

# Early parental death and its association with children's mental and economic well-being in adulthood: a nationwide population-based register study

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## ABSTRACT

**Background** This study examined the association between early parental death and children's subsequent mental health, years of schooling, and labour-market outcomes (ie, employment and earnings) in adulthood.

**Methods** We used nationwide register-based data for Finnish citizens born between 1971 and 1986 (n=962 350). Logistic and linear regression models were used to examine the association of early parental death before the age of 21 years with subsequent mental health and labour-market outcomes in adulthood at ages 26–30. The estimated models accounted for an extensive set of demographic and parental characteristics based on longitudinal register data.

**Results** Early-life parental death was found to be consistently associated with a higher risk of hospitalisation due to mental health disorders, higher use of mental health-related medications, and absence from work due to illness in adulthood. The associations were negative regardless of the gender of the child or parent, but the estimated odds ratios were usually quantitatively larger for males than females. When examining the type of outcome, we observed the largest quantitative effects were observed using substance-use disorders and intentional self-harm as outcomes. Moreover, we documented considerable reductions in years of schooling, employment, and earnings in adulthood.

**Conclusions** Parental death before the age of 21 was significantly associated with an increased risk of being diagnosed with a mental disorder and lower level of economic well-being measured by labour-market success in adulthood.

## INTRODUCTION

Premature death of one's parents is a profound source of parental absence.<sup>1 2</sup> It leads to a loss of parental economic resources and close social support that are challenging to compensate with public policy interventions.<sup>3</sup> Early parental death has potentially large negative consequences on individuals' mental well-being and economic prosperity in adulthood. The burden of poor mental health may accumulate over time and increase health inequalities within society.<sup>4</sup>

McKay *et al*<sup>5</sup> conducted a meta-analysis of studies investigating the relationship between early parental death and psychiatric disorders of the affected children. The evidence suggests a positive association between premature death of parents

## WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ The association between early parental death and children's poor mental health and economic outcomes has been documented in earlier research.
- ⇒ Nearly all the research on this topic has been based on survey data and has investigated only the overall effect for males and females.

## WHAT THIS STUDY ADDS

- ⇒ This study provides the first analysis of the cumulative long-term relationship between early parental death and mental health/economic outcomes in adulthood based on the nationwide registry data separately for males and females.
- ⇒ Early parental death is strongly associated with a higher risk of children's poor mental health in adulthood for both males and females, but the estimated odds ratios are usually quantitatively larger for males.
- ⇒ When examining the type of outcome, the largest quantitative effects are observed using substance-use disorders and intentional self-harm as outcomes.
- ⇒ Early parental death is negatively associated with children's labour-market outcomes (ie, employment and earnings) in adulthood, and these associations are quantitatively larger for males.

## HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ The burden of poor mental health is significantly greater among children who have lost a parent before the age of 21.
- ⇒ Early parental death is associated with a lower level of employment and earnings in adulthood.
- ⇒ Policy interventions that direct greater amounts of preventive mental health services to children who have lost their parent at a young age should be encouraged.

and the subsequent development of anxiety, affective, or psychotic disorders. Early parental death is also negatively related to educational achievement.<sup>6–8</sup> Moreover, mental health disorders result in reductions in work performance and increased absenteeism.<sup>9</sup>



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Although the empirical studies exploring this topic provide support for the negative association between parental death and individuals' mental well-being and economic prosperity in adulthood, these associations have rarely been examined using high-quality nationwide register data over the period of several decades.<sup>10</sup> To date, research has also not paid much attention to the differences in the associations by children's gender. An exception is Böckerman *et al*<sup>11</sup>; however, they considered only the short-term impacts of parental death on mental health-related hospitalisation in childhood immediately after a parental death.

In the present study, we utilised nationwide register-based data from Finland to investigate the association between parental death before the age of 21 years and several measures of poor mental health and labour-market outcomes in adulthood (measured at ages 26–30). We contribute to the literature by examining the cumulative long-term relationship between early parental death and children's mental/economic well-being. Using register-based data minimises measurement error and reporting bias. The results by the gender of the dead parent and child are helpful to target potential policy interventions to those who suffer the most from early parental death. Because of extensive social safety networks, these relationships are particularly interesting in the context of a Nordic welfare state. The current study aimed to investigate the following research questions:

1. Is early parental death associated with children's poor mental health and labour-market outcomes in adulthood?
2. To what degree do these associations differ by the children's gender?

## METHODS

### Study population

The census data provided comprehensive information on the parents and their children, including family composition, education, earnings, occupation, and the region of residence. By following Finns born between 1971 and 1986, we acquired data on approximately one million individuals who had reached at least the age of 30 (in 2016). We excluded children born outside Finland and those who had no data for either parent. Information on parental death, health and education registers was linked to the census data using personal identifiers given to all Finnish citizens.

Following an expert statement from the Office of the Data Protection Ombudsman, the Finnish Institute of Health and Welfare (THL-834-50500-2015) approved the study. The data were linked with the permission of Statistics Finland (TK-53-409-18), the Finnish Institute of Health and Welfare (THL/1423/14.02.00/2021), and the Social Insurance Institution of Finland (53/522/2017 and 6/522/2021).

### Parental death

We used data from the comprehensive death certificates<sup>12</sup> gathered by Statistics Finland (SF) to identify the dates of the parental deaths (1970–2016). Age at parental death was determined by the parent's death year and the individual's birth year; for example, if a father died when his child was aged between 0 and 20, the child was classified as having experienced the early death of their father. A similar variable was constructed to measure exposure to the early death of their mother. Most Finns no longer live with their parents after the age of 20. Because the outcome variables were measured at ages 26–30, the comparison group consisted of individuals who had not experienced a parental death before the age of 31. Individuals who had

experienced a parental death at ages 21–30 were not included in the control group, because their mental health (at ages 26–30) may be affected by the recent parental death.

### Mental health disorders and medication

We used the Discharge Register<sup>13</sup> from the Finnish Institute for Health and Welfare. It identified all inpatient discharges in specialised public healthcare (1970–2016)<sup>14</sup> and outpatient visits to specialised mental healthcare facilities (1998–2016). The national health insurance system covers all citizens, with almost all hospitalisations in the public sector.

Our hospitalisation measure was whether an individual had at least one in-patient hospitalisation spell due to mental health-related disorders based on the International Statistical Classification of Diseases and Related Health Problems (ICD-10: F, ICD-8 and ICD-9: 290–319) at ages 26–30. We examined the specific conditions related to (1) depression, (2) anxiety, and (3) substance-use disorder. We also studied hospitalisations due to intentional self-harm (including suicide attempts) at ages 26–30. Self-harm attempts (ICD-10: X60–X84, ICD-8 and ICD-9: E950–E959) were recorded as independent, external causes of hospitalisation. Mental health disorders were recorded as the principal cause in approximately 10% of these cases.

We also utilised data from the Social Insurance Institution of Finland (Kela) containing filled mental health-related medications<sup>15</sup> dispensed at Finnish pharmacies (1995–2016). These medications are listed in the WHO's anatomical therapeutic chemical (ATC) classification system as codes beginning with 'N05', 'N06A', 'N06B', or 'N06C'. Antidepressants are the first choice of treatment in moderate and severe depression cases based on the clinical treatment guidelines. The data record the individual-level prescriptions reimbursed under the national health insurance. We created an indicator of having at least one prescription for mental health-related disorders at ages 26–30.

### Sickness absence

The register-based data on sickness absence spells and days (1995–2016) originated from Kela.<sup>16</sup> The incapacity for work is certified by a physician, and the employer is obliged to notify Kela of the sick leave. The employee is entitled to their normal, full salary during the 9-day waiting period. Thus, Kela records reimbursed sickness absence spells lasting longer than 9 days. Using the medical reason for sickness leave (2004–2016), we created two indicator variables: (1) whether an individual reimbursed a sickness absence spell at ages 26–30; and (2) whether an individual reimbursed a sickness absence spell due to mental health reasons at ages 26–30.

### Education and labour-market outcomes

We used register-based information from SF and the Finnish tax authorities on completed degrees (by age 30) since 1970 and the employment rate and annual earnings at ages 26–30. Almost all individuals have completed their education by 30 and entered the labour market. The highest completed degree by age 30 was converted into years of schooling based on the Standard Classification of Education and using the official estimates by SF to complete a specific education degree. Years of schooling can be easily compared across countries and time periods. The employment rate for each individual was the 5-year average of being employed during the last week of each year at ages 26–30. Earnings comprised earned labour and entrepreneurial income deflated to the 2016 price level using the consumer price index by SF.

## Statistical analysis

The association of early parental death with mental health outcomes was estimated using the logit model

$$P(Y_i^{cp}) = F(\alpha_{cp}D_i^{cp} + X_i^{cp}\beta_{cp}) \quad (1)$$

where  $F(\cdot)$  is the cumulative logistic distribution;  $Y_i$  is a health-outcome variable; and the variable of interest,  $D_i$ , is equal to 1 if a parent  $p$  died when the child was aged between 0–20, and 0 if the parent  $p$  died after the child had turned 31 (a comparison group). We estimated separate models for four gender combinations of the child and parent to capture the heterogeneity of the associations. The sub-/superscripts  $c$  and  $p$  are an index for the gender of the child and parent, respectively.

The control variables  $X_i$  included the mother or father's education, income, occupation, mental health, native language, mother's age, the number of siblings, birth year, and birth region fixed effects. All control variables were measured before the child was born to ensure they were not affected by parental death.<sup>17</sup> Controlling for parental socioeconomic status (SES) is crucial because SES is correlated with longevity, that is, children with low SES parents are more likely to lose their parents early. Mental health-related hospitalisations of parents account for the inherited risk factors of mental health disorders at the family level.

The identifying assumption is that the control variables ( $X_i$ ) capture all the relevant differences between the children who had experienced an early parental death and those who had not. The estimates represent the cumulative long-term association between parental death and the outcomes for the affected children in adulthood.

Annual earnings and years of schooling are continuous variables; therefore, their results were based on linear regression models. For these variables, we used logarithmic transformation so that the results could be interpreted as percentage changes. The control variables were the same as those for mental health outcomes. All statistical analyses were conducted using Stata version 17 (Stata Corp, College Station, TX, USA).

## RESULTS

### Descriptive statistics on parental death

Mean values of outcome and control variables are reported in online supplemental tables 1 and 2. Above 15% of individuals experienced a parental death before they had turned 31 (table 1). Less than 5% of them had experienced the death of their mother, compared with nearly 12% for the death of their

father. The likelihood of parental death increases substantially with the individual's age, from under 1% for a parental death before the age of 6 years to 4.7% when the individual is between 26 and 30 years old. Fathers are nearly three times more likely to die than mothers before children turn 21 (table 1).

### Mental health disorders and medication

In figures 1–2, we summarise the results of the logit models for each gender combination and each mental health and sickness absence outcome. Odds ratios (ORs) are reported along with 95% confidence intervals (95% CI) based on robust standard errors. Figures 1 and 2 show the results for males and females, respectively. The results remained similar when we estimated the models using linear regression on annual hospitalisation rates between the ages of 26 and 30 (online supplemental figures 1 and 2).

The most striking result was that the parental death variables were often large and statistically significant, regardless of the gender of the child or the parent (figures 1–2). For example, males and females who were exposed to early maternal death had, respectively, 1.70 and 1.52 times the odds of being hospitalised due to mental health disorders compared with those males and females who experienced it after the age of 30 (male, 95% CI 1.53 to 1.89,  $p < 0.001$ , figure 1; female, 95% CI 1.34 to 1.72,  $p < 0.001$ , figure 2). Our supplementary analysis suggests that the effect size varies more according to the specific age at maternal death than paternal death (online supplemental table 3 and figure 3).

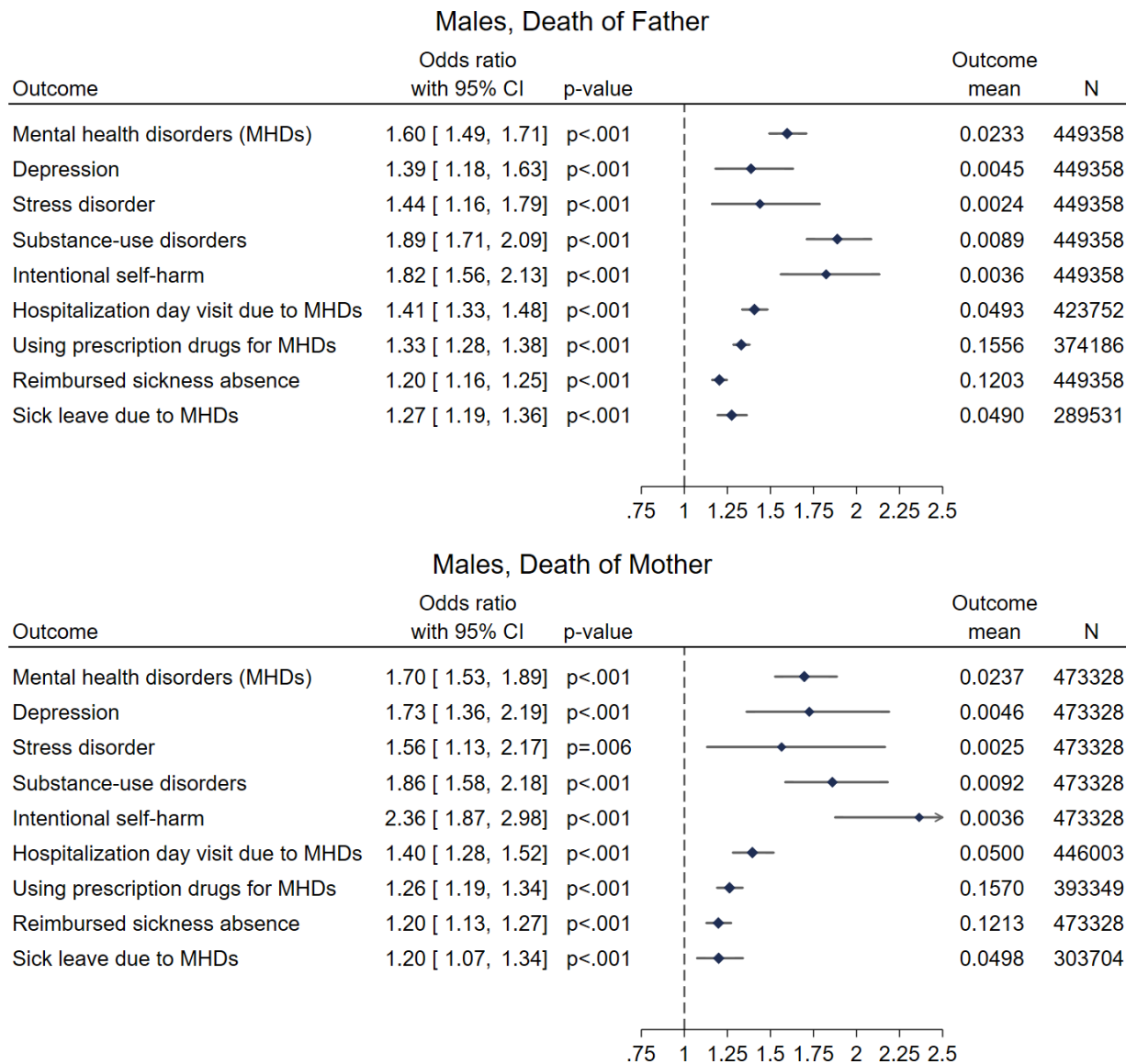
Quantitatively, the largest effects were obtained using substance-use disorders and intentional self-harm as outcomes. We found that males exposed to early maternal death had 2.36 times the odds of being hospitalised due to intentional self-harm compared with those who had not experienced maternal death before their 30s (95% CI 1.87 to 2.98,  $p < 0.001$ ; figure 1). Females exposed to early paternal death had 2.04 times the odds of having substance-use disorders compared with those without this exposure (95% CI 1.72 to 2.42,  $p < 0.001$ ; figure 2). For females, early maternal death was also associated with a substantial increase in the incidence of stress disorders (OR 1.88, 95% CI 1.41 to 2.50,  $p < 0.001$ ; figure 2).

For both males and females, we found a significant increase in the use of mental health-related medications among those who were exposed to early parental death (ORs ranged from 1.18 to 1.33;  $p$  values  $< 0.001$ ). The relationship among both genders was interesting, because the baseline probability of using mental

**Table 1** Age of individual on parental death

| Age when parent died (years) | Death of father |        | Death of mother |        | Death of parent |        |
|------------------------------|-----------------|--------|-----------------|--------|-----------------|--------|
|                              | Frequency       | %      | Frequency       | %      | Frequency       | %      |
| 0–5                          | 5401            | 0.56   | 1428            | 0.15   | 6780            | 0.70   |
| 6–10                         | 11 305          | 1.17   | 3461            | 0.36   | 14 556          | 1.51   |
| 11–15                        | 14 090          | 1.46   | 4841            | 0.50   | 18 469          | 1.92   |
| 16–20                        | 19 673          | 2.04   | 7362            | 0.77   | 25 992          | 2.70   |
| 21–25                        | 26 558          | 2.76   | 10 409          | 1.08   | 34 804          | 3.62   |
| 26–30                        | 34 998          | 3.64   | 14 238          | 1.48   | 45 072          | 4.68   |
| After age 30                 | 834 189         | 86.68  | 915 164         | 95.10  | 816 677         | 84.86  |
| Parent unknown               | 16 136          | 1.68   | 5447            | 0.57   | –               | –      |
| Total                        | 962 350         | 100.00 | 962 350         | 100.00 | 962 350         | 100.00 |

Note: The sample does not include individuals whose both parents are unknown.



**Figure 1** Controlled association of early paternal death (upper image) and maternal death (lower image) with mental health and sickness absence in adulthood for males. Note: the odds ratios are based on logit models (equation 1). Confidence intervals (95% CIs) are based on robust standard errors. The upper CIs were truncated at 2.5. Control variables are reported in online supplemental table 2. N=number of observations.

health-related medications was much higher among females in the population; 21% of females used them at least once when aged 26–30, whereas the corresponding figure for males was 16%.

### Sickness absence

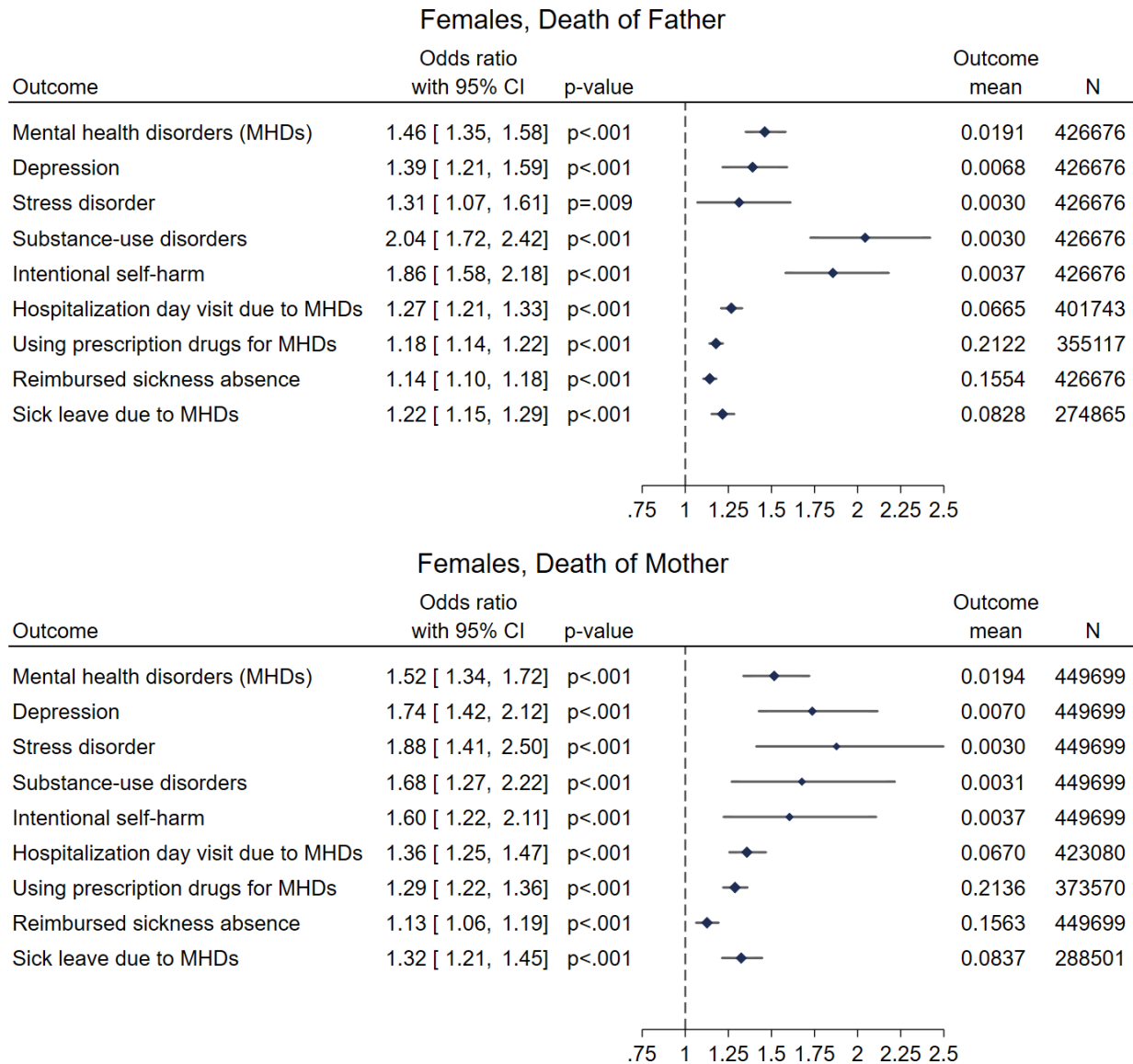
The results also showed a significant increase in the odds of having a reimbursed sickness absence spell at ages 26–30 if the individual was exposed to early parental death in childhood (figures 1–2). The association prevailed for both genders: the estimated ORs were approximately 1.20 for males and 1.14 for females. An increase was also observed in the odds of sickness absence due to mental health-related reasons: the estimated ORs ranged from 1.20 to 1.27 for males and 1.22 to 1.32 for females.

### Education and labour-market outcomes

Next, we examined whether economic resources in adulthood were negatively affected by early parental death. We found

substantial negative associations of early parental death with years of schooling, annual earnings, and employment at ages 26–30 for both females and males (figures 3–4).

Early death of a parent was associated with over 3% lower years of schooling, which translates to a half-year reduction in schooling, based on the average years of schooling. For comparison, the average length of post-compulsory education in Finland is approximately 4.5 years. For males and females, the effect size was similar regardless of the gender of the parent. The largest reduction in years of schooling was estimated for females experiencing early maternal death (–4.0%, 95% CI –4.4% to –3.6%,  $p<0.001$ ). The estimates on labour-market outcomes (ie, earnings and employment) were generally larger for males; for example, the early death of a father was associated with 16.4% lower annual earnings (95% CI –17.9% to –14.9%,  $p<0.001$ ) and 6.1 percentage points reduction in the employment rate (95% CI –0.065 to –0.056,  $p<0.001$ ) for males, while the corresponding estimates for females were –10.9% (95% CI



**Figure 2** Controlled association of early paternal death (upper image) and maternal death (lower image) with mental health and sickness absence in adulthood for females. Note: the odds ratios are based on logit models (equation 1). Confidence intervals (95% CIs) are based on robust standard errors. Control variables are reported in online supplemental table 2. N=number of observations.

–12.5% to –9.4%,  $p<0.001$ ) and –4 percentage points (95% CI –0.045 to –0.036,  $p<0.001$ ).

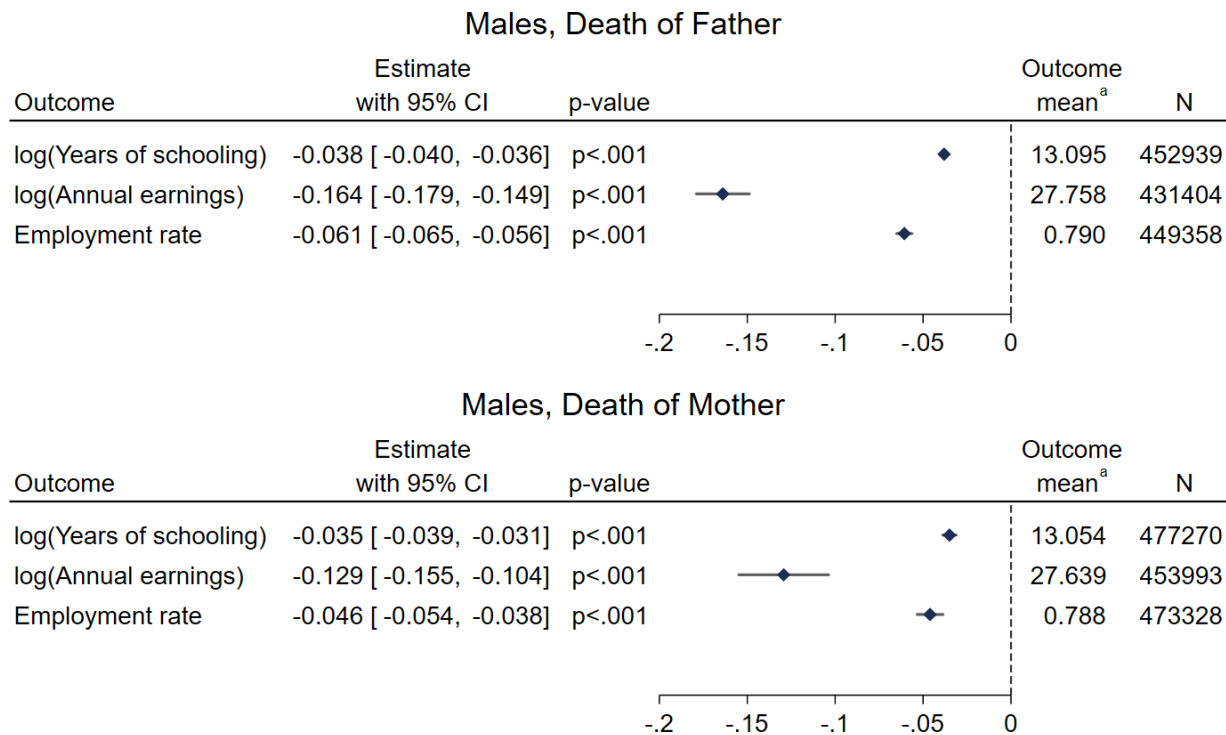
## DISCUSSION

Parental death at an early age is a traumatic life event that has substantial negative impacts on multiple life domains. Using high-quality nationwide register data from Finland, we presented results based on logistic and linear regression models that accounted for an extensive set of demographic and parental characteristics that may otherwise confound the relationship.

We documented significant increases in mental health-related hospitalisations and the use of mental health-related medications and sickness absence, as well as substantial reductions in years of schooling, employment, and earnings for the affected children in adulthood. Mental health disorders and adverse labour-market outcomes are likely to be interrelated.<sup>18</sup> The findings also highlight the strong association between early parental death and labour-market outcomes for males. The relationship is plausibly stronger for males because Finnish males are usually

the primary breadwinners in families (ie, the probability of being employed is higher for males). Our results were consistent with the previously reported effects of early parental death (at age 23 or younger) on children's university education for Finland.<sup>7</sup> The associations were slightly larger for low-income families, but the difference between low- and high-income families is not statistically significant on mental health-related hospitalisations (online supplemental table 4).

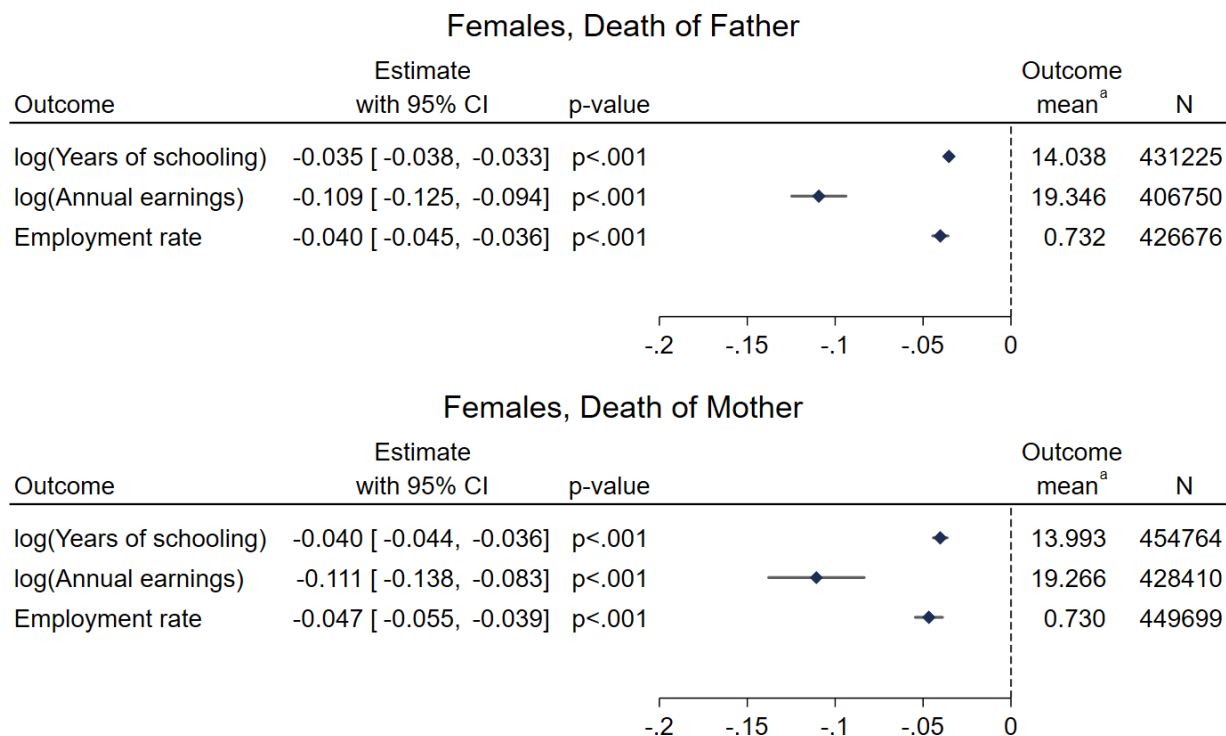
The findings of the present study are in accordance with the empirical literature where parental death has been associated with poor mental health among the affected children. However, the importance of parental death has rarely been studied using nationwide register data, and the associations have not been examined by gender. Consistent with the study of Hiyoshi *et al*,<sup>19</sup> our results highlight that the largest quantitative effects were obtained using substance-use disorders and intentional self-harm as outcomes. Since early parental death leads to substantial negative consequences on mental health and significant labour-market losses in adulthood, policymakers should pay special



**Figure 3** Controlled association of early paternal death (upper image) and maternal death (lower image) with schooling, earnings, and employment in adulthood for males. Confidence intervals (95% CIs) are based on robust standard errors. Control variables are reported in online supplemental table 2. <sup>a</sup>Means are reported for the untransformed outcome variables. N=number of observations.

attention to the allocation of appropriate resources to policy interventions, such as providing therapy for the affected children with the aim of mitigating these effects.

For future research, besides considering the impacts in different institutional contexts, further insights into gender-specific associations between early parental death and children's



**Figure 4** Controlled association of early paternal death (upper image) and maternal death (lower image) with schooling, earnings, and employment in adulthood for females. Confidence intervals (95% CIs) are based on robust standard errors. Control variables are reported in online supplemental table 2. <sup>a</sup>Means are reported for the untransformed outcome variables. N=number of observations.

mental and economic well-being would be useful to tailor policy interventions. Additional research should be conducted using other possible outcomes—for example, examining whether women who have experienced an early parental death have fewer children.

### Strengths and limitations

The use of a nationwide study population with complete follow-up and both secondary and primary care psychiatric register data are the main strengths. Moreover, the study is based on the use of high-quality register data of approximately one million individuals from 1970 to 2016. However, the study has its limitations as well. First, although informative, the cross-sectional results are best viewed as descriptive. The empirical specifications control for non-random variation in parental death through the inclusion of extensive control variables. Observational studies rarely account for all confounders, such as personality traits that may affect the estimated associations. Second, the models were estimated on the condition that the population of interest were alive at ages 26–30. Third, the measures for mental health-related hospitalisation and medication do not capture mild mental health problems. Fourth, the analysis did not account for (shared) genetic and environmental influences using twin design or physical health in childhood. Fifth, Finland has a healthcare system with universal access to healthcare services for all citizens and financial considerations do not generally prevent access to these services. Consequently, the findings might not be generalisable to other high-income countries with different institutions. In countries where the coverage of primary healthcare services for citizens is not universal or where out-of-pocket costs for obtaining healthcare services are considerable, the negative consequences of early parental death on mental health and economic outcomes in adulthood may be larger.

### CONCLUSIONS

Based on the nationwide register data of Finnish citizens, our results showed a negative association between early parental death and children's subsequent mental health, employment, and earnings in adulthood. These findings suggest that the burden of mental disorders is significantly greater on individuals who suffer from early parental death at ages 0–20; moreover, there were considerable negative labour-market consequences in terms of lost earnings and economic well-being for the affected children.

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**Contributors** All authors: conceptualisation, formal analysis, writing - original draft, writing - review and editing. The author acting as guarantor is Petri Böckerman.

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**Data availability statement** The data that support the findings of this study are available from Statistic Finland, the Finnish Institute for Health and Welfare, and the

Social Insurance Institution of Finland. Restrictions apply to the availability of these data, which were used under licence for this study. For information on accessing the data, see [www.thl.fi](http://www.thl.fi), [www.kela.fi](http://www.kela.fi), and [www.stat.fi](http://www.stat.fi).

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