaved offspring, the offspring's age in the year of parental death/reference year, the offspring's and both parents' educational attainment, measured in the year of parental death/reference year, whether the offspring had any child under the age of twelve (at time of measure for the outcome variable), and the offspring's marital status in the year of parental death/reference year.

Patient and public involvement

There was no direct involvement of either patients or the public in planning, implementation, interpretation or reporting of this research. The study is part of an overarching study project which collaborates with user groups for those bereaved by suicide in Norway (the union of suicide bereaved, LEVE; the union of young suicide bereaved, Unge LEVE).

RESULTS

The total sample comprised 2 264 837 Norwegian residents aged between 25 and 49 in the period 2000-2014 where at least one parent could be identified. Among these, 3 862 (0.2%) were bereaved by parental death by suicide. This group had a somewhat lower age (mean=35.4 years) than the population controls (mean=36.6 years) (table 1). A total of 415 934 (18.4%) subjects were bereaved by parental death of other causes, and they were somewhat older (mean=40.8 years, SD=6.3) than the population controls. There was a fairly balanced gender distribution in all three groups (the proportion of women ranged between 48.8% and 50.7%). A majority of the bereaved had lost a father, 68.5% among the suicide bereaved and 64.5% among those bereaved by other causes.

With regards to level of education both the suicide bereaved (33%) and those bereaved by other causes (31%) had lower levels of higher education compared with the population controls (37%). A larger proportion of those bereaved by suicide were unmarried (57%) compared to those bereaved by other causes (39%) and the population controls (52%). The proportion of separated/divorced was relatively similar for those bereaved by suicide (9.5%) and the population controls (9.2%) whereas among those bereaved by other causes the proportion was higher (13%). For further details regarding the demographic variables see Table 1.

Table 1 Descriptives

	Population controls (n=1 845 077)	Bereaved by other causes (n=415 934)	Bereaved by suicide (n=3 862)	Total (n=2 264 837)
Gender n (%)				
Female	900 140 (48.8)	204 061 (49.1)	1 940 (50.7)	1 106 141 (48.8)
Age* (years) mean (SD)	36.6 (8.5)	40.8 (6.3)	35.4 (6.8)	37.4 (8.3)
Education* n (%)				
None/ primary education only	11 767 (0.6)	2 612 (0.6)	18 (0.5)	14 397 (0.6)
Lower secondary	368 016 (20.0)	97 984 (23.6)	950 (24.8)	466 950 (20.6)
Upper secondary or tertiary	778 444 (42.2)	184 556 (44.4)	1 606 (42.0)	964 606 (42.6)
Higher	686 850 (37.2)	130 782 (31.4)	1 252 (32.7)	818 884 (36.2)
Marital status* n (%)				
Unmarried	955 287 (51.8)	162 236 (39.0)	2 171 (56.7)	1 119 694 (49.4)
Married	713 766 (38.7)	198 143 (47.6)	1 283 (33.5)	913 192 (40.3)
Separated/divorced	169 191 (9.2)	53 551 (12.9)	362 (9.5)	223 104 (9.9)
Widow/widower	6 798 (0.4)	2 002 (0.5)	10 (0.3)	8 810 (0.4)
Has a child < 12 years* n (%)	797 157 (43.2)	202 985 (48.8)	1 991 (52.0)	1 002 133 (44.3)
Kinship to the deceased n (%)				
Mother		147 487 (35.5)	1 250 (31.5)	
Employed* n (%)	1 069 552 (73.2)	283 087 (74.5)	2 333 (69.4)	1 354 972 (73.5)

* At reference time/time of bereavement

Employment at time of bereavement

First, we examined employment status in the full sample. Among those bereaved by parental suicide, 69.4% were registered as working 20 hours/week or more in the year of bereavement

(table 1). This proportion was lower than for those bereaved by other causes (74.5%) and for the population controls (73.2%).

Table 2 shows the crude and adjusted associations between suicide bereavement and employment status at the time of bereavement. In the fully adjusted model, controlling for gender, age, educational attainment, marital status, having a child under the age of 12 and parental education, we found an increased odds of 1.14 (95% CI 1.05 to 1.23), for non-employment in the suicide bereaved group compared to the population controls (see table 2). This was significantly higher for those bereaved by suicide compared to both the general population and those bereaved by other causes. We also included an interaction term in the fully adjusted model in order to examine whether there was a gender difference in odds of non-employment at the time of bereavement (not shown). This revealed a significant stronger relationship between suicide bereavement and employment status for women than for men (OR 1.23, 95% CI 1.05 to 1.44). We also checked for interactions between suicide bereavement and having a child under the age of 12, between suicide bereavement and education level, and between suicide bereavement and age, all of which were non-significant.

Table 2 Logistic regression analyses showing the associations between bereavement and non-employment at the reference year/time of bereavement

	Unadjusted		Adjusted	
	OR	**(95% CI)**	**OR**	**(95% CI)**
Group				
Population controls	1.00	(reference)	1.00	(reference)
Bereaved by other causes	0.94**	(0.93-0.94)	1.03**	(1.03-1.04)
Bereaved by suicide	1.21**	(1.12-1.30)	1.14**	(1.05-1.23)
Gender				
Men			1.00	(reference)
Women			2.24**	(2.22-2.26)
Age			0.97**	(0.97-0.97)
Education				
None/ primary education only			1.00	(reference)
Lower secondary			0.30**	(0.29-0.32)
Upper secondary or tertiary			0.13**	(0.12-0.13)
Higher			0.10**	(0.09-0.10)
Marital status				
Unmarried			1.00	(reference)
Married			0.73**	(0.72-0.74)
Separated/divorced			1.01**	(0.99-1.02)
Widow/widower			1.28**	(1.21-1.35)
Having a child < 12 years				
No			1.00	(reference)
Yes			0.76**	(0.75-0.76)
Mothers education				
None/ primary education only			1.00	(reference)
Lower secondary			0.75**	(0.73-0.78)
Upper secondary or tertiary			0.69**	(0.66-0.71)
Higher			0.84**	(0.81-0.87)
Fathers education				
None/ primary education only			1.00	(reference)
Lower secondary			0.78**	(0.76-0.81)
Upper secondary or tertiary			0.75**	(0.72-0.77)
Higher			0.88**	(0.85-0.91)

* $p < .05$
** $p < .01$

The statistically significant interaction effect of gender identified in the fully adjusted model was further examined in stratified analyses together with the effect of gender of the deceased parent. Results are presented in Table 3. First, we report the result from the separate analysis of the suicide bereaved. For women, we see that a lower proportion of women bereaved by parental suicide were employed (61.0%) compared to women bereaved by other causes (67.4%) and the non-bereaved (66.8%). In the fully adjusted model, suicide bereaved women had a significantly higher odds of being non-employed both compared to the non-bereaved and women bereaved by other causes. Among the men we did not find any significant differences between those bereaved by suicide, other causes, or the population controls (78.1%, 81.3% and 79.3% respectively).

Second, the results from the analyses stratified on the gender of the deceased parents showed a substantial lowered proportion of employment among those bereaved by maternal suicide (66.4%) compared to those bereaved by other maternal death (73.4%) and population controls (73.2%) (see table 3). We found no significant difference among those bereaved by the suicide of a father with regards to proportion in employment (70.7%) compared to those bereaved by paternal death of other causes (75.1%) and population controls (73.2%).

Table 3 Logistic regression analyses of the association between bereavement and non-employment at the reference year/time of bereavement in different strata.

Group	Women		Men		Deceased mother		Deceased father	
	Crude OR (95% CI)	Adjusted OR[a] (95% CI)	Crude OR (95% CI)	Adjusted OR[a] (95% CI)	Crude OR (95% CI)	Adjusted OR[b] (95% CI)	Crude OR (95% CI)	Adjusted OR[b] (95% CI)
Population controls	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Bereaved by other causes	0.97** (0.96-0.98)	1.03** (1.01-1.04)	0.88** (0.87-0.89)	1.04** (1.03-1.06)	0.99 (0.98-1.00)	1.08** (1.06-1.09)	0.91** (0.90-0.92)	1.01* (1.00-1.02)
Bereaved by suicide	1.29** (1.17-1.42)	1.20** (1.09-1.33)	1.08 (0.96-1.21)	1.00 (0.88-1.13)	1.38** (1.22-1.57)	1.24** (1.08-1.42)	1.13** (1.04-1.24)	1.09 (0.99-1.20)

[a] Adjusted for age, education, marital status, parental education
[b] Adjusted for gender, age, education, marital status, having a child under the age of 12, parental education
* $p < .05$
** $p < .01$

Employment status two and five years after bereavement

Next, we examined changes in employment status two, and five, years following bereavement in the subsample that were working at the time of bereavement. In the total sample 88.4% (835 103) of those who were employed at time of bereavement/reference time were employed after two years and 87.2% (471 662) after five years. See table 4 for employment rates by groups. Regarding those who were non-employed at time of bereavement/refence time 59.1%

(201 646) were also non-employed after two years (57.4% of population controls, 65.2% of those bereaved by other causes and 63.0% of those bereaved by suicide). After five years 48.5% (97 472) of those non-employed at time of bereavement/refence time were non-employed (46.6% of population controls, 54.9% of those bereaved by other causes and 54.7% of those bereaved by suicide).

The logistic regression analyses show that those bereaved by suicide had a somewhat higher, but not statistically significant, odds of non-employment (OR 1.13, 95% CI 0.99 to 1.30) compared to the population controls after two years (Table 4). Five years after bereavement those bereaved by suicide had a significantly higher odds of non-employment than the population controls (OR 1.20, 95% CI 1.02 to 1.40). Those bereaved by other causes had a small, but significant, increased of non-employment compared to the population controls both two and five years after bereavement.

Additional analyses stratified by gender were also performed and they showed that men had an increased odds of non-employment both two years (OR 1.36, 95% CI 1.12 to 1.64) and five years (OR 1.31, 95% CI 1.05 to 1.64) following bereavement from suicide compared to the population controls. A similar pattern was not found for women. These findings should be interpreted with caution though due to a low number of observations included in the analyses which limits the statistical power.

Table 4 Logistic regression analyses showing the association between bereavement and non-employment two and five years after the loss

	Employed[b] n (%)	Crude OR (95% CI)	Adjusted[a] OR (95% CI)
Two years			
Population controls	647 250 (88.3)	1.00 (reference)	1.00 (reference)
Bereaved by other causes	186 237 (88.9)	0.95** (0.93-0.96)	1.03** (1.02-1.05)
Bereaved by suicide	1 616 (86.4)	1.18** (1.04-1.36)	1.13 (0.99-1.30)
Five years			
Population controls	364 267 (87.3)	1.00 (reference)	1.00 (reference)
Bereaved by other causes	106 335 (86.9)	1.04** (1.02-1.06)	1.06** (1.04-1.08)
Bereaved by suicide	1 060 (84.5)	1.26** (1.08-1.47)	1.20* (1.02-1.40)

[a] Adjusted for gender, age, education, marital status, having a child under the age of 12, parental education
[b] Subsample containing only those registered as employed at time of bereavement/reference time
* $p < .05$
** $p < .01$

DISCUSSION

Employment at time of bereavement

In this study we found that the rate of employment was lower among suicide bereaved offspring prior to the loss. This adds to previous research that has reported pre-existing differences between those bereaved by suicide and non-bereaved such as higher rates of mental disorders[6]. Even though we are unable to draw any causal conclusions from our study there are several possible explanations for our findings.

Firstly, bereaved offspring will be expected to share some genetic and environmental risk factors with their parent that suicided. Both psychiatric disorders[26] and physical illness are associated with suicide, as is non-employment and disability[27 28]. Second, the event of a suicide may for many be preceded by a period of time with increased stress, worry and strain for those who are left behind[12]. Contact with mental health services the last year before a suicide is common[29] and indicates that many of the deceased have had a period of psychological problems prior to death. For some of the bereaved, the load in this period might reach such magnitudes that it could interfere with working life in a severe manner.

The gender stratified analyses further revealed that the difference in employment status we found at time of bereavement was specific for women. We found no such difference for the men bereaved by suicide. There are several possible explanations for this gender specific finding. Women are found to carry more of the burden of caring for elderly parents[30 31] and mentally ill family members[32], so one hypothesis might be that adult suicide bereaved daughters are more affected by their parents potential afflictions prior to the suicide. Women also in general score higher than men on the trait of neuroticism[33], which is associated with psychopathology and diminished coping capacities in the face of stressors. It might therefore be that the stress and strain from having a suicidal parent affects women more.

Another interesting finding from the stratified analyses was that a heightened risk of non-employment was only observed for offspring who lost a mother to suicide. Those losing a father to suicide were employed at the same rate as the general population. This finding is in line with previous research showing that exposure to suicide related behavior in mothers is more strongly associated with suicide related behavior in offspring[17]. It is difficult to find good explanations for why only subsequent maternal suicide was associated with an increased risk of non-employment. Studies that have found a more pronounced effect of mothers psychopathology on the offspring's mental health could be of relevance[34].

Another potential explanation could be gender differences in number of suicide attempts prior to suicide[35] or gender differences in mental disorders such as bipolar disorder[36] that is especially stressful to cope with for the relatives. Unfortunately, we did not have access to diagnostic data allowing us to further explore these hypotheses. Finally, another reason might be that mothers in general tend to have closer contact with their adult offspring[37] so that a mothers psychopathology or suicidal behavior might affect the offspring more.

In many countries grandparents, and especially grandmothers, may play an important role in parents opportunity to remain employed when having young children. This does not seem to be the case in Norway[38] where a long period of paid parental leave and universal coverage

of affordable childcare allow parents to remain employed without relying on help from family members. A possible effect of having young children was examined, but did not negatively affect employment on it's own or in interaction with parental death in our sample.

Employment two and five years after bereavement

To get an impression of how the suicide of a parent affects employment in adult offspring we also looked at employment rates two and five years after the loss of a parent. To factor out some of the expected baseline differences between suicide bereaved and the control groups only those employed at time of bereavement/reference time were included. Potential differences are thus more likely to be attributable to the event of losing a parent to suicide.

We found that adults bereaved by suicide of a parent did not have a significant increased risk of non-employment compared to the population controls two years after losing a parent to suicide. At five years there was a somewhat increased proportion of non-employed among the suicide bereavement group compared to the general population. In other words, we did not find a strong association between parental suicide bereavement and falling out of employment and most of those who are employed when losing a parent to suicide manage to stay employed after both two- and five-years' time. The mechanisms behind why some fall out of work after suicide bereavement is not clear, but the effects of suicide bereavement on mental and physical health[6 8 13] is one potential explanation.

It is worth noting that the difference in proportion of non-employment between those bereaved by suicide and the population was higher after five years than after two years. This could point to a small, but long-lasting negative effect on employment status after the suicide of a parent among those previously employed. Acute difficulties related to grief and depression typically subside over time after losing someone close to suicide[39], and previous research has pointed to a turning point around three years after the loss when such problems are less pronounced[40 41]. Our results indicate that the loss of a parent to suicide might create occupational problems for some individuals that last beyond this period.

Interestingly, the stratified analyses by gender revealed that the increased proportion of non-employment was mostly due to men falling out of employment and this gender pattern is the opposite of non-employment at baseline. These gender differences are not directly comparable as they represent two different populations (all vs. only those working at baseline). Gender differences in coping strategies could be one potential explanation for these observations. In general, men are more inclined to use problem focused coping skills whereas women tend to use more emotion focused coping skills[42]. Most often a problem focused coping strategy such as removing oneself from the stressor is beneficial with regards to mental health outcomes but not when the stressor cannot be changed or escaped from. A loss of a loved one is a typical stressor that cannot be changed and therefore is less effectively coped with by problem focused coping skills. In contrast, prior to the loss a problem focused strategy in form of helping the distressed relative or even distancing for periods in order to recover could prove effective. Another explanation for this gendered pattern might be that men seem to have a heightened threshold for seeking help for mental health related issues[43 44] and it might be that fewer men engage with support services after a suicide loss and that

this impacts their ability to continue working. As there were relatively few observations in these analyses, this observation should be interpreted with caution.

In this study we used a dichotomous occupational outcome, classifying individuals as employed vs. not employed. It is important to keep in mind that between these states there are a range of occupational problems that might be present, such as diminished work performance due to cognitive and emotional aspects of grief[11] and extended periods of sick leave[8]. In Norway employees are to a certain extent protected from being laid-off during the first year of sick leave. Many of those transferring out of employment first go through a period of sick leave, and because of this one would expect a lag between when an occupational problem begins and when a person is being registered as non-employed.

Strengths and limitations

By using data from large national registries covering the entire population this study limits some methodological weaknesses typically present in research on suicide bereavement, namely small, non-representative and/or selective samples, loss to follow-up and recall bias[6]. These data allow for a large sample of suicide bereaved, which is of great value when studying the relatively low frequent event of losing a parent to suicide. In addition to increased statistical power to detect even small differences, the large sample size allows for examination of smaller sub-groups such as gender both in the deceased parent and for the suicide bereaved. To our knowledge, there is a lack of studies reporting pre-bereavement measures for men and women separately, so we cannot state if the gender difference found in this study can be linked to other pre-bereavement gender differences in health related, social, or demographic characteristics. Unfortunately, our sample of adult suicide bereaved offspring was not large enough for even more fine masked sub-group analyses such as interactions between the gender of the offspring and the parent.

As discussed above, our chosen outcome measure of employment versus non-employment does not illuminate many of the occupational problems suicide bereaved offspring might face, but the fact that we see an association with employment status indicates that these problems may be substantial. Furthermore, our data do not reveal the reasons for not being employed (e.g. being unemployed, receiving disability pension, being a student). The choice to only include those employed at time of bereavement in the follow-up analyses means that the findings for differences in employment after two and five years are more likely to be attributable to the event of losing a parent to suicide. On the other side, this also means that the findings can only tell us something about the subgroup that exhibit a given level of occupational functioning in the first place. The observational design of the study does not allow for causal inferences. There are a number of factors that influence employment and the effect of unmeasured confounders cannot be excluded.

Implications and future research

This study shows that adult suicide bereaved offspring already prior to bereavement are a more vulnerable group with respect to non-employment, and that this is especially true for women and for those losing a mother. With regards to staying employed after the loss of a

parent to suicide, our results indicate that men are more vulnerable to falling out of employment in the long term. This is troubling as becoming unemployed is associated with increased suicidal behavior for men[45], and so there seems to be an accumulation of risk factors for suicide in this group warranting the attention of clinicians and researchers. Our findings also illustrate the importance of taking into account both the gender of the bereaved and of the deceased when exploring the impact on work participation. Future studies are needed to further explore the mechanisms underlying these gender specific effects.

The results from this study shows that increased attention to the difficulties faced by those bereaved by suicide is warranted. To better accommodate the needs of this group, further insights into what kind of occupational problems they face and the reasons for falling out of employment are needed.

CONCLUSION

Women bereaved by parental suicide and those losing a mother to suicide have a weaker attachment to the labor market already before losing their parent. This illustrates how those bereaved by suicide in some aspects might be a vulnerable group even before the loss and future research on suicide bereavement should keep this in mind. In addition, those who were employed at the time of the loss were somewhat more likely to be non-employed five years after the event. Clinicians should keep in mind the possibility of a suicide loss affecting occupation and more research revealing how a suicide loss might affect employment is needed.

Contributions. LJH, KS, AR and SGC initiated the overarching study project. The concept and design of the specific study was developed by SMB, LJH and KS. Data preparation and handling were performed by LJH and SMB. Analyses were conducted by SMB. All authors contributed to interpretation of the findings. The manuscript was drafted by SMB and KS and critically revised by LJH, AR, SGC and PM. All authors have read and approved the final version of the manuscript. The authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Funding. This work was supported by the Research Council of Norway (project number 288731).

Competing interests. None declared.

Patient consent for publication. Not applicable.

Ethics approval. Ethical approval from the Reginal Committee for Medical and Health Research Ethics (2014/1970). Ethical evaluation and approval from all data providers.

Data availability statement: The data used in this research was obtained from a third party and are not publicly available. The researchers received the data from the registry holders as deidentified data files. The data is available upon request to the registry holders, given legal and ethical approval.

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STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1, 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up (*b*) For matched studies, give matching criteria and number of exposed and unexposed	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5, 6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5, 6
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5, 6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding (*b*) Describe any methods used to examine subgroups and interactions (*c*) Explain how missing data were addressed (*d*) If applicable, explain how loss to follow-up was addressed (*e*) Describe any sensitivity analyses	6, 9
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	7
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) Summarise follow-up time (eg, average and total amount)	7
Outcome data	15*	Report numbers of outcome events or summary measures over time	8, 9, 10

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (*b*) Report category boundaries when continuous variables were categorized (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	8, 9, 10
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	9, 10
Discussion			
Key results	18	Summarise key results with reference to study objectives	11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11, 12
Generalisability	21	Discuss the generalisability (external validity) of the study results	13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	15

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.