Effects of Parental Death on Labor Market Outcomes*

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Abstract

Nearly everyone experiences the death of a parent in adulthood, but little is known about its effects on adult children's labor market outcomes and the underlying mechanisms. In this paper, we use Danish administrative data to examine the impact of parental loss on individual labor market outcomes. We leverage the timing of sudden, first parental deaths and adopt a matched-control difference-in-differences strategy. Our findings show that parental death negatively affects adult children's earnings: sons' earnings decline by 2% five years after parental loss, while daughters' earnings decrease by 3% during the same period. Exploring the underlying mechanisms, we find that both men's and women's mental health deteriorates following parental loss: women seek psychological assistance more frequently, while both men and women increase their use of mental health and opioid prescriptions. Furthermore, women with young children experience a comparatively larger earnings decline (around 4%) due to the loss of informal childcare. These findings collectively highlight a substantial labor market penalty for individuals who experience parental death.

JEL classifications: D64, J10, J16

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"Death ends a life, but it does not end a relationship, which struggles on in the survivor's mind toward some final resolution, some clear meaning, which it perhaps never finds." (Anderson, 1968)

1 Introduction

Nearly everyone experiences the loss of a parent at some point in life, most often in adulthood. In Denmark, 91% of individuals experience their first parental death at age 19 or older (Figure B.1). Given its prevalence, parental death can have profound implications both for individual well-being and aggregate economic outcomes. In this paper, we examine how parental death affects individual earnings, emphasizing its impact through mental health and family support channels. We also investigate its long-term effects and explore gender-specific interactions between parents and children. Although parental death is inevitable, understanding the mechanisms through which it influences labor market outcomes can help policymakers design interventions to mitigate its negative consequences—an area where substantial policies remain rare and largely modest.

The impact of parental death on individual labor market outcomes can operate through multiple mechanisms. First, losing a family member can trigger mental health crises, which in turn affect labor market outcomes (Fadlon *et al.*, 2025; van den Berg *et al.*, 2017).[1] Second, the loss of grandparents, who often provide informal childcare, can negatively impact the labor market outcomes of adult children, particularly women (Garcia-Moran and Kuehn, 2017; Anstreicher *et al.*, 2022; Marcos, 2022; Kaufmann *et al.*, 2022; Bratti *et al.*, 2018). Third, labor market outcomes may be influenced by additional factors following parental death, such as adult children assuming caregiving responsibilities for a surviving parent or receiving inheritances from the deceased (Arrieta and Li, 2023; Nekoei and Seim, 2023). Finally, parental death and the associated grief may alter individuals' preferences and values, leading them to make different choices—such as reallocating time between work and family (Lehman *et al.*, 1993; Park, 2010; Umberson, 2003). Despite these potential mechanisms, empirical evidence on the labor market effects of parental death remains limited. Our study aims to fill this gap and identify key mechanisms at work.

We use administrative data covering the full Danish population from 1980 to 2019 to study the impact of parental loss on the earnings of women and men. We leverage the exogenous timing of *sudden* and *first* parental deaths and adopt a matched-control difference-in-differences (DiD) strategy. Specifically, we use nearest-neighbor (NN) matching to identify an observationally similar control for each treated individual and compare their labor market trajectories before

[1] A body of literature outside economics also examines the effects of bereavement, particularly on individual mental health (Umberson and Chen, 1994; Marks *et al.*, 2007; Stroebe *et al.*, 2007; Parkes, 2021; Kamis *et al.*, 2022).

and after the treated individual's parental loss. By exploiting variation in the timing of sudden deaths in our matched-control design, we mitigate concerns related to anticipatory effects, reverse causality, and selection bias arising from certain groups of parents being more prone to premature death. Additionally, restricting our focus to sudden and first parental deaths allows us to isolate the roles of mental health and informal family support. The bequest effect primarily becomes relevant after the second parental death, while elderly caregiving for the first parent is limited when parents die suddenly and are not widowed at the time of death.[2][3] Finally, the extensive time span and large scale of our panel data enable us to examine gender effects at two levels: the differential impact of mothers' vs. fathers' deaths on daughters vs. sons.

Our analysis shows that the loss of a parent has both immediate and long-term negative impacts on the earnings of both women and men. Specifically, men experience a persistent decline in earnings, amounting to 2% in the fifth year after parental death. In contrast, women's continuous drop in earnings amounts to almost 3% in the fifth year after parental death. Furthermore, when distinguishing between the effects of mothers' and fathers' deaths, we find that compared to fathers' deaths, mothers' deaths have a larger negative impact on both sons' and daughters' earnings. We also find that, relative to the effects on sons, the negative effects on earnings of both fathers' and mothers' deaths are larger for daughters.

Next, we explore the role of health and family support in shaping the impact of parental death on adult children's earnings. First, using detailed health records—including psychologist and psychiatrist consultations as well as medical prescriptions—we examine whether parental loss leads to increased mental and physical health problems. Our findings show that, compared to their matched controls, women visit psychologists 0.1 more times per year after their mothers' deaths and 0.06 more times after their fathers' deaths, representing increases of 130% and 78% relative to the baseline mean, respectively. For men, psychologist visits increase by 0.03 and 0.017 after mothers' and fathers' deaths, corresponding to 142% and 80% relative to the baseline mean.

We also observe an increase in the share of individuals receiving mental health-related prescriptions, rising by 1.4 (0.9) percentage points for women and 1 (0.7) percentage points for men after their mothers' (fathers') deaths. These increases correspond to 11% (6.8%) and 12% (8.3%)

[2]Existing studies have consistently documented (very) small effects of bequests on adult children's labor market outcomes (Nekoei and Seim, 2023), typically less than 1% of labor earnings upon receiving a bequest. Therefore, in this paper, we focus primarily on the mental health and informal care channels, for which little evidence currently exists.

[3]A parent with a cohabiting partner is likely to receive care from their partner before death if necessary; see, e.g., Pinquart and Sörensen (2011); Mommaerts (2025).

relative to the baseline mean for women and men, respectively. Additionally, opioid prescriptions rise following parental death—by 7% for men and 5% for women relative to the baseline mean. Together, this evidence suggests that both men and women experience more mental health problems after losing a parent. We also find that parental death increases hospital and GP visits for both men and women, with a larger effect observed following mothers' deaths. We continue to show that the increase in medical treatment tends to co-occur with the onset of declining earnings trajectories, suggesting their strong interlinkage after parental death.

Second, we examine how parental death affects labor market outcomes through the informal childcare channel. Since families with children aged five or younger have the greatest demand for informal childcare, we analyze the heterogeneity of its impact on the earnings of men and women with and without young children. Our findings show that men and women without young children experience similar earnings declines of around 2% (1%) following the deaths of their mothers (fathers). In contrast, women with young children see a larger earnings drop of 4% (3.5%) after losing their mothers (fathers), while for men with young children, earnings decline by around 1% following the death of either parent. These results highlight the family support channel as a key driver of the gender-specific effects on labor market outcomes.

Third, we examine how parental death affects labor market outcomes through elderly care for widowed parents. Since parents with high health risks require more care, we analyze the heterogeneous effects of parental death on the earnings of men and women with widowed parents of varying health statuses. Additionally, because children may relocate to provide informal care, we estimate the effect of first parental death on the proximity between adult children and their widowed parents. Our findings show that women experience a slightly larger earnings decline when their widowed parents have higher health risks. Furthermore, women are marginally more likely to reside in the same region as their widowed parents after losing their first parent. These results suggest that eldercare responsibilities may contribute to the labor market effects of parental death, though the impact is relatively small.

We conduct a series of robustness checks and supplementary analyses to validate our findings. First, we explore alternative mechanisms, including fertility and cohabitation, inheritance, and preferences for work and leisure. Second, we examine heterogeneity across geographic proximity between parents and adult children, causes of parental death, parental and child age at parental death, and time periods. Third, we assess within-family spillover effects by analyzing how parental death influences spousal labor market outcomes. Finally, we test the robustness of our results using alternative specifications and discuss their external validity.

Our paper makes a significant contribution to the literature on the impact of family health shocks on individual labor market outcomes (Fadlon and Nielsen, 2021; Fadlon *et al.*, 2025; Breivik and Costa-Ramón, 2022; van den Berg *et al.*, 2017). While existing research uses a similar empirical strategy, it primarily examines the effects of fatal health shocks experienced by spouses or children on individual employment and earnings. Although the consequences of these shocks are substantial and have important policy implications, their rare occurrence limits their generalizability to the broader working-age population. In contrast, our study focuses on a more prevalent family health shock—losing a parent during adulthood—and its impact on individual outcomes. Given the commonality of the event we examine, our results have broader implications for assessing population-level well-being compared to existing studies in this field.

We also contribute to understanding how parental death affects individual labor market outcomes through mental health and family support channels, including informal childcare and eldercare (Banerjee *et al.*, 2017; Garcia-Moran and Kuehn, 2017; Anstreicher *et al.*, 2022; Ciccarelli and Van Soest, 2018; Fu *et al.*, 2017; Marcos, 2022). Our findings provide significant evidence that parental death during adulthood negatively impacts labor market outcomes by deteriorating mental health and through the loss of informal childcare.

Our paper also aligns closely with the literature examining the impact of parental health shocks on children's outcomes. Several studies have investigated the effects of parental health shocks during children's upbringing on their mental health and educational outcomes (see e.g., Aaskoven *et al.*, 2022; Alam, 2015; Adda *et al.*, 2011; Chen *et al.*, 2009; Corak, 2001; De Giorgi *et al.*, 2023; Kristiansen, 2021). In contrast, our study focuses on the labor market outcomes of adult children following the loss of a parent, an event that is much more prevalent. Furthermore, the mechanisms driving the effects of parental health shocks on young children differ significantly from those affecting adult children. While parental death influences young children through human capital investment and the development of non-cognitive skills, it affects adult children through family support and health.

The rest of the paper is structured as follows. Section 2 provides a brief overview of the institutional setting in Denmark. Section 3 presents the data and descriptive statistics. Section 4 outlines our empirical strategy. Section 5 discusses the main results, and Section 6 explores the underlying mechanisms. The final section concludes the paper and discusses its policy implications.

2 Institutional background

We consider the effects of parental death on a wide range of outcomes. To enable meaningful interpretation of our results, we provide relevant institutional details here.

2.1 Healthcare

In the Danish healthcare system, general practitioners (GPs) serve as the initial point of contact for most health concerns. While GPs typically operate in private practices, they are predominantly funded by public authorities, and patients receive treatment free of charge. GPs play a crucial role in referring patients to specialized practitioners, such as psychiatrists or dermatologists, or to hospitals for more specialized or inpatient care. Both treatments by specialized practitioners and hospitals are also provided free of charge to patients.

However, there are a few exceptions to the provision of free healthcare in Denmark. Patients may be required to pay a co-payment for certain services, such as psychologists and physiotherapists, after receiving a referral from their GP. For psychologists, treatment is partially funded by the authorities for specific conditions, including suicide attempts, serious somatic illnesses, and bereavement of close relatives.

Prescribed medications are subject to a co-payment that decreases proportionally to the total amount spent on medication within a year. Once the annual expense threshold (DKK 4,110 $\approx$ USD 600 in 2019) is reached, medications are provided free of charge. Medications administered in hospitals are also provided free of charge to patients. All interactions with the publicly funded healthcare system in Denmark are recorded in the Danish health registers, allowing comprehensive data collection and analysis.

2.2 Childcare

In Denmark, children are entitled to access formal childcare from the age of 26 weeks until they reach school age, typically around age 5/6 (European Commission, 2022). Childcare is heavily subsidized, with local municipalities covering at least 75% of the cost (European Commission, 2022). In 2012, the average annual cost of full-time childcare for children under school age ranged from approximately 18,000 DKK to 33,000 DKK, depending on the type of care chosen (Naumann *et al.*, 2013). Large discounts are offered to low-income parents and families with more than one child. The relatively low cost of childcare contributes to high enrollment rates in formal childcare. In 2012, 90-98% of children under the age of 6 were enrolled in formal childcare (Naumann

et al., 2013). However, most childcare providers are only open during core working hours (from 6:30/7:00 am to around 4:00 pm), Monday to Friday. Lastly, after school care for children up to around age 10 is also provided and substantially subsidized by local municipalities (European Commission, 2022).

Despite the extensive provision of formal childcare in Denmark, informal childcare by grandparents is also very common. For example, Glaser *et al.* (2013, p.8) report that Danish grandparents are among the most likely to be involved in the care of grandchildren in Europe: *"The highest incidence of grandparents providing any childcare is in the Netherlands and Denmark, with around 57% of grandparents looking after a grandchild in the past 12 months."*

2.3 Elderly care

Extensive care for elderly individuals is provided free of charge by Danish municipalities. Initially, elderly care is typically provided at home, where care assistants employed by municipalities visit individuals based on their needs. If individuals require more extensive care, municipalities offer them the opportunity to move into a care home where full-time care is available. Although care services are free of charge, individuals moving into care homes must pay for rent and food. More details are provided by Danish Ministry of Health (2017) and Olejaz *et al.* (2012). Gørtz *et al.* (2023) use Danish survey data to provide a comprehensive analysis of long-term care in Denmark. The authors show that, given the generally favorable health status of the elderly in Denmark, a large fraction receive relatively few hours of care per week (3 hours at the median). Among those who need eldercare, services are provided both formally by municipalities and informally by family, friends, and neighbors. However, informal care is primarily offered by older individuals and retirees.

2.4 Inheritance

When one of the spouses of a married couple dies in Denmark, a commonly used option in Danish inheritance law allows the surviving spouse to choose not to share the estate of the deceased spouse with any potential children until the surviving spouse dies (Grønborg and Ravn-Petersen, 2022). For example, this would allow a surviving spouse to continue living in a house owned jointly with the deceased spouse, and thus, minimize disruption for the surviving spouse. Thus, research on the effects of inheritance tends to consider only the death of the second biological parent (see e.g., Boserup *et al.*, 2016). However, if the deceased spouse has one or more children with a third party, those children may object to the surviving spouse remaining in an undivided

estate and demand the estate of the spouses to be split, resulting in immediate inheritance to the children after parental death. By default, the remaining spouse and any children split the estate of the deceased spouse 50-50. If the deceased parent has signed a will, this ratio may be different (Grønborg and Ravn-Petersen, 2022).

3 Data and descriptive analysis

3.1 Data

In this paper, we use population-level register data from Denmark. The main advantage of these data is that we observe child-parent linkages for children born in the 1950s or later, as well as a wide range of demographic information for the entire population after 1980. Furthermore, we observe deaths and causes of death dating back to 1970 (DODSAARS/DODSAARG). These data allow us to identify our treatment sample of individuals who experienced their first sudden parental death.

We estimate the effect of the first parental death on a wide range of outcomes, including labor market participation, earnings, and a proxy for hours worked (IND/AKM/IDAS/IDAN/IDAP).[4] Earnings include income from both employment and self-employment. When considering earnings as an outcome, we index individual earnings by the average earnings of men and women one year before parental death.[5] Therefore, the estimated treatment effects can be interpreted as a percentage change in earnings relative to the baseline mean for men and women, respectively.

Starting in 1990, we have data on the number of consultations with private practicing GPs, psychologists, and psychiatrists (SYSI/SSSY). From 1994 we also observe both in- and out-patient hospital visits due to somatic illness (LPR_ADM/ LPR_DIAG). From 1995 onward, we observe all hospital visits related to psychiatric treatment (PSYK_ADM/PSYK_DIAG), as well as all medications prescribed by doctors for relevant diagnoses (LMDB). We focus on prescriptions related to mental health and the use of painkillers. Also beginning in 1995, data on formal childcare enrollment at the child level (DAGI/BOERNFB) become available, though the childcare registers have only partial coverage in some municipalities, especially before 2005.

[4]The proxy for hours worked is derived from ATP pension payments; see Kleven *et al.* (2019) for details.
[5]To exclude extreme outliers, we apply a 98% winsorization to earnings.

3.2 Treatment group

To identify the effects of losing a parent on individual labor market outcomes, we leverage the timing of the first sudden parental death to address key empirical challenges. First, elderly parents may fall ill before death. Adult children may anticipate the death of their parents, given their parents' health conditions and adjust their labor market behavior. Second, reverse causality may be a concern: adult children may first lose their employment and earnings, reducing total family resources and potentially worsening their elderly parents' health. To mitigate the anticipation effect and the reverse causality problem, we focus on parental deaths that are sudden and unexpected, including those caused by heart disease, cerebrovascular disease, acute respiratory infections, and traffic or other external accidents. The use of such sudden causes of death to examine the causal effects of family members' fatal health shocks is well-documented in the existing literature (van den Berg *et al.*, 2017; Fadlon and Nielsen, 2021). Focusing on the first parental death also helps control for both the bequest channel and the effects of elderly care for the first deceased parent. Specifically, the bequest channel is more relevant after the second parental death, when adult children become the primary heirs of their deceased parents' estate (Boserup *et al.*, 2016). The elderly care channel is less relevant in cases of sudden first parental deaths, as parents are generally in relatively good health beforehand, and their spouses typically serve as their primary caregivers.

Although we can observe parental deaths as far back as 1970, most of our analyses require incorporating pre- and post-trends in outcomes, typically covering five years before and five years after the first parental death. Since most of our outcome variables are available from 1980 to 2019, we restrict the treatment group to individuals whose first parental death occurred between 1985 and 2014. We further refine our treatment group to include only individuals with two known parents present in the population the year before the first parental death. Finally, we focus on individuals of prime working age (25 to 50 years old at the time of their first parental death), as we are particularly interested in labor market outcomes, and most people experience the loss of their first parent within this age range.[6]

3.3 Summary statistics

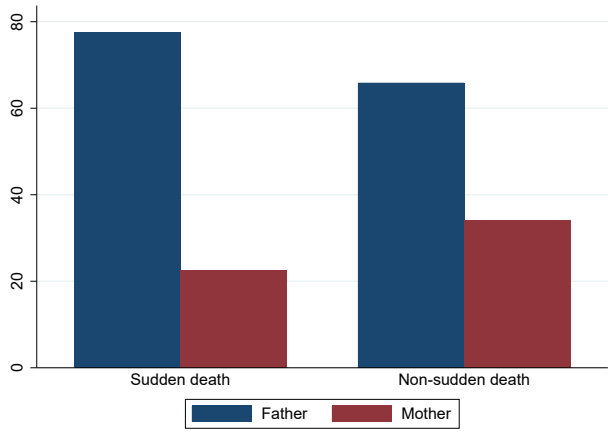
In this section, we examine whether the sample of sudden deaths is generally comparable to the full population of deaths. Comparing sudden and non-sudden parental deaths allows us to assess

[6]Our calculations show that 72% of the Danish population lost their first parent between ages 25 and 50 from 1985 to 2014, 16% lost their first parent before age 25, and 12% lost their first parent after age 50.

whether focusing on sudden parental deaths in our main analyses introduces selection bias.[7]

Figure 1 shows that first deceased parents are more likely to be fathers in the subsample of unexpected deaths compared to expected deaths. In our analyses, we account for this by separately estimating the effects of mothers' and fathers' deaths. In Table 1, we further examine the characteristics of children whose first parent dies suddenly versus non-suddenly. Parents who die unexpectedly tend to be slightly older, primarily due to the increased likelihood of dying from heart disease and cerebrovascular disease, which rises with age. However, while unexpectedly deceased parents are slightly older, this results in only a marginal age difference for the children experiencing parental loss.[8] Overall, the two groups of children appear very similar across key characteristics. Thus, the sample of children whose first parent dies suddenly does not differ systematically from the general population of children experiencing parental death.

Figure 1: Gender of first deceased parent



Notes: This figure presents the gender composition of the first deceased parent by sudden deaths vs. nonsudden death. Sudden deaths include heart diseases, cerebrovascular diseases, and traffic or other (external) accidents. Non-sudden deaths include the remainder of deaths. We include the first parental deaths occurring between 1985 and 2014 for children aged 25-50 in the year of the first parental death and with two known parents. See Table B.1 for details on the sample.

3.4 Descriptive analysis

To motivate our analysis of the effects of parental death on adult-child outcomes, we first present a set of event studies, largely following the specification of Kleven *et al.* (2019). This approach provides estimates of the effect of parental death on adult-child outcomes without requiring a

[7] Although this does not affect the identification of the effects of unexpected deaths, potential selection is relevant for the external validity of our estimates.

[8] Figure B.2 presents the full age distribution of deceased parents, categorized by sudden vs. non-sudden causes of death, while Figure B.3 shows the corresponding age distribution of children.

Table 1: Summary statistics for adult children at $t = -1$

	Sudden death	Non-sudden death	p-value
Age	36.98	36.88	0.00
Male	0.53	0.52	0.00
Share with college or above	0.21	0.22	0.00
Share with high school	0.51	0.52	0.00
Share without high school	0.29	0.26	0.00
Cohabitation	0.71	0.70	0.00
Number of children	1.39	1.38	0.02
Age of youngest child	7.94	7.76	0.00
Share with children under 6	0.34	0.34	0.00
Mother age	65.44	64.28	0.00
Father age	69.57	67.93	0.00
Mother married	0.85	0.81	0.00
Father married	0.85	0.82	0.00
First death age	70.00	68.00	0.00
Employment	0.84	0.84	0.31
Intensive margin	1016.34	1020.04	0.00
Annual earnings	296.80	303.33	0.00
N	206286	528057	734343

Notes: This table shows the summary statistics for children in the calendar year preceding the first parental death, split by first parental sudden vs. non-sudden death. We include the first parental deaths occurring between 1985 and 2014 for children aged 25-50 in the year of the first parental death and with two known parents. All statistics are derived from Danish population-level register data; the specific datasets used for this exercise are described in Section 3. Table B.1 in the Online Appendix further splits the two groups by the gender of the deceased parent.

control group. We use the treatment group described above and construct a panel of observations spanning five years before and five years after parental death.[9]

Figure B.4 shows that the labor supply of both women and men is affected by sudden parental deaths. Panels (a) and (b) illustrate that both the extensive and intensive margins of employment are impacted: five years after the first parental death, the participation rate of both genders is approximately 0.7% lower. This decline in labor supply also leads to reduced earnings. Panel (c) shows a noticeable drop in earnings of around 1.5% relative to pre-parental death levels for both

[9]We run the following regression for the various outcomes we consider:

$$Y_{ity} = \sum_{k=-5, k\neq -1}^{5} \delta_k \cdot \mathbb{1}[k = t] + AgeYear_{iy} + EduYear_{iy} + \epsilon_{ity} \tag{1}$$

where Y_{ity} represents the outcomes of interest, e.g., earnings, at calendar year y for individual i whose first parent died $t = -5, ..., 5$ years from year y. The coefficients of interest δ_k, identify the effects of parental death on individual labor market outcomes relative to the omitted year before the incident. δ_k is identified from the variation in age at the time of the first parental death. However, since returns to age may change over time and no control group experiences a comparable shift in returns to age within this setup, we include controls for age in year dummies interacted with year-fixed effects ($AgeYear_{iy}$). This interaction allows the effect of age to evolve over time, which is particularly important given our long sample period. Additionally, we control for education-level fixed effects ($EduYear_{iy}$), which are similarly interacted with year-fixed effects. All regressions are estimated separately for women and men.

women and men. Panel (d) examines changes in mental health around the first parental death. We find a significant increase in mental health-related prescriptions for both genders immediately after parental death. Compared to one year before parental loss, prescription use rises by 20% for women and 15% for men in the year of parental death, with a persistent increase of 5% for women and 10% for men five years later.

A key limitation of this approach is that both unobserved and unaccounted-for observed heterogeneity may drive general trends and gender differences in outcomes. For example, women with young children at the start of the panel may experience changes in labor supply as their children age, whereas men are less affected by this dynamic. As such, in the descriptive exercise, we focus on discontinuities in outcomes around the time of parental death, rather than the absence of (pre-)trends in outcomes. In addition, any meaningful comparison of the effects of parental death between women and men requires appropriate control groups. In the next section, we describe our empirical strategy for addressing these concerns.

4 Empirical strategy

To examine the effect of parental death, we employ panel data with matched controls, allowing us to estimate a model that accounts for individual fixed effects. Specifically, we use nearest-neighbor matching with Mahalanobis distance to identify a control individual for each treated individual. The control individual has similar characteristics but does not experience the death of either parent within the five-year window following the treated individual's parental death. We perform exact matching on gender, earnings (above or below the median), and whether the youngest child is above or below six years old one year before parental death. Within each exact match group, we apply nearest-neighbor matching based on age, education level, sector of employment (public or private), cohabitation status, residential region, number of children, parental ages, and the age of the youngest child one year before the treated individual's first parental death. Additionally, we match on employment and earnings history over the three years preceding the treated individual's first parental death.[10]

[10] All variables are included as fixed effects in the matching procedure. Continuous variables, such as earnings, are first discretized into quantile groups, and the resulting categorical variables are then used as fixed effects. In the main analysis, we include parental age to control for health-related risks. As a robustness check, we further incorporate the number of inpatient hospital visits for both fathers and mothers to control for parental health risks, finding that results remain consistent regardless of this inclusion. The adult children in the treatment group may experience a second parental death within the sample period. However, for 91% of our sample, the gap between parental deaths exceeds five years, and our results remain similar when restricting the treatment group to these cases.

Panel A of Table B.3 compares the means of the variables used in the matching for the treatment and their matched controls. The results show that all matched variables are similar between the two groups, indicating a well-balanced matching process. In Panel B, we compare the means of variables not used in the matching, such as mental health prescriptions, visits to psychologists, and hospital visits. Although some differences exist between the treatment and control groups in these variables, they are small, demonstrating the overall comparability of the two groups.[11]

Formally, using treated individuals and their matched controls, we estimate the following event study separately for women and men:

$$Y_{ity} = \sum_{k=-5, k\neq -1}^{5} \left(\delta_k \cdot \mathbb{1}[k=t] \cdot D_i + \theta_k \cdot \mathbb{1}[k=t]\right) + \gamma_i + \gamma_y + Age_{iy} + \epsilon_{ity} \tag{2}$$

where Y_{ity} represents the outcome of interest – e.g., employment or earnings – for worker i in calendar year y, whose first parent died $t = -5, ..., 5$ years from year y. D_i is an indicator variable equal to 1 for the treated individuals and 0 for their matched controls. In the regressions, we omit the indicator for the year prior to the event (-1), which serves as the reference year. The coefficients of interest, δ_k, identify the effects of parental death on individual labor market outcomes relative to the matched counterfactual and the omitted year before the incident. Additionally, we control for year fixed effects (γ_y), individual fixed effects (γ_i), time-since-event fixed effects (θ_k), and age fixed effects (Age_{iy}).[12] Standard errors are clustered at the individual-by-match ID level.

The key identifying assumption for our analysis is that the earnings and employment trajectories of individuals who have lost a parent would have otherwise evolved similarly to those of their matched controls following the event. Estimates from Equation 2 provide visual support for the parallel trends assumption.[13]

[11] We do not include mental health and hospital visit variables (including own and parental hospital visits) in the matching because these data are only available after 1995. Our results remain robust if we restrict the data to 1995 onwards and include one or more of these variables in the matching. Also in our main specification below, we control for individual fixed effects to address any level difference between treatment and controls.

[12] As pointed out by Hall *et al.* (2007); Fannon and Nielsen (2019) and Fannon *et al.* (2021), one cannot separately identify the linear effects of age, calendar years, and cohorts (in our case, cohort effects are absorbed by individual fixed effects). However, in a fixed-effects setup, the coefficients on age, years, and cohort/individual fixed effects are identified from *non-linearities*. To address collinearity, we impose the same effects for two age groups (e.g., ages 21 and 22) and two calendar years (e.g., 1980 and 1981). Our primary interest is in estimating and identifying the treatment effects of parental death (i.e., coefficients on the event time dummies), while controlling for any (non-linear) effects from age, calendar year, and individual factors; we do not directly interpret the coefficients on age, calendar year, or individual fixed effects. Our results are robust to controlling linearly for age and year effects.

[13] A recent body of literature raises concerns about the use of staggered DiD designs (see, e.g., Roth *et al.*, 2023). However, since our design allows only a single, permanent switch from untreated to treated and does not include already-treated individuals in the matched controls, we avoid "forbidden" comparisons, ensuring that our strategy remains robust to these concerns.

The event study analysis will illustrate the dynamic long-term effects of parental death on individual employment and earnings. However, to obtain aggregate estimates of how parental death affects our outcomes of interest, we estimate the following DiD model. We use the same time window and estimate the following equation separately for women and men:

$$Y_{ity} = \beta D_i \cdot post_t + \gamma_i + \gamma_t + \gamma_y + Age_{iy} + \epsilon_{ity} \tag{3}$$

where D_i is an indicator variable equal to 1 for treated individuals, and $post_t$ is an indicator variable equal to 1 for observations after parental death. We also control for sets of fixed effects similar to those in the event study analysis, and the sample consists of observations from five years before to five years after parental death, along with their matched controls. The coefficient of interest, β, measures the effect of parental death on employment and earnings relative to the matched controls. We estimate Equation 3 separately for men and women.

When analyzing the differential effects of mothers' and fathers' deaths, we estimate:

$$Y_{ity} = \beta_m M_i \cdot post_t + \beta_f F_i \cdot post_t + \gamma_i + \gamma_t + \gamma_y + Age_{iy} + \epsilon_{ity} \tag{4}$$

where M_i is an indicator equal to 1 if the first deceased parent is the mother, and F_i is an indicator equal to 1 if it is the father.

5 Results

In this section, we present the results from our dynamic event study, which allows us to inspect pre-trends in outcomes as well as the dynamics of treatment effects.

5.1 Dynamic effects

Figure 2 presents the event study analysis of the impact of parental death on the employment and earnings of women and men. We observe that, prior to the occurrence of the first parental death, the raw earnings and employment levels for both the treated individuals and their matched controls are nearly identical. The absence of differential pre-trends in the outcome variables supports the validity of our empirical strategy.

Following the first parental death, treated individuals experience a persistent decline in both employment and earnings. This pattern holds for both men and women. Panel (a), Figure 2, shows that men's employment gradually declines by 0.5 percentage points (pp), while women's

employment experiences a larger drop, reaching 1 pp in the fifth year after parental death. Panel (b) shows that the intensive margin of labor supply conditional on working exhibits similar patterns for women and men, with declines of just more than 0.7% five years after parental death, relative to the year before parental year. Thus, we see significant labor supply adjustments at both the intensive and extensive margins. Panel (a) of Figure B.5 shows the combined response at both margins by including zeros when considering the intensive margin, suggesting a total decline in labor supply of 1.7% for women and 1.2% for men five years after parental death. Panel (c), Figure 2, shows that in the fifth year following parental death, earnings for both men and women decrease by approximately 7,000 DKK. Panel (d) shows that this decline earnings corresponds to a 2% reduction for men relative to their matched controls and a 3% reduction for women compared to their matched controls.[14]

Estimates of Equation 3 are given in the lower left corner of the graph regions in Figure 2. On average, over the five years after parental death, we find that men's overall employment declines by 0.4 pp, whereas for women, the decline is 0.7 pp. Similarly, first parental death leads to an overall earnings reduction of 1.5% for men and 2% for women.

5.2 Effects by parental and child gender

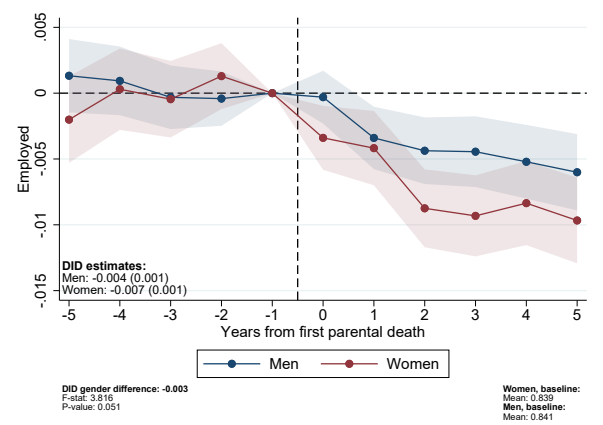
We further disaggregate the first parental deaths by distinguishing between mothers' and fathers' deaths to examine their differential impact on the earnings of adult children in Figure 3 (see Figure B.6 for dynamic effects). Our findings indicate that, compared to fathers' deaths, mothers' deaths lead to a significantly larger decline in earnings for both men and women. Additionally, women experience a greater reduction in earnings than men following the death of either parent. For instance, the negative effect of mothers' deaths on women's earnings is 2.7%, whereas for men, it is 2%.

Since parental death is common among adults, nearly everyone in the economy will be affected by the loss of a parent. Therefore, the individual treatment effect will effectively contribute to the overall treatment effect for the wider population. Given that the average age at the time of the first parental death is just above 36 years, these negative effects will impact individuals for many years in the labor market, leading to profound implications for aggregate economic outcomes both in the labor market and beyond.

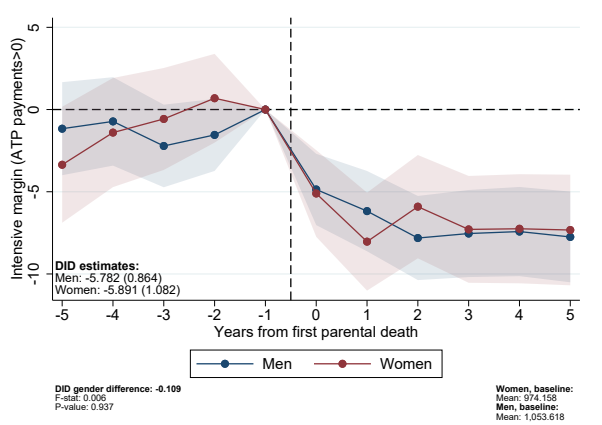
[14] An alternative transformation of earnings would be to consider earnings ranks – we provide these results in Figure B.7 in the Online Appendix. The earnings decline in terms of percentile rank is similar for women and men, amounting to just less than 1 percentile rank point for men and just more than 1 rank point for women. However, women's baseline mean rank is lower than that of men, so the relative declines in ranks are approx. 1.5% and 2% for men and women, respectively.

Figure 2: Effect of parental death by gender

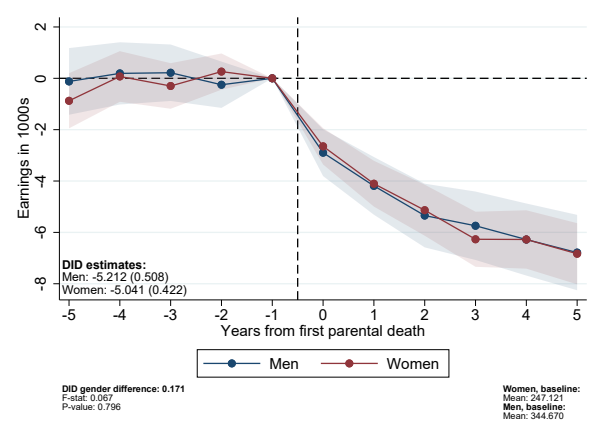
(a) Employment



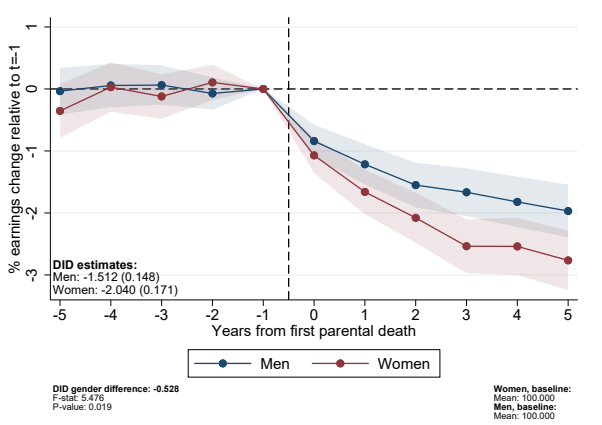
(b) Intensive margin: conditional on working



(c) Raw earnings

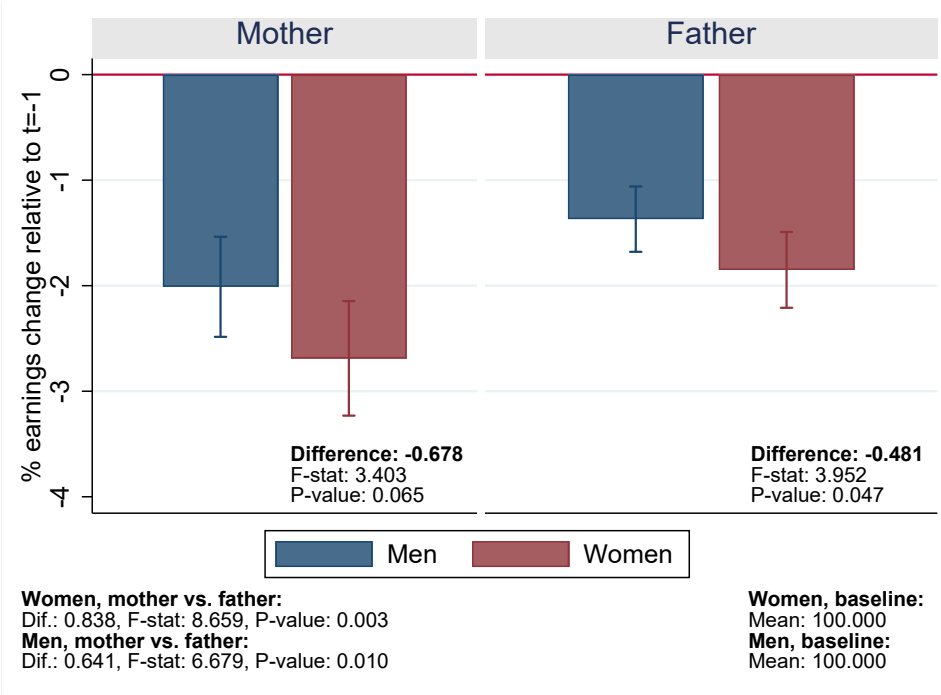


(d) Indexed earnings



Notes: This figure plots the estimated coefficients from Equation 2 for men's and women's employment and earnings. Participation is measured as strictly positive ATP contributions; intensive margin is the amount of ATP contributions. ATP-pension contributions are paid proportionally to hours worked. Earnings are indexed by the average earnings of men and women one year before parental death. The sample consists of all unexpected, first parental deaths from 1985 to 2014 and their matched controls for children aged 25-50 in the year of first parental death and with two known parents. See Table B.2 for details on the sample. 95%-confidence interval indicated. Standard errors are clustered at the individual-by-match ID level.

Figure 3: Effects by parental and child gender interactions



Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's earnings. Earnings are indexed by the average earnings of men and women one year before parental death. The sample consists of all unexpected, first parental deaths from 1985 to 2014 and their matched controls for children aged 25-50 in the year of first parental death and with two known parents. Effects are within 5 years after the first parental death. See Table B.2 for details on the sample. 95%-confidence interval indicated. Standard errors are clustered at the individual-by-match ID level.

6 Mechanisms

In this section, we discuss the mechanisms driving the impact of parental death on men's and women's earnings, as well as the underlying channels. The primary mechanisms include the effects of parental death on mental health, the informal childcare channel, and the eldercare channel.

6.1 Health

One important channel through which parental death affects adult children's labor market outcomes is health, including both mental and physical health. The existing literature has thoroughly documented the effect of both physical and mental health on labor market outcomes (Biasi *et al.*, 2021; Stephens Jr and Toohey, 2022). For example, Biasi *et al.* (2021) use Danish administrative data and find that mental health disorders are associated with significant earnings penalties, ranging from 34-74 percent. To examine the effect of parental death on individual physical and mental health, we leverage rich administrative data on individual visits to privately practicing health professionals, hospitals, and prescriptions.

6.1.1 Mental health

We first examine the effect of parental death on mental health outcomes. We consider three different ways in which mental health issues can be treated and manifest: 1) Visits to clinical psychologists and psychiatrists; 2) Medical prescriptions related to mental health, e.g., anti-depressants.[15] 3) Substance abuse and alcohol abuse behavior, using prescription data on opioids and alcohol dependence treatment.[16]

We first consider the effect of parental death on consultations with psychologists and psychiatrists. Panel (a) in Figure 4 shows that both men and women visit clinical psychologists more after parental death compared to their matched controls. Specifically, women visit psychologists more than men after both mothers' and fathers' deaths; mothers' deaths lead to more psychologist visits for both men and women.[17] In particular, for women, mothers' deaths cause 0.1 more

[15] All medical prescriptions are classified into ATC codes. We classify ATC codes N05*, N06A*, N06B*, and N06C* as mental health-related.

[16] In the prescription data, we extract information on both the treatment of alcohol dependence (ATC codes N07BB*, including Antabuse) and opioid painkillers (ATC codes N02A*).

[17] Mothers' deaths may cause additional mental health effects for a number of reasons, e.g., children may have a stronger attachment to their mothers.

visits per year relative to their matched controls.[18]

Panel (b) in Figure 4 shows that both men and women increase their mental health prescriptions after mothers' deaths (1 pp for men and 1.4 pp for women). The baseline averages are 8.4% for men and 13.2% for women, suggesting that men see an increase in mental health prescriptions of 12%, compared to women's increase of 11%. The effect on mental health-related prescriptions is significantly smaller after fathers' deaths compared to mothers' deaths. We also find a noticeable increase in opioid prescriptions after parental death – a 7% (5%) increase after parental deaths relative to the baseline mean for men (women). Because opioids are likely to be misused (Fadlon and Nielsen, 2019), we interpret opioid usage as a proxy for substance abuse. From Panel (a) in Figure B.8, we also see evidence that the male uptake of treatment for alcohol dependence increases after parental death.

In Figure B.9, we conduct the event study analysis for psychologist visits and mental health prescriptions. These results suggest that the effect on mental health is more pronounced in the first few years after parental death, with a smaller, persistent effect in the long run.[19] Moreover, there is no pre-trend in any of the mental health outcomes, even though we do not explicitly match on individual mental health prior to parental death.

6.1.2 General health

Panel (d) in Figure 4 reports the effect of mothers' vs. fathers' deaths on individuals' annual number of hospital visits. We find that both mothers' and fathers' deaths increase men's and women's total number of hospital visits compared to their matched controls. For instance, after maternal deaths, men increase their hospital visits by 0.02 per year, a 5% increase relative to their baseline mean, while women increase their hospital visits by 0.04 per year, a 5.4% increase relative to the baseline mean. The effect of paternal deaths on men's and women's hospital visits is smaller. Panel (b) in Figure B.8 reports the effect on GP visits, which shares the same trend as hospital visits. In sum, we observe that mothers' and fathers' deaths both have substantial effects on adult children's visits to GPs and hospitals, with the effect being more pronounced following mothers' deaths.[20]

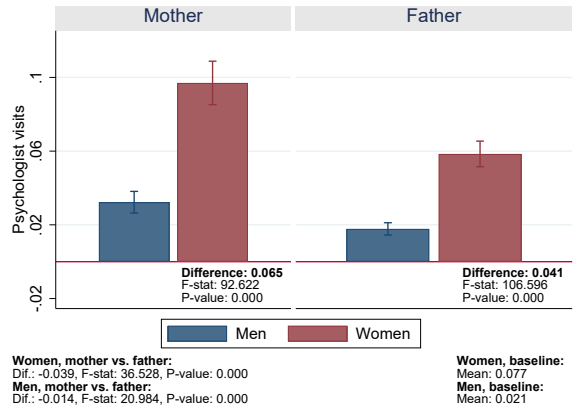
[18] We do not find any effect of parental death on consultations with psychiatrists, suggesting that effects of parental death do not manifest as severe mental health events.

[19] Note that co-payment of psychological treatment from Danish public health authorities in relation to bereavement requires a GP referral to psychologist treatment to be issued within one year after the death of a relative. As such, we may expect psychological treatment to be further sustained and spread out in the absence of such a requirements.

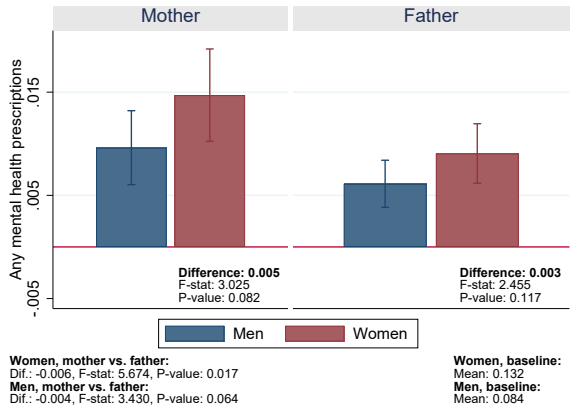
[20] Panel (d) in Figure B.9 provides the event studies for hospital visits before and after parental death.

Figure 4: Psychologist visits, prescriptions, and hospital visits, mothers' vs. fathers' deaths

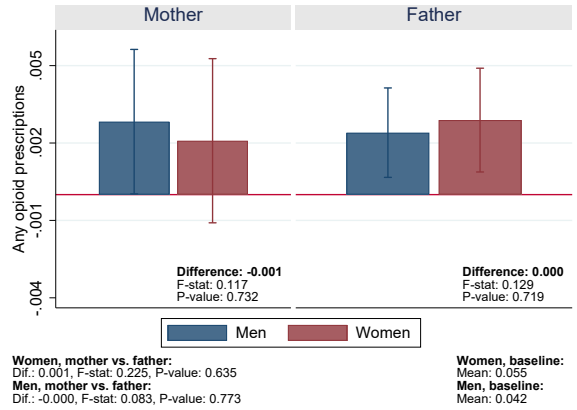
(a) Psychologist visits



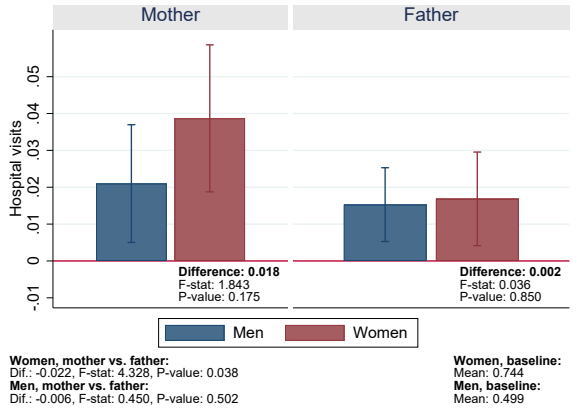
(b) Any prescriptions related to mental health



(c) Any prescribed opioid painkillers



(d) Hospital visits



Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's psychologist visits, mental health and opioid prescriptions, and hospital visits. Data on psychologist visits are available from 1990-2019. All medical prescriptions are classified into ATC codes. We classify ATC-codes N05*, N06A*, N06B*, and N06C* as mental health related, ATC-codes N02A* as opioid painkillers. The prescription data are available from 1995. Hospital visits include both in- and outpatient visits at non-psychiatric hospital wards, and these data are available from 1994-2018. Effects are within 5 years after the first parental death. 95%-confidence interval indicated. Standard errors are clustered at the individual-by-match ID level.

Rather than an actual deterioration in health status, the increase in hospital visits could be caused by a higher level of self-screening after parental death. Family members' fatal health shocks may incentivize individuals to undertake more rigorous health monitoring and screening (Fadlon and Nielsen, 2019). To examine the possibility that our results are driven by self-screening, we study the effect of parental death on hospital visits for screening and non-screening purposes and report the effects in Figure B.10. We find that the magnitude of the effect on hospital visits for non-screening purposes is much larger. This suggests that parental death has a negative impact on adult children's actual health, rather than merely changing their health screening behavior.

6.1.3 Health as mediator

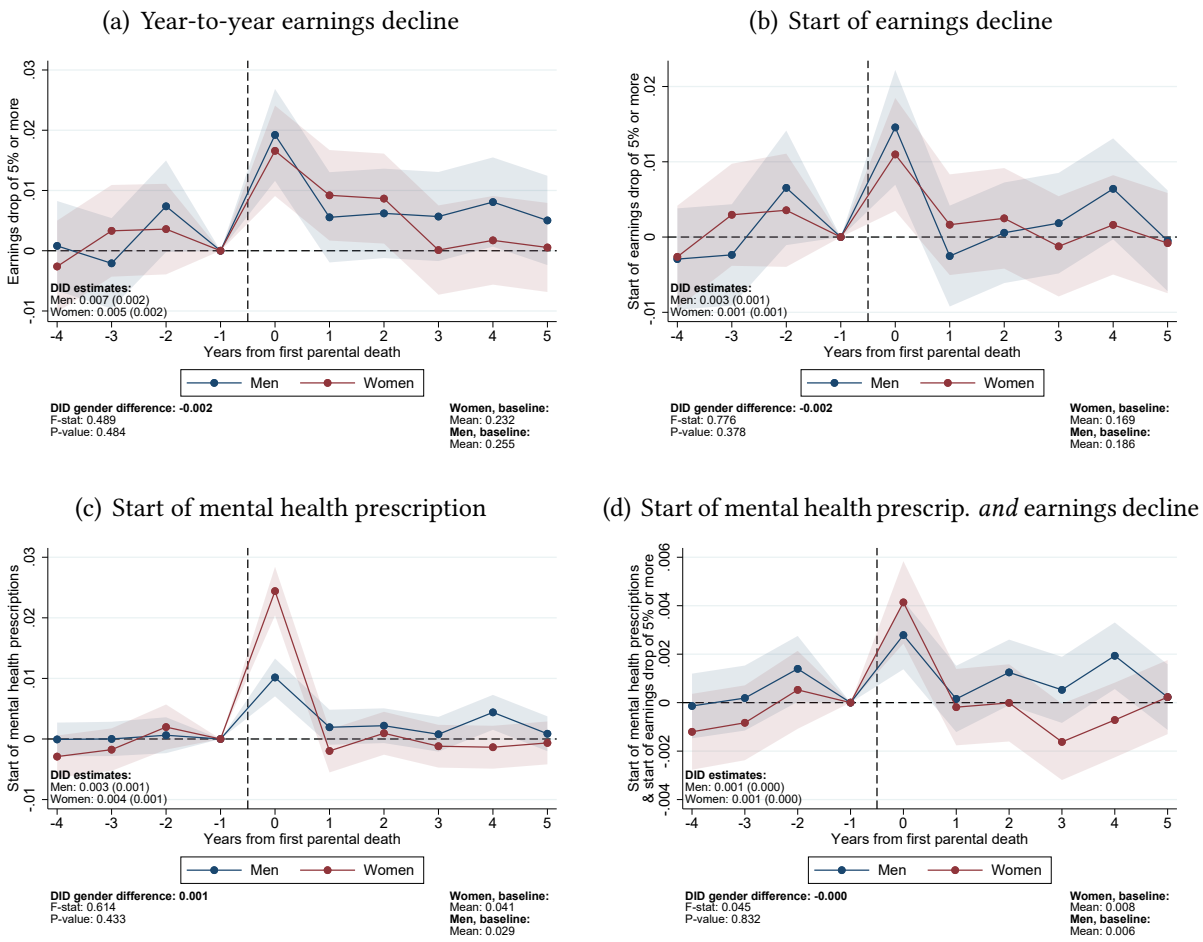
Ideally, we would directly estimate to what extent the deterioration of mental and physical health following parental death *causes* a decline in earnings. Standard mediation analyses are insufficient in our setting because health measures are also affected by parental death, making them "bad controls" (Angrist and Pischke, 2009). For this reason, Gelbach- or Oaxaca-Blinder-style decompositions would likely yield misleading results without a causal interpretation (Gelbach, 2016; Fortin *et al.*, 2011). Unlike other studies that exploit the *sequential timing* of intermediate outcomes (e.g., Heckman *et al.*, 2013; Bhalotra *et al.*, 2022), we observe simultaneous effects on both potential mediators and outcomes, as shown in Figures 2 and B.9.

As an alternative, we examine the co-occurrence of negative health effects and earnings declines. Figure 2 shows negative effects on earnings that persist five years after parental death. To determine whether different individuals drive short- and long-term effects, we define two outcomes: 1) an indicator for a year-to-year earnings decline of at least 5%, and 2) an indicator for the *onset* of such declines (not experienced in the previous year). Figure 5, panels (a) and (b) present these results. Panel (b) shows that the probability of *starting* a declining earnings trajectory increases significantly only in the year immediately following parental death, by 1.10 pp for women and 1.43 pp for men. Panel (a) indicates that these declining earnings trajectories persist for additional years after parental death.

Similarly, the probability of starting mental health treatment increases by 2.44 pp for women and 1.02 pp for men in the year immediately following parental death (Panel c). Examining the joint outcome – experiencing *both* the onset of earnings decline and mental health treatment in the same year – shows increases of 0.41 pp for women and 0.28 pp for men (Panel d). This suggests that of those experiencing the start of declining earnings, 37% of women and 20% of men will also

start mental health prescriptions.[21] Similar patterns emerge with psychologist treatment (see Appendix Figure B.11). Although this approach does not fully establish causality between health deterioration and earnings decline, it provides causal evidence of their co-occurrence, suggesting their strong interlinkage after parental death.

Figure 5: Co-occurrence of earnings declines and mental health treatment start



Notes: This figure plots the estimated coefficients from Equation 4 where outcomes include indicators for earnings declines relative to previous years as well as the onset of earnings decline and mental health prescription treatment. Panel (d) considers the interacted indicators of the onset of earnings declines and onset of mental health treatment. In Appendix Figure B.11, we extend this analysis to psychologist treatment, opioid prescriptions, and hospital visits. We classify ATC-codes N05*, N06A*, N06B*, and N06C* as mental health related, ATC-codes N02A* as opioid painkillers. The prescription data are available from 1995, so we restrict all analyses in this figure to begin in 1995 for consistency. We drop year -5 to define start of treatment in year -4 before parental death. 95%-confidence interval indicated. Standard errors are clustered at the individual-by-match ID level.

[21] Co-occurrence rates can also be calculated with mental health treatment as the denominator – that is, among those starting mental health treatment, 17% of women and 27% of men will also experience the start of declining earnings.

6.2 Informal childcare

In this subsection, we investigate the effects of parental death on earnings through the family support channel. The existing literature has focused extensively on family support in terms of informal childcare (Garcia-Moran and Kuehn, 2017; Anstreicher *et al.*, 2022; Bick, 2016; Kaufmann *et al.*, 2022; Bratti *et al.*, 2018). Households with children under age 6 (as most children start school at age 6) have the greatest need for informal childcare, particularly when formal childcare is unavailable. To examine the family support channel through informal childcare, we estimate Equation 4 separately for men and women with or without young children (aged 0–5 one year before parental death). If the family support channel contributes to the effects of parental death, we would expect to see a larger earnings drop among those with young children compared to those without.

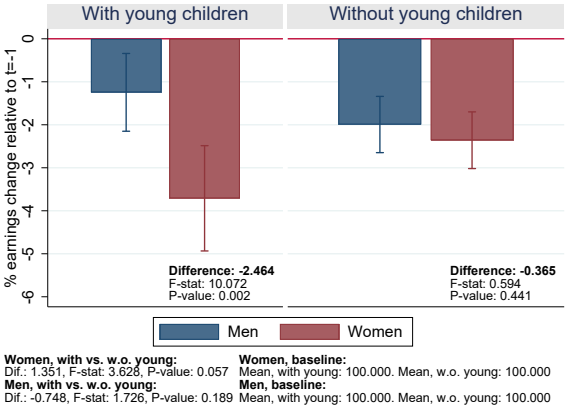
Figure 6 presents the estimated effects of first parental death on men's and women's earnings for those with or without young children. We also examine gender-specific effects by distinguishing between mothers' and fathers' deaths. Overall, women with young children experience a larger earnings penalty after the first parental death compared to women without young children. Specifically, the earnings of women with young children drop by almost 4% after parental death, whereas the earnings of men with young children are only marginally affected. Additionally, men and women without young children experience a smaller and similar decline in earnings after parental death.

When comparing the differential effects of mothers' versus fathers' deaths, we find that mothers' deaths have a slightly larger impact on women with young children. The difference in earnings penalties from parental death—between women with and without young children, and between men and women with young children—suggests that family support is an important channel in explaining women's earnings decline after parental death and contributes significantly to the gender earnings gap caused by parental death.[22] This is consistent with existing literature that uses grandmother retirement variation to examine the impact of informal childcare on women's labor market outcomes. For example, Kaufmann *et al.* (2022) show that a one-hour increase in grandmothers' hours worked causes adult daughters with young children to work half an hour less. Bratti *et al.* (2018) find that those whose own mothers are eligible to retire have an 11% higher probability of being in the labor force than those whose mothers are ineligible.

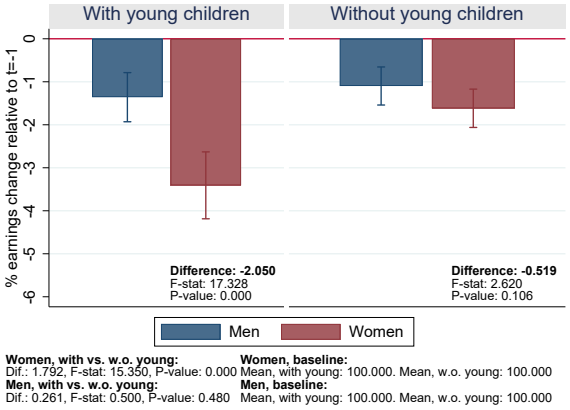
[22] We also examine heterogeneity by the age of the youngest child (0–5 vs. 6–14) and report the results in Figure B.12. We find that women with children under 6 years of age experience the largest decline, consistent with the fact that younger children require more intensive care.

Figure 6: Earnings by young children, mothers' vs. fathers' deaths

(a) Mothers' deaths



(b) Fathers' deaths



Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's earnings, but the sample is divided depending on whether individuals have a child under age 6. Earnings are indexed by the average earnings of each group of men and women one year before parental death. The sample consists of all unexpected, first parental deaths from 1985 to 2014 and their matched controls, see Table B.2 for details on the sample. Effects are within 5 years after the first parental death. 95%-confidence interval indicated. Standard errors are clustered at the individual-by-match ID level.

If a family loses access to informal childcare, they may substitute it with formal childcare. Thus, we examine whether men and women with young children switch to formal childcare after parental death by considering the probability of enrolling children in formal childcare. Figure B.13 shows that first parental death significantly increases formal childcare uptake among both men and women, for children both below and above age 5.[23] This suggests that formal childcare and parental informal childcare serve as substitutes for one another.

6.3 Eldercare for parents

Parental death can potentially impact adult children's labor market outcomes through the elderly care channel. On the one hand, elderly parents may require care from their adult children before death. When a parent passes away, adult children are relieved of caregiving responsibilities and may be able to increase their labor supply and earnings. On the other hand, when the first parent dies, the surviving parent becomes widowed and may require additional care from their adult children.

Due to our empirical design, the former channel is less relevant because we focus on the sudden death of the first parent, meaning parents are generally healthy before passing. Even if the first deceased parent required elderly care, our data show that more than 90% of parents

[23] Above age 5, formal child care is care out of school hours.

were married, and existing studies indicate that spouses are the primary caregivers for sick elderly individuals (Pinquart and Sörensen, 2011; Mommaerts, 2025). Thus, they are more likely to receive care from their spouses rather than their adult children. The latter channel, however, might still be relevant, even in Denmark, where an extensive public elderly care system is in place (Danish Ministry of Health, 2017; Olejaz *et al.*, 2012). Nevertheless, using data from the Netherlands, Rellstab *et al.* (2020) find no effect of elderly parents' care needs on adult children's labor market outcomes, likely due to a similarly comprehensive public elderly care system.

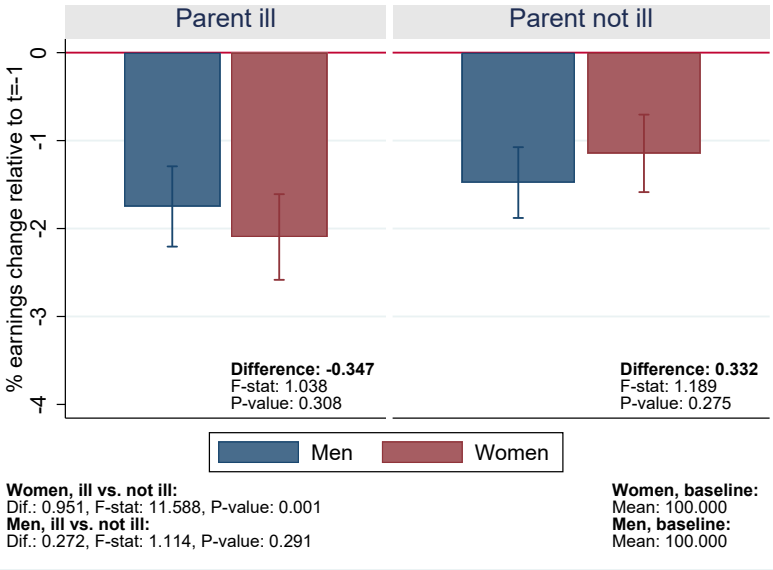
To examine the effect of caregiving for widowed parents, we follow existing literature (e.g., Rellstab *et al.*, 2020; Arrieta and Li, 2023) and exploit variation in whether the surviving widowed parent is ill. Ill widowed parents are more likely to require care from adult children than healthy parents, allowing us to identify a potential elderly care effect. Using hospitalization data, we analyze heterogeneous effects on labor market outcomes based on parental health status. In our sample, approximately 20% of widowed parents have undergone hospital treatment for more than three months within five years after the first parent's death, including continuous outpatient care. The heterogeneity analysis by parental health status in Figure 7 shows that both men and women experience a larger drop in earnings if their surviving parent is ill, but the difference is statistically significant only for women.

Furthermore, we examine whether men and women are more likely to move to the same region as their widowed parents after the first parental death. We create an indicator variable for whether adult children reside in the same region as their widowed parents and report the results in Figure B.14.[24] We find a very small positive effect (less than 0.5 pp) on the likelihood that men and women live in the same region as their widowed parents, without significant differences by parental health status. Therefore, the labor market effects of parental death are unlikely to be driven by men and women relocating closer to their surviving parents.

However, heterogeneous effects based on whether widowed parents are ill may also be confounded by the informal childcare or mental health channels. Specifically, ill parents are less likely to provide informal childcare to their adult children, and adult children may experience different mental health effects if their widowed parent is ill. To control for the informal childcare channel, we restrict our sample to men and women without young children in the analysis above. To examine heterogeneous effects on mental health, we estimate the impact of parental death on mental health prescriptions based on the widowed parent's health status. We find that when widowed parents are ill, men and women take slightly more mental health prescriptions, but the

[24]For this analysis, we use NUTS3 regions, dividing Denmark into 11 regions.

Figure 7: Earnings by surviving parent's health status



Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's earnings. Earnings are indexed by the average earnings of men and women one year before parental death. We divide the sample by the surviving parents' health status, based on their hospital visits. Hospital visits include in- and outpatient visits at non-psychiatric hospital wards; these data are available from 1994-2018. We restrict the sample to men and women without young children, i.e., children age below 6. Effects are within 5 years after the first parental death. 95%-confidence interval indicated.

effects are quantitatively small. Thus, the differential effect on women's earnings by the widowed parent's health status does not appear to be driven by the mental health channel, making the elderly care channel a more plausible explanation.

We emphasize that even though we find suggestive evidence of the elderly care channel affecting adult female children, this channel will impact only a small share of them, given that 80% of widowed parents remain healthy within five years of spousal death. Therefore, we conclude that this channel is not a primary driver of the general decline in earnings after parental death. These findings align with recent research by Gørtz *et al.* (2023), who use survey data to examine eldercare in Denmark. The authors report that approximately one-third of elderly individuals aged 65+ receive some informal care. Among them, 30% receive care from their children, with a median of three hours per week. Moreover, informal care is more often provided by older individuals and retirees, who are already out of the labor market. Taken together, this evidence suggests that while the eldercare channel may play a role, it is unlikely to be the primary mechanism driving the effects of parental death on adult children's labor market outcomes.

6.4 Alternative mechanisms and robustness

Finally, we conduct a series of robustness checks and supplementary analyses to ensure the validity of our findings. All of these are described and discussed in detail in Appendix A. In our first additional exercise, we examine the interaction between first parental death and parental wealth on individual labor market outcomes, finding no evidence that the decline in earnings following parental death is driven by the bequest channel. Second, we investigate the impact of parental death on fertility and cohabitation, ruling out the possibility that changes in these behaviors drive the observed deterioration in labor market outcomes. Third, we explore within-family spillover effects by analyzing how parental death influences spousal labor market outcomes. We find a significant negative impact of parents-in-law deaths on women's earnings through the informal childcare channel. Fourth, we find no evidence that parental death affects earnings by altering preferences for certain job types, e.g., by switching occupations or firms. Fifth, we conduct further analyses to assess heterogeneity based on factors such as geographic proximity between parents and adult children, causes of parental death, parental and child age at the time of death, and time periods. The negative effects on earnings of parental death on adult children are greater when they live in closer proximity, when parents die younger, when the adult children are younger at the time of loss, and in more recent periods, with no variation by cause of death. Sixth, we demonstrate that our key results are robust to using a control group of soon-to-be-treated individuals similar to Fadlon and Nielsen (2021).

7 Conclusion and policy implications

In this paper, we examine the labor market effects of an event that almost everyone experiences at some point in their lives: the death of a parent. Despite the widespread occurrence of parental death, the literature evaluating its impact on adult children's outcomes is limited. To contribute to the understanding of the effects of parental death, we use Danish register data from 1980 to 2019 and analyze all sudden, first parental deaths in Denmark between 1985 and 2014. Using a DiD approach with a matched nearest-neighbors control group, we find that adult children experience substantial and enduring declines in earnings and employment following the first parental death. The large sample of first parental deaths allows us not only to examine the overall impact of parental death on adult children's outcomes but also to quantify parent-child gender interaction effects—i.e., the differential effects of losing a mother versus a father on daughters versus sons. We find that the death of mothers has a significantly larger negative impact on both men's and

women's earnings. Furthermore, women experience a larger drop in earnings compared to men after both mothers' and fathers' deaths.

We focus on first and sudden parental deaths in this paper not only for identification purposes but also because of their inherent importance. Sudden death accounts for 28% of all parental deaths in Denmark, thus itself affecting a substantial share of the population. In Online Appendix Section A.7, we argue that our results may carry external validity for non-sudden deaths and for other countries. The family support and mental health mechanisms identified in our setting likely extend beyond sudden deaths and across different institutional contexts, as adult children in many settings would face the loss of informal childcare and potential mental health impacts as a result of parental death.

Our findings indicate that the mental health and family support channels are the main drivers of the labor market effects resulting from the first parental death. Although parental death is ultimately unavoidable, this does not mean that policymakers should ignore the negative effects on children. Given the near-universal nature of parental death, the long-term adverse effects on individuals will also have significant consequences for the economy as a whole. Kleven et al. (2019) document earnings penalties around childbirth for women but not for men, finding that women's earnings drop by around 20% after childbirth. We find that the earnings of women with young children drop by as much as 4% after losing a parent, i.e. around 20% of the estimated child penalty. Furthermore, we show that parental death negatively affects both women and men, meaning a larger proportion of the population is adversely impacted, thereby amplifying its effect on the aggregate economy.

Currently, policies aimed at assisting bereaved adult children are scarce, as parental death is typically managed without significant intervention from public authorities. Religious institutions, such as the church, often play a role in managing death, for example, by overseeing funerals. However, with the increasing secularization of societies, public non-religious policies could be developed to address the negative effects of parental death. We suggest that potential policies could draw inspiration from those implemented around childbirth, which, like parental death, is an event with significant economic and emotional implications.

In Denmark, local authorities organize "mommy groups" to facilitate interactions among mothers of newborns who share similar experiences and challenges. Similar support groups are also organized by charities or authorities in many other countries (see, e.g., Hanna *et al.*, 2002). In the context of parental death, the establishment of grief groups could provide comparable emotional support by connecting adult children who have recently lost a parent. This approach has

the potential to address some of the significant negative mental health effects associated with parental death. Furthermore, just as the health of newborn children and their mothers is closely monitored after childbirth, a similar approach could be adopted for parental death. For example, authorities could organize automatic psychological screenings for children following the loss of a parent.

While parents of newborns are entitled to parental leave to help alleviate time constraints surrounding childbirth, children have no legal entitlement to paid leave in the event of parental death in Denmark. Paradoxically, the death of a parent often imposes substantial legal and organizational burdens on children during a time of emotional distress. Therefore, we propose that offering paid leave in connection with parental death could help alleviate these time constraints and provide bereaved children with the necessary time to manage administrative responsibilities and mourn.

Finally, to address the negative effects on labor market outcomes through the informal childcare channel, policymakers could consider increasing the supply of out-of-hours childcare, particularly for those in occupations where shift work is prevalent. Together, these policies could potentially mitigate the long-term negative effects of parental death, although more research is needed to evaluate their efficacy. We hope that our findings will motivate such policy discussions and further research on the effects of parental death.

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ONLINE APPENDIX:

Effects of Parental Death on Labor Market Outcomes

A Supplementary outcomes and robustness checks

A.1 Inheritance

Our empirical design focuses on the first parental death. As described in Section 2, after the first parental death, the entire estate of the deceased parent is usually held by their spouse for married couples. Thus, by focusing on the first parental death, this channel is less relevant in driving the effect of parental death on adult children's labor market outcomes. However, to ensure that bequest is not a significant driver of our results, we conduct a heterogeneity analysis exploiting information on parental wealth before death (bequests are not observed directly). We regress adult children's earnings on the interaction term between a treatment indicator and parental wealth one year before the first parental death. If parents are wealthy, adult children tend to receive more bequests. If bequests are driving the earnings decline, we would expect the interaction term to be negative.

We report the results by gender of parental death and adult children in Table B.4. We find no impact of any of the interaction terms on adult children's earnings. As an alternative, we also interact the treatment indicator with adult children's own assets and regress the interaction term on adult children's earnings. The coefficient of the interaction term measures the impact of own wealth increase on adult children's earnings after parental death. We still do not find an economically meaningful impact on individual earnings. Collectively, this evidence suggests that the bequest channel does not drive the decline in earnings after the first parental death.[25]

A.2 Effects on cohabitation and fertility

Parental death could also affect adult children's labor market outcomes by influencing family behavior. For example, if parental death changes cohabitation and marital status, or affects fertility, we would expect resulting effects on adult children's labor market outcomes. Figure B.15 shows the effect of parental death on fertility and cohabitation.

[25] As a further robustness check, we also replicate the results by only using the wealth of the deceased parents and the wealth of the widowed parents separately. The interaction between the treatment and wealth of the widowed parents can provide suggestive evidence if widowed parent uses inter-vivo transfers to induce more care from their adult children, and thus, affect adult children's labor market outcomes. We do not find any effects supporting this argument.

We find an economically small and negative effect of mothers' or fathers' deaths on men's and women's cohabitation status. Additionally, we find that first parental death reduces the fertility rate of adult children. Compared to matched controls, the total number of children is 0.015 (0.02) lower for men (women) after losing a mother, while the total number of children is 0.005 lower after paternal death. Since higher fertility is associated with lower employment and earnings, particularly for women, a reduction in fertility would predict an increase in employment and earnings. Similarly, marriage and cohabitation are typically associated with lower employment and earnings, so a reduction in cohabitation status would also predict an increase in employment and earnings. These findings suggest that changes in relationship status and fertility behavior cannot explain the observed deterioration in labor market outcomes for men and women after parental death.

A.3 Effects on spouses

Parental death may not only affect the labor market outcomes of daughters and sons, it could also have a spillover effect on the labor market outcomes of daughters-in-law and sons-in-law. In this subsection, we explore the spillover effect of parental death on the earnings of daughters-in-law and sons-in-law. Because the treated individuals are men and women who lost their first parent-in-law, the sample is restricted to those who cohabit or are married. Our control group is again obtained through nearest-neighbor matching. For each treated individual, we identify an observationally similar matched control who is also married or cohabiting, but who does not lose either of their parents-in-law in the sample window. When obtaining the matched controls, we also control for whether the individual's own parents are still alive to ensure that the two groups are comparable in terms of their own parent death status.

We find that the death of parents-in-law has a negative impact on the earnings of men and women with young children (children below age 6), which is shown in Figure B.16. Specifically, compared to men, women with young children experience a larger decline in earnings, around 2%. This suggests that the death of parents has a greater spillover effect on female spouses through the informal childcare channel.

A.4 Preference change: Type of work and leisure

Parental death could also affect labor market outcomes by altering adult children's preferences for work. Specifically, a body of literature outside economics considers the impact of bereavement on individuals' values in life (Lehman *et al.*, 1993; Park, 2010; Umberson, 2003). Based on these

discussions, parental death and the associated grief could influence individuals' preferences or values, potentially leading them to make different choices, such as prioritizing time with family over work.

First, after parental death, adult children may switch to occupations or positions they enjoy more, even if they earn less. To test whether this channel is operative, we examine the impact of parental death on job changes and present the results in Table B.5. We find no economically meaningful effect of parental death on occupational switching or transitions between firms and sectors, suggesting that parental death is unlikely to affect labor market choices by altering preferences for certain types of jobs.

Second, after losing a family member, people may value time spent with the rest of their family more, leading them to adjust their relative preference between the economic benefits of work and leisure. If this were the case, we would expect adult children to be more likely to form a family and have more children to enjoy time with family. However, as described in Section A.2, we do not find evidence of such an effect. Taken together, our results do not lend support to the hypothesis that parental death influences adult children's labor market outcomes through altered preferences for specific job types or leisure.

A.5 Heterogeneity analysis

We conduct additional heterogeneity analyses to examine the effect of parental death based on whether parents and adult children live in the same region, the reasons for parental death, the ages of both parents and children at the time of death, and different time periods. The results are presented in Figure B.17 and Table B.6.

We find that if parents and adult children live in the same region before parental death, the effect of parental death on adult children's earnings is greater (Figure B.17). To further examine this result, we create a categorical variable based on an intensive measure of distance, specifically whether parents and adult children live in: 1) the same municipality (99 regions), 2) the same NUTS3 region (but not the same municipality; there are 11 NUTS3 regions in Denmark), 3) the same NUTS2 region (but not the same NUTS3 region; there are 5 NUTS2 regions in Denmark), or 4) a greater distance. This approach gives us four levels of distance, and we find that the negative earnings effects of parental death decrease monotonically with regional distance (Figure B.18). This result can be explained by both the family support and mental health channels. In particular, parents are more likely to provide informal childcare and receive eldercare if they live close to their adult children. Additionally, living in the same region may suggest a stronger relationship

between parents and children, meaning that adult children may suffer more from mental health problems after parental death.

Furthermore, we find that the effects of parental death are similar across different causes of death, such as heart attack, stroke, car accident, etc., suggesting no heterogeneous effects conditional on sudden death (see Table B.6, Columns 1 and 2). We also find a larger impact of parental death when parents die at a relatively younger age and when children are relatively young at the time of parental death (see Table B.6, Columns 3-6). This could be due to the family support and mental health channels: parents are more likely to provide informal childcare when they are young and healthy; adult children suffer more mental health problems when parents die unexpectedly at a relatively young age; and young children are more likely to need informal childcare from parents and may struggle more mentally with parental death. Finally, we find that the effects are comparatively larger in more recent time periods (after 2005).

A.6 Alternative specification

As an alternative to the combination of fixed effects and a control group of matched nearest-neighbors, another widely used identification strategy relies on a control group of individuals who experience the same treatment but Δ years later. This approach is applied in, for example, Fadlon and Nielsen (2019, 2021). The control groups in Fadlon and Nielsen (2019, 2021) consist of individuals who will be treated in the future, outside the estimation window. Our combination of fixed effects and a control group of matched nearest-neighbors is similar to the approach used in Fadlon and Nielsen (2019): Our control group does not lose either of their parents within the estimation window, but they will lose their parents in the future, though it may be due to sudden or non-sudden causes. In the data section, we show that the group of children whose parents die suddenly is very similar to the group whose parents die non-suddenly.

One may still worry that even if adult children whose parents die suddenly appear similar to those whose parents die expectedly on aggregate, the anticipatory effect of non-sudden deaths could still bias our results. For example, if we find a matched control for a treated individual whose parent dies suddenly, and the control individual's parents are both alive during the window but are seriously ill, the parental illness could generate an anticipatory effect for the control group. This anticipatory effect may lead the matched control to downward adjust their employment and earnings in response to the parental illness. If this is the case, comparing the treated individual's employment and earnings behavior to their matched controls would result in a downward-biased estimate of the negative impact of parental death. As such, our match-control estimates would

provide a lower bound of the true effect.

As a robustness check, we follow Fadlon and Nielsen (2021) and apply their alternative empirical strategy, which relies on future-treated individuals as the control group. We define individuals born in the same cohort using a 5-year age bin and consider a time gap in treatment of 6 years. For example, we use individuals whose first parent died suddenly in 2010 as the control group for those who lost their parents in 2004. We then compare the labor market trajectories of the two groups over the period from 2001 to 2009. The results are presented in Figures B.19 and B.20. Using this alternative specification, we find results that are similar to those from our main specification, which uses matched nearest-neighbors as the control group.

We also present the results related to the mental health, informal childcare, and eldercare channels using the alternative specification of Fadlon and Nielsen (2021) in Figures B.21, B.22, and B.23. We find that all the results are similar to those from the main specification using the matched control approach, except for larger standard errors in some of the heterogeneity analysis (e.g. heterogeneity by remaining parent illness). In the context of our paper, we prefer a combination of fixed effects and a control group of matched nearest-neighbors because it allows us to maintain a large sample size, which is crucial for capturing the two layers of gender effects and ensuring the precision of heterogeneity analyses performed on various subsamples of our data.

A.7 External validity

In this section, we first provide evidence suggesting that the effect of parental death may extend to non-sudden deaths and then discuss the implications of our findings for understanding the impact of parental death in other countries.

In Figure B.24, we present event studies for first, *non*-sudden parental deaths, similar to those for sudden deaths shown in Figure B.4. Quantitatively, the average reductions in labor supply and earnings following *non*-sudden parental deaths are very similar to those following sudden deaths. Furthermore, as shown in Panel (d), there is a sharp increase in mental health-related prescriptions at the time of parental death. These descriptive results suggest that the effects of parental death are very similar regardless of whether the cause is sudden or *non*-sudden. However, in contrast to Figure B.4, Figure B.24 reveals clear evidence of pre-trends. The increase in mental health prescriptions and the negative effects on labor market outcomes appear to begin even before *non*-sudden parental deaths. These pre-trends likely reflect the fact that parents dying of non-sudden causes are often ill for a significant period before death, and parental illness may influence child outcomes.

In this paper, we use administrative data from Denmark, an OECD country with extensive publicly provided childcare and eldercare. Denmark is comparable to other EU countries in terms of GDP, longevity, public provision of childcare and eldercare, and its healthcare system. Therefore, we would expect the effects of parental death to have external validity for other EU countries with similar institutional frameworks, such as Norway, Sweden, Finland, the Netherlands, and France.

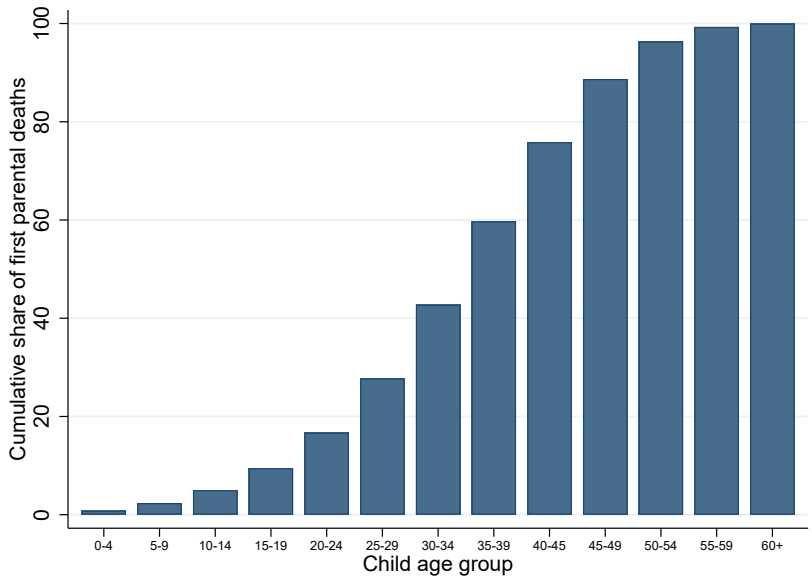
In the context of other countries, where there is limited publicly provided childcare or eldercare, as well as a weaker healthcare system (including mental health support), we anticipate that the effects of parental death would be more pronounced compared to Denmark. Specifically, we expect people in these countries to face larger labor market penalties due to: 1) the loss of informal childcare, as there is less public childcare available; 2) the added burden of caring for remaining parents, due to inadequate pension and long-term care systems; and 3) the deterioration of mental health, given the lack of sufficient mental health services. Thus, we believe our estimates could serve as an informative lower bound when considering the effects of parental death in other countries.

Overall, we argue that studying these questions within the context of the current data and framework is not only important in its own right but is also likely to carry significant implications for understanding similar effects in other contexts.

B Additional figures and tables

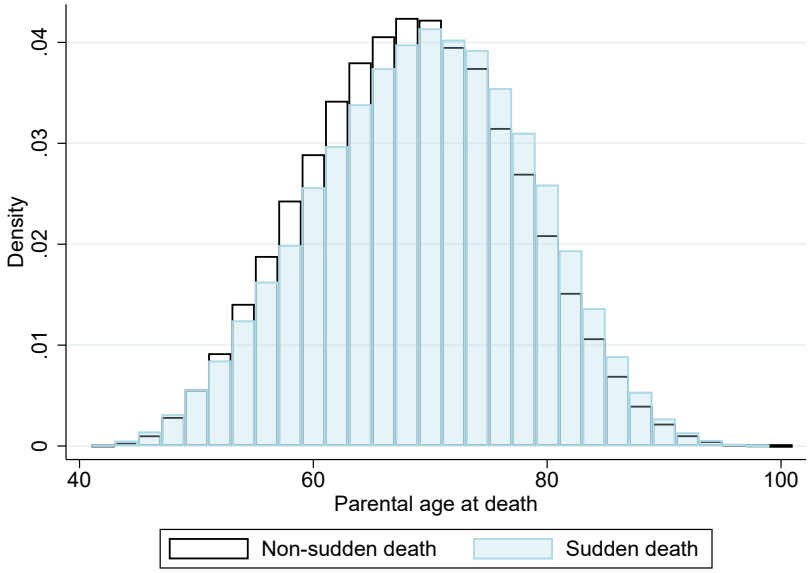
B.1 Additional descriptives

Figure B.1: Percentage of people with deceased parents by age: Denmark



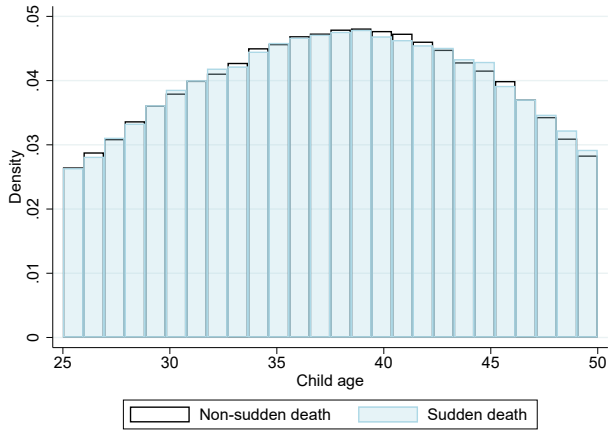
Notes: This figure shows the cumulative percentage of people who have lost their parents by age between 1985 and 2014. We consider all causes of death for this figure. Source: Danish population registry, BEF, and the cause of death registers, DODSAARS/DODSAARG.

Figure B.2: Age of first deceased parent distribution



Notes: This figure plots the age distribution of the first deceased parent by sudden vs. nonsudden death. We include the first parental deaths occurring between 1985 and 2014 for children aged 25-50 in the year of first parental death and with two known parents. See Table 1 for sample sizes. Bars including fewer than 5 individuals are dropped due to data confidentiality restrictions.

Figure B.3: Adult children age distribution when first parent deceased



Notes: This figure plots the age distribution of adult children at the time of first parent death and by first parent sudden vs. nonsudden death. We include the first parental deaths occurring between 1985 and 2014 for children aged 25-50 in the year of first parental death and with two known parents. See Table 1 for sample sizes. Bars including fewer than 5 individuals are dropped due to data confidentiality restrictions.

Table B.1: Summary statistics for adult children at $t = -1$, split by gender and suddenness of first parental death

	First death mother		First death father	
	Sudden	Non-sudden	Sudden	Non-sudden
Age	37.65	36.67	36.78	36.99
Male	0.53	0.52	0.53	0.52
Share with college or above	0.20	0.22	0.21	0.22
Share with high school	0.49	0.52	0.51	0.52
Share without high school	0.31	0.27	0.28	0.26
Cohabitation	0.71	0.70	0.71	0.70
Number of children	1.43	1.37	1.38	1.39
Age of youngest child	8.43	7.69	7.79	7.79
Share with children under 6	0.32	0.34	0.34	0.34
Mother age	66.82	64.12	65.05	64.36
Father age	69.39	66.85	69.63	68.49
Mother married	0.83	0.80	0.85	0.81
Father married	0.87	0.85	0.85	0.81
First death age	67.82	65.12	70.63	69.49
Employment	0.83	0.84	0.84	0.84
Intensive margin	1018.54	1017.14	1015.71	1021.54
Annual earnings	293.35	300.22	297.79	304.95
N	46273	180149	160013	347908

Notes: This table shows the summary statistics for children in the calendar year preceding first parental death, split by both parental gender and suddenness of parental death. We include the first parental deaths occurring between 1985 and 2014 for children aged 25-50 in the year of first parental death and with two known parents. All statistics are derived from Danish population-level register data.

Table B.2: Summary statistics for adult children at $t = -1$ for sudden, first parental deaths

	First death mother: Daughters	First death father: Daughters	First death mother: Sons	First death father: Sons
Age	37.59	36.73	37.71	36.83
Share with college or above	0.24	0.26	0.16	0.17
Share with high school	0.45	0.46	0.53	0.55
Share without high school	0.31	0.28	0.31	0.28
Cohabitation	0.74	0.74	0.68	0.68
Number of children	1.57	1.51	1.31	1.26
Age of youngest child	9.02	8.35	7.81	7.20
Share with children under 6	0.32	0.35	0.32	0.34
Mother age	66.77	64.99	66.86	65.10
Father age	69.33	69.56	69.44	69.69
Mother married	0.83	0.85	0.83	0.86
Father married	0.87	0.84	0.87	0.85
First death age	67.77	70.56	67.86	70.69
Employment	0.83	0.84	0.83	0.84
Intensive margin	978.30	974.07	1054.56	1052.33
Annual earnings	243.13	246.58	338.55	342.96
N	21919	74991	24354	85022

Notes: This table shows the summary statistics for children in the calendar year preceding a sudden and first parental death, split by both child and parent gender. We include the first parental deaths occurring between 1985 and 2014 for children aged 25-50 in the year of the first parental death and with two known parents. All statistics are derived from Danish population-level register data.

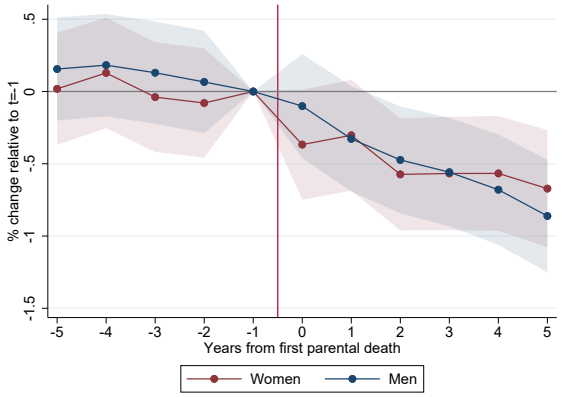
Table B.3: Summary statistics for treatment and their matched controls at $t = -1$

	Treatment	Control
Panel A: Targeted variables		
Age	36.979	36.966
Male	0.530	0.530
Share with college or above	0.207	0.209
Share with high school	0.506	0.536
Share without high school	0.287	0.255
Cohabitation	0.708	0.726
Number of children	1.391	1.386
Age of youngest child	7.936	7.841
Share with children under 6	0.336	0.338
Mother age	65.467	65.269
Father age	65.467	65.269
Employment	0.840	0.840
Annual earnings (1000 DKK)	299.973	304.411
Public sector	0.286	0.277
Panel B: Non-targeted variables		
Intensive margin of employment	854.181	854.181
No. GP visits	5.571	5.262
Any hospital visits	0.318	0.301
Any psychology visits	0.010	0.007
Any psychiatry visits	0.012	0.012
Any mental health pres.	0.111	0.103
Any alc. abuse pres.	0.007	0.005
Any opioid pres.	0.052	0.044
Mother any hospital	0.579	0.531
Father any hospital	0.668	0.521
N	206282	206282

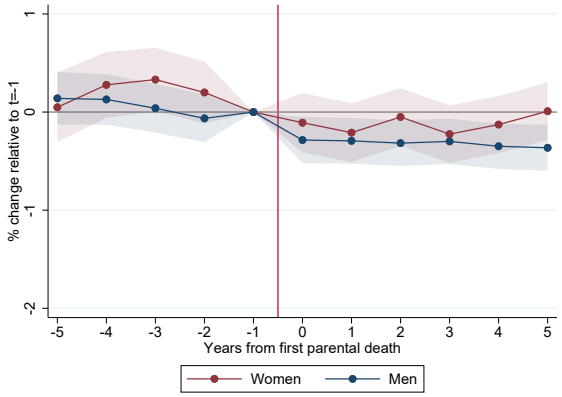
Notes: This table presents summary statistics for treated individuals and their matched controls one year before the parental death of the treated individual. We include first parental deaths occurring between 1985 and 2014 for individuals who were aged 25–50 at the time of the first parental death and had two known parents. All statistics are derived from Danish population-level register data.

Figure B.4: Descriptives: Effect of sudden parental death

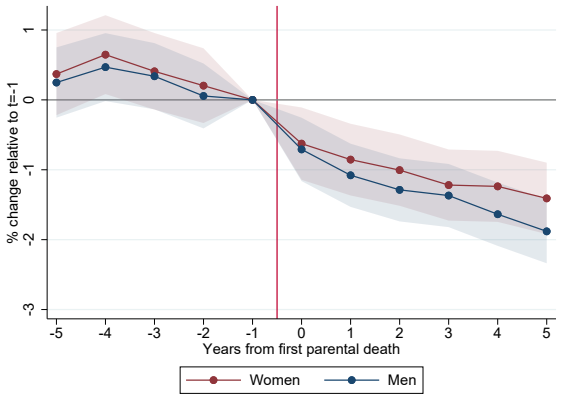
(a) Participation



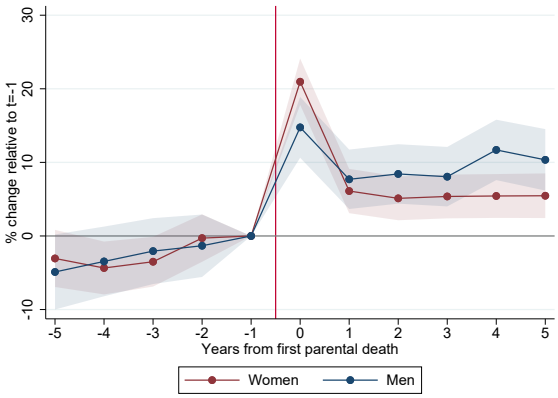
(b) Intensive margin: conditional on working



(c) Raw earnings



(d) Any mental health prescriptions

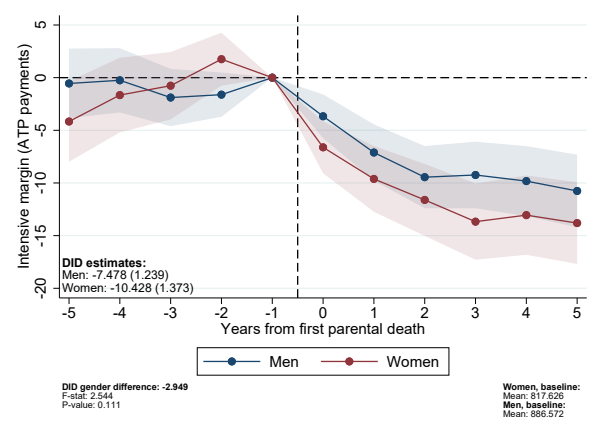


Notes: This figure plots the estimated coefficients from Equation 1 for men's and women's labor market outcomes, and if using any mental health prescriptions. We follow Kleven *et al.* (2019, p. 188) and convert the estimated coefficients into percentage change relative to the baseline. Participation is measured as strictly positive ATP contributions. The intensive margin is based on ATP contributions, similar to Kleven *et al.* (2019). ATP-pension contributions are paid proportionally to hours worked. Earnings are inflated to 2020 levels and include earnings from both employment and self-employment. The sample consists of all sudden, first parental deaths from 1985 to 2014 for children aged 25-50 in the year of first parental death and with two known parents. The prescription data are available from 1995. 95%-confidence intervals indicated.

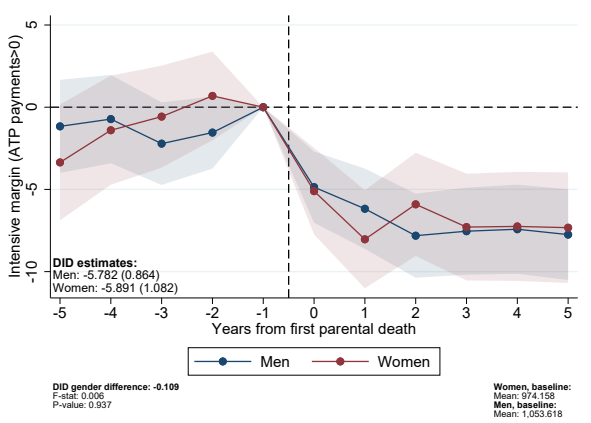
B.2 Additional main results

Figure B.5: Effect of parental death by gender: Intensive margins

(a) Intensive margin: unconditional/including zeros

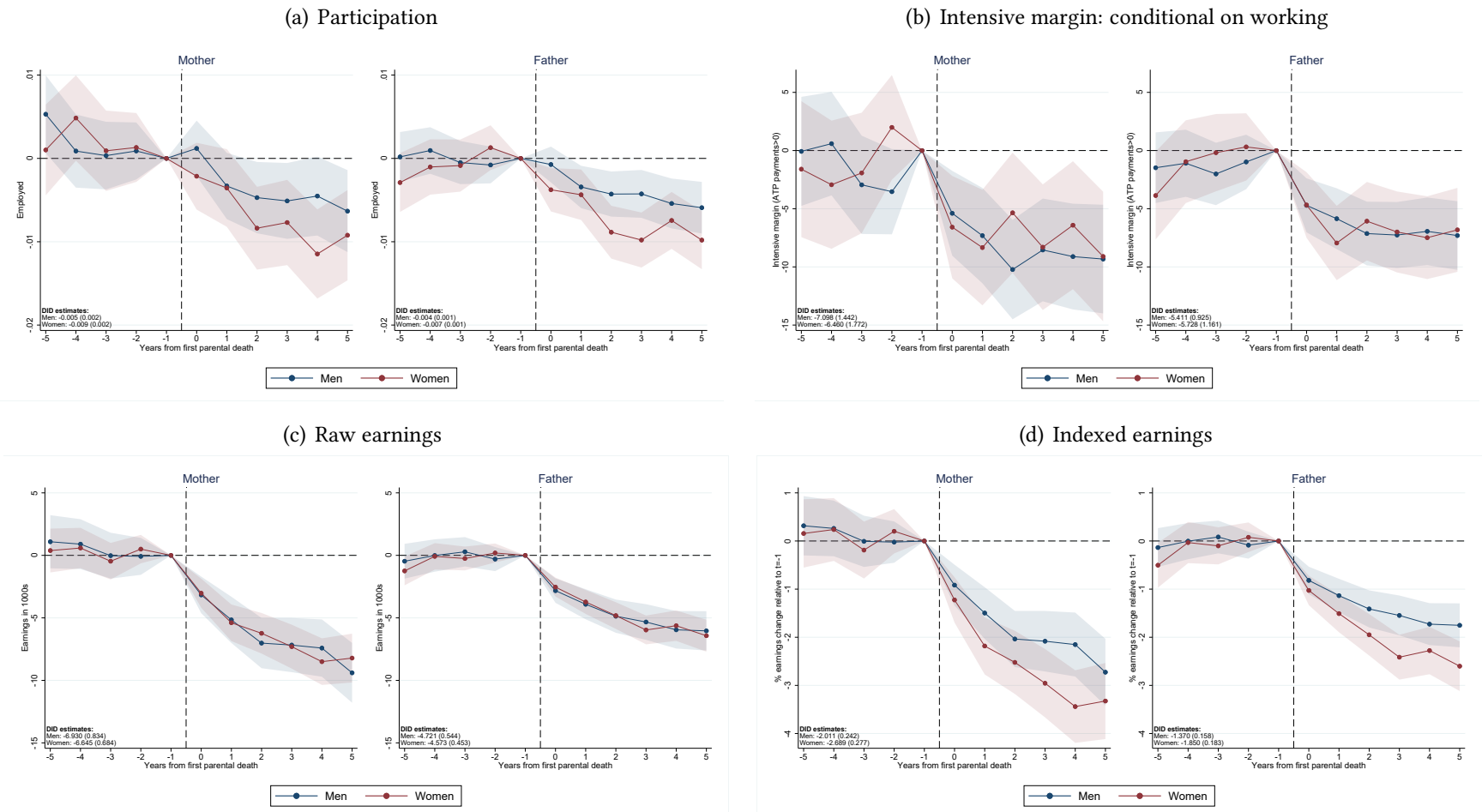


(b) Intensive margin: conditional on working/excl. zeros



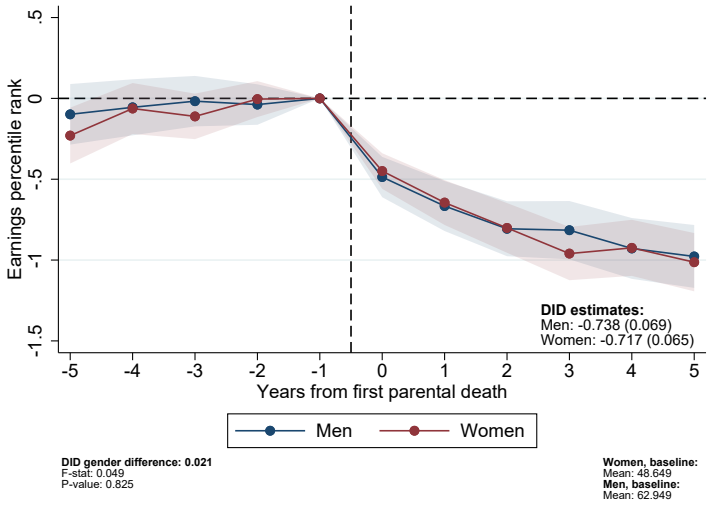
Notes: This figure plots the estimated coefficients from Equation 2 for men's and women's intensive margins of labor supply. Intensive margin is the amount of ATP contributions. ATP-pension contributions are paid proportionally to hours worked. We include those with no ATP-payments as zeros in Panel (a), and exclude them in Panel (b). The sample consists of all sudden, first parental deaths from 1985 to 2014 and their matched controls for children aged 25-50 in the year of first parental death and with two known parents. See Table B.2 for details on the sample. 95%-confidence interval indicated. Standard errors are clustered at the individual-by-match ID level.

Figure B.6: Effects by parental and child gender interaction



Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's earnings. Participation is measured as strictly positive ATP contributions; intensive margin is the amount of ATP contributions. ATP-pension contributions are paid proportionally to hours worked. Earnings are indexed by the average earnings of men and women one year before parental death. The sample consists of all unexpected, first parental deaths from 1985 to 2014 and their matched controls for children aged 25-50 in the year of first parental death and with two known parents. Effects are within 5 years after the first parental death. 95%-confidence interval indicated. Standard errors are clustered at the individual-by-match ID level.

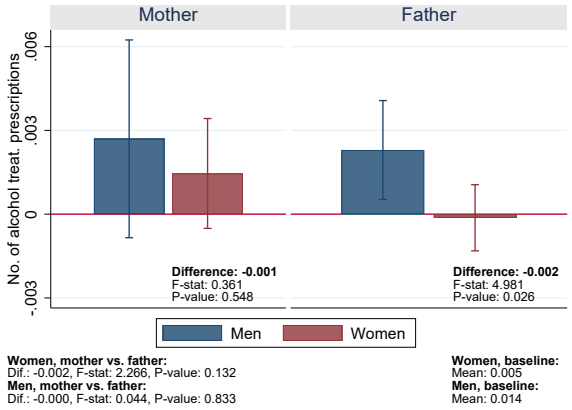
Figure B.7: Effect of parental death by gender: Earnings percentile ranks



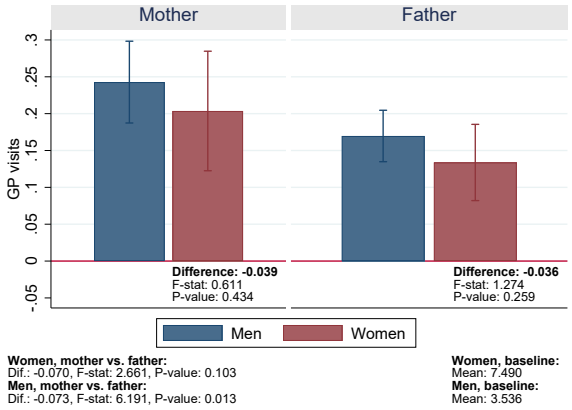
Notes: This figure plots the estimated coefficients from Equation 2 for men's and women's percentile earnings rank. Earnings are ranked within calendar years across the population aged 20-55. The sample consists of all unexpected, first parental deaths from 1985 to 2014 and their matched controls for children aged 25-50 in the year of first parental death and with two known parents. See Table B.2 for details on the sample. 95%-confidence interval indicated. Standard errors are clustered at the individual-by-match ID level.

Figure B.8: Treatment of alcohol addiction and GP visits, mothers' vs. fathers' deaths

(a) No. of prescriptions



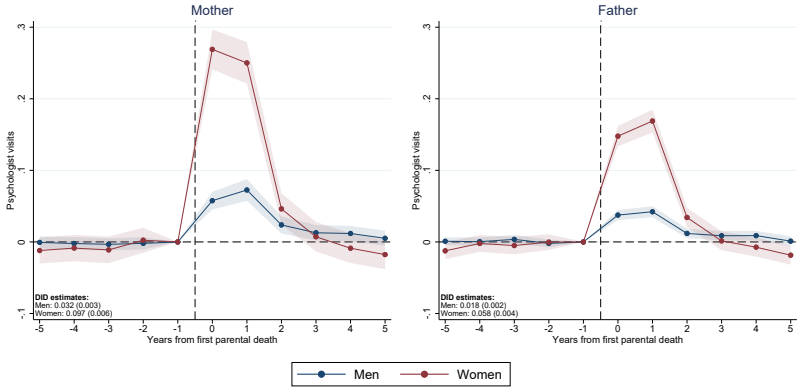
(b) GP visits



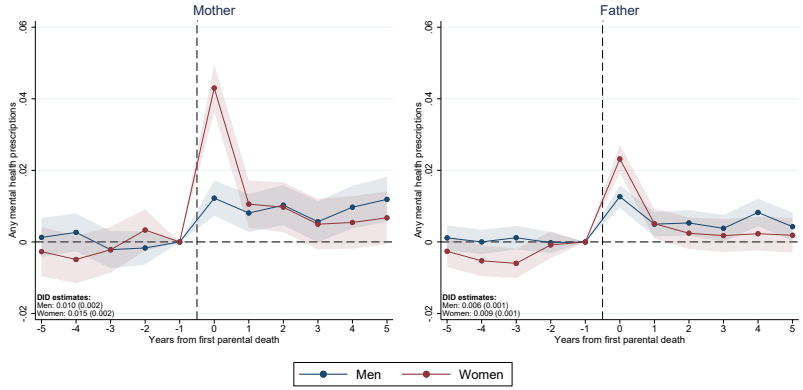
Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's prescriptions related to alcohol addiction, as well as men's and women's visits to GP. All medical prescriptions are classified into ATC codes. We classify ATC-codes N07BB as prescriptions related to the treatment of alcohol addiction. Effects are within 5 years after the first parental death. 95%-confidence interval indicated.

Figure B.9: Event Study: Psychologist visits, prescriptions, and hospital visits, mothers' vs. fathers' deaths

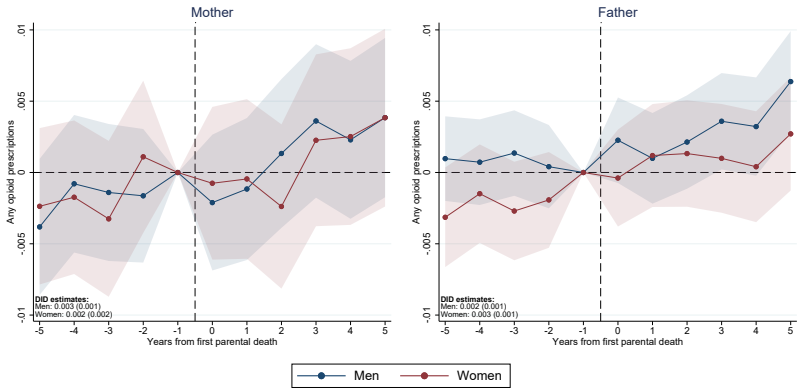
(a) Psychologist visits



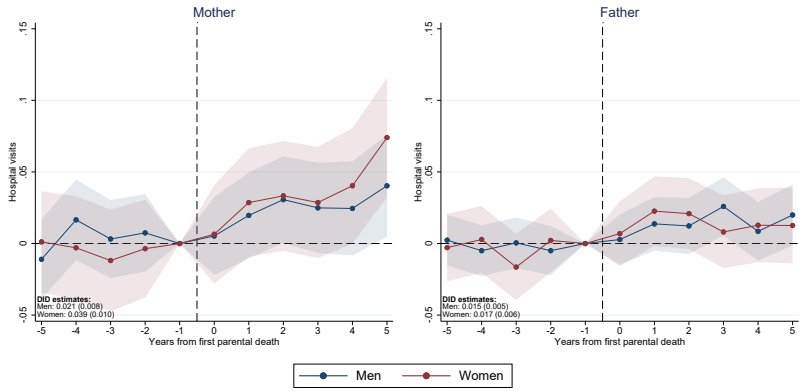
(b) Any prescriptions related to mental health



(c) Any prescribed opioid painkillers



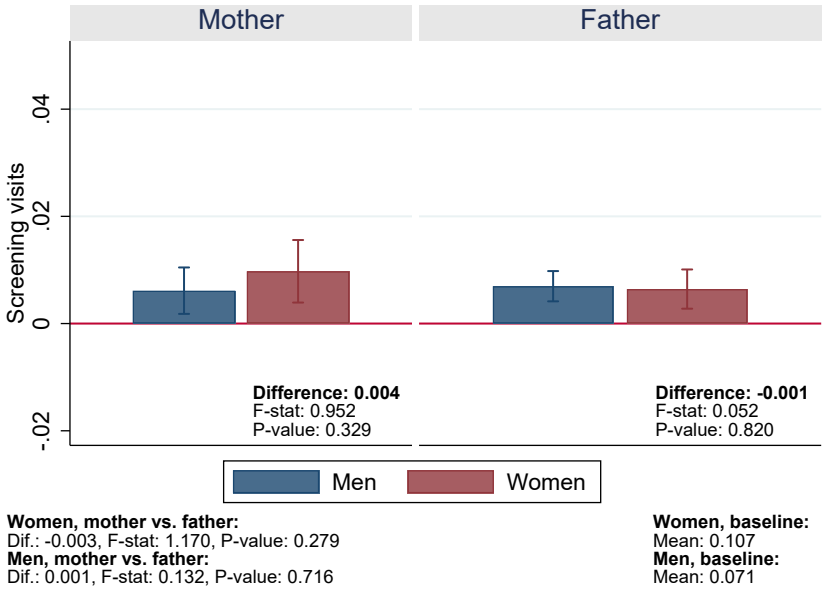
(d) Hospital visits



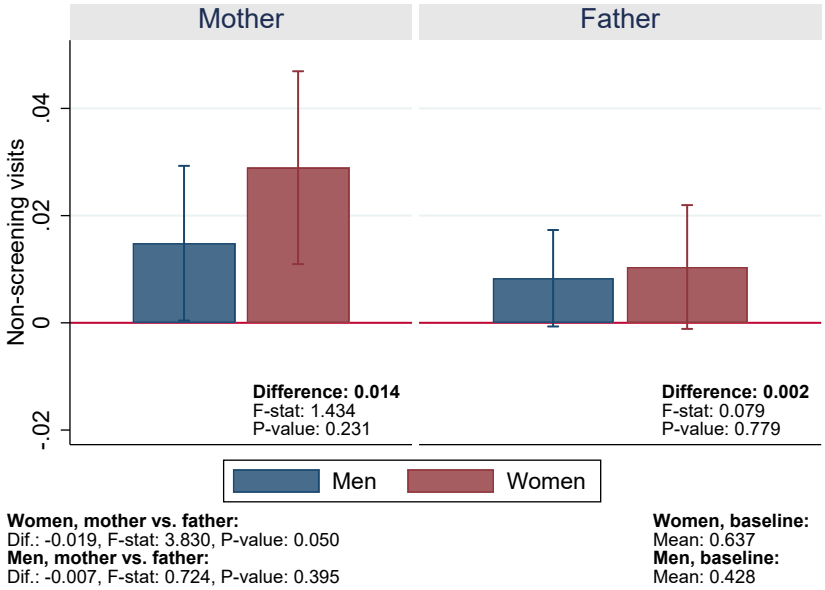
Notes: This figure plots the estimated coefficients from Equation 2 for men's and women's psychologist visits, any prescriptions related to mental health, any prescribed opioid painkillers, and hospital visits. Data on psychologist visits are available from 1990-2019. All medical prescriptions are classified into ATC codes. We classify ATC-codes N05*, N06A*, N06B*, and N06C* as mental health related, ATC-codes N02A* as opioid painkillers. The prescription data are available from 1995. Hospital visits include both in- and outpatient visits at non-psychiatric hospital wards, and these data are available from 1994-2018. Effects are within 5 years after the first parental death. 95%-confidence interval indicated. Standard errors are clustered at the individual-by-match ID level.

Figure B.10: Screening vs. non-screening, mothers' vs. fathers' deaths

(a) Screening related hospital visits



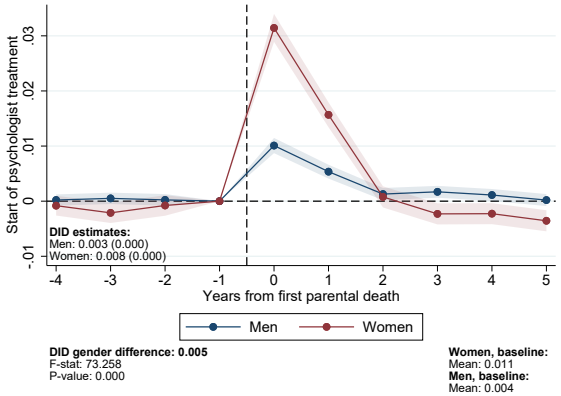
(b) Non-screening related hosital visits



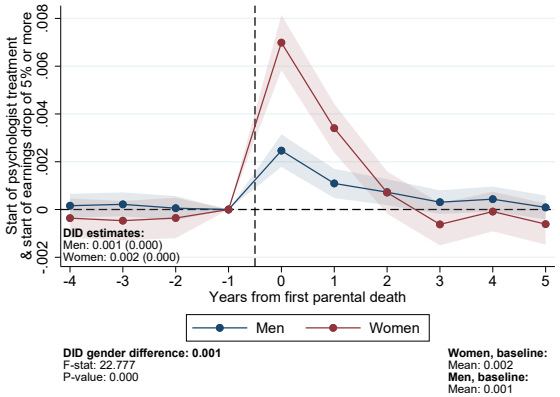
Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's hospital visits, divided by screening and non-screening diagnoses. We consider the following ICD-10 codes (including their subcategories) as self-screening: "Z00: General examination and investigation of persons without complaint and reported diagnosis" and "Z01: Other special examinations and investigations of persons without complaint or reported diagnosis". Hospital visits include both in- and outpatient visits at non-psychiatric hospital wards, and these data are available from 1994-2018. Effects are within 5 years after the first parental death. 95%-confidence interval indicated.

Figure B.11: Co-occurrence of earnings declines and health treatment start

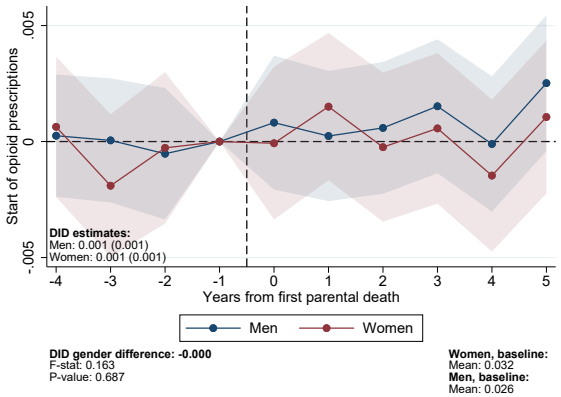
(a) Start of psychologist treatment



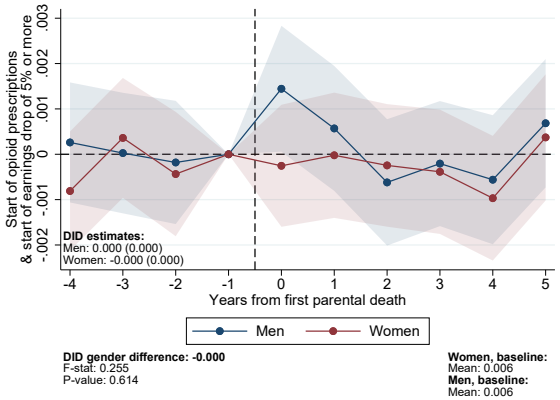
(b) Start of psychologist treatment *and* earnings decline



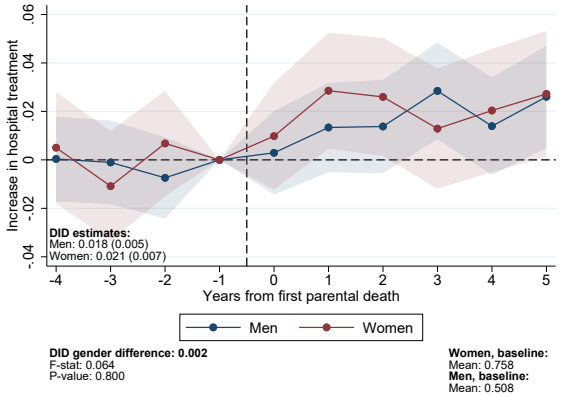
(c) Start of opioid prescription



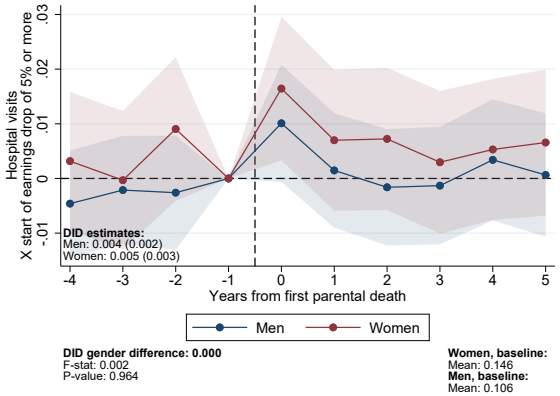
(d) Start of opioid prescrip. *and* earnings decline



(e) No. of hospital visits



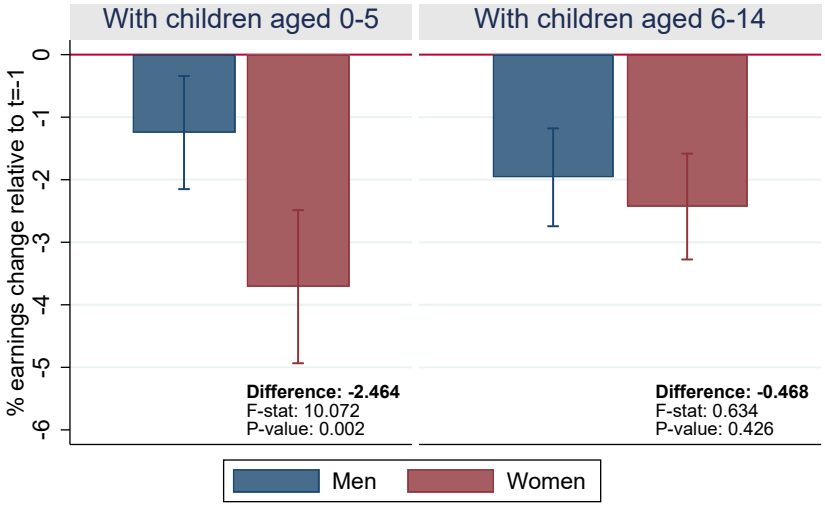
(f) No. of hospital visits *times* earnings decline



Notes: This figure plots the estimated coefficients from Equation 4 where outcomes are indicators for medical treatment (and counts of hospital treatment) as well as their interactions with the onset of earnings declines. We classify ATC-codes N05*, N06A*, N06B*, and N06C* as mental health related, ATC-codes N02A* as opioid painkillers. The prescription data are available from 1995, so we restrict all analyses in this figure to begin in 1995 for consistency. We drop year -5 to define start of treatment in year -4 before parental death. 95%-confidence interval indicated. Standard errors are clustered at the individual-by-match ID level.

Figure B.12: Earnings by child age group, mothers' vs. fathers' deaths

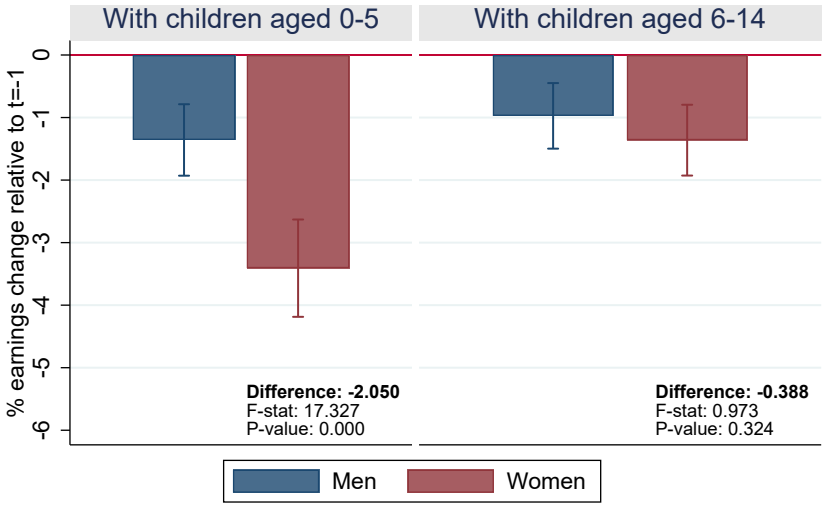
(a) Mothers' deaths



Women, with 0-6 vs. 7-14 young:
Dif.: 1.281, F-stat: 2.847, P-value: 0.092
Men, with 0-6 vs. 7-14 young:
Dif.: -0.715, F-stat: 1.375, P-value: 0.241

Women, baseline:
Mean, with 0-6: 100.000. Mean, with 7-14: 100.000
Men, baseline:
Mean, with 0-6: 100.000. Mean, with 7-14: 100.000

(b) Fathers' deaths



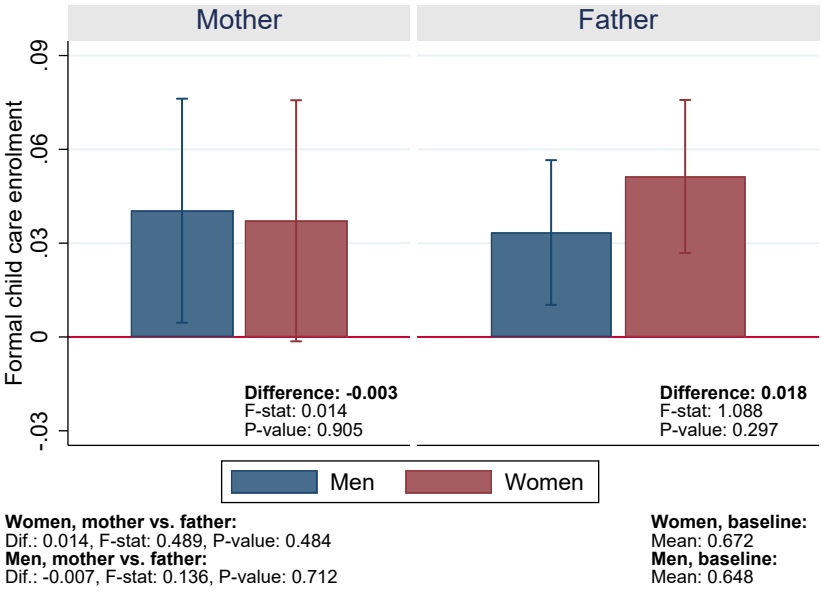
Women, with 0-6 vs. 7-14 young:
Dif.: 2.047, F-stat: 17.392, P-value: 0.000
Men, with 0-6 vs. 7-14 young:
Dif.: 0.385, F-stat: 0.949, P-value: 0.330

Women, baseline:
Mean, with 0-6: 100.000. Mean, with 7-14: 100.000
Men, baseline:
Mean, with 0-6: 100.000. Mean, with 7-14: 100.000

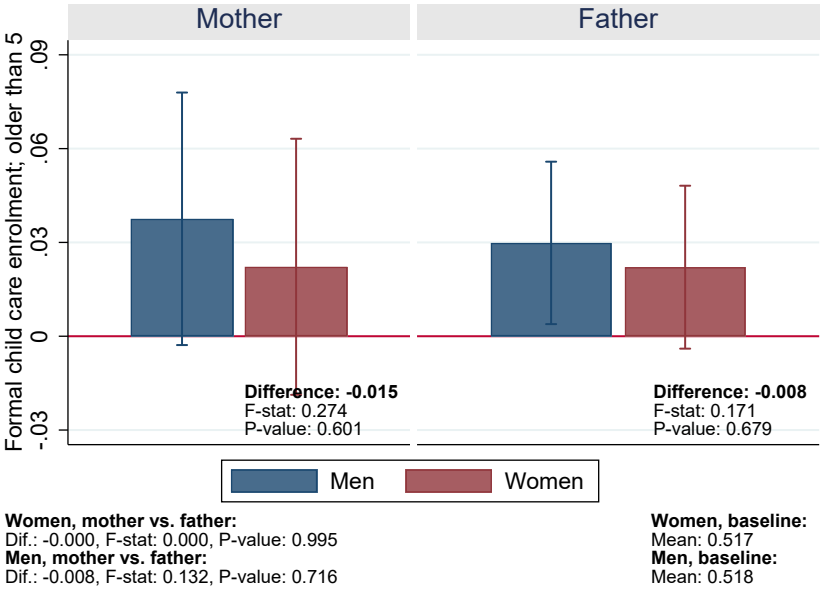
Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's earnings, but where the sampled is divided depending on whether individuals' youngest child is aged 5 or younger, or 6 to 14 years. Earnings are indexed by the average earnings of men and women one year before parental death. The sample consists of all unexpected, first parental deaths from 1985 to 2014 if the individual experiencing parental loss has a child aged 14 or younger. Effects are within 5 years after the first parental death. 95%-confidence interval indicated.

Figure B.13: Formal childcare, mothers' vs. fathers' deaths

(a) Formal childcare under age 5

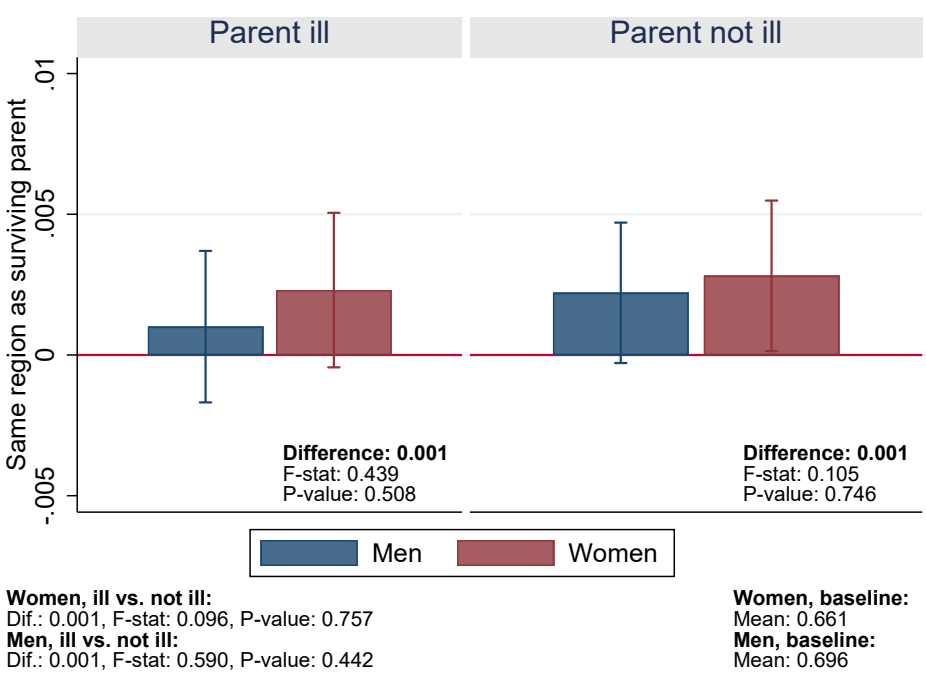


(b) Formal childcare above age 5



Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's uptake of formal childcare. The data on formal childcare have low coverage before 2005, so we only include data from 2005-2019. Effects are within 5 years after the first parental death. 95%-confidence interval indicated.

Figure B.14: Same region of residence as surviving parent



Notes: This figure plots the estimated coefficients from Equation 3 for men's and women's living in the same region with surviving parents by parental health status. We use the 11 NUTS3 regions in Denmark for this exercise. Detailed regional data are available from 1985 and hospital data until 2018. Half of the individuals are treated, and the other half are matched controls. Effects are within 5 years after the first parental death. 95%-confidence interval indicated.

B.3 Additional outcomes and robustness checks

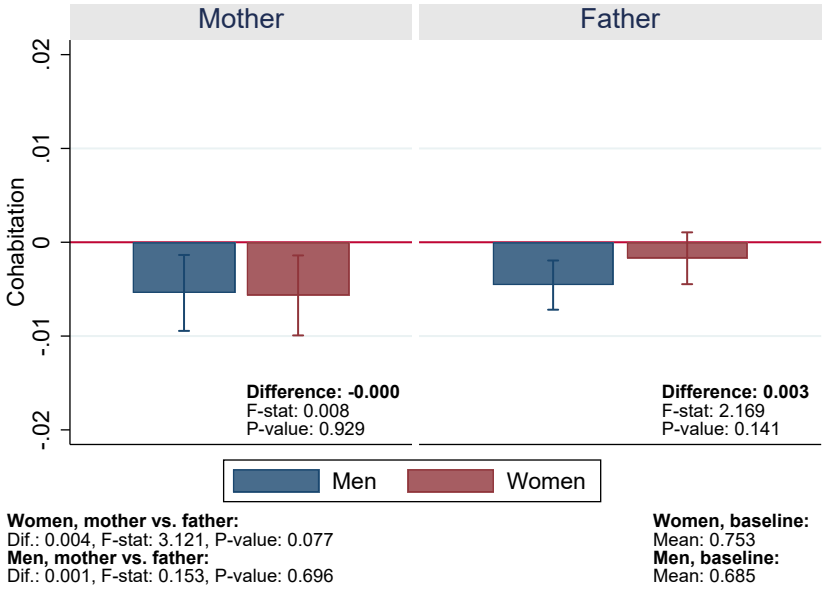
Table B.4: Parental net assets and earnings

	(1)	(2)	(3)	(4)
	First death mother		First death father	
VARIABLES	Men Earnings	Women Earnings	Men Earnings	Women Earnings
Treatment × Parental Wealth	0.001	0.000	0.000	0.002***
	(0.001)	(0.000)	(0.001)	(0.000)
Treatment	-2.084***	-2.549***	-1.419***	-2.238***
	(0.407)	(0.360)	(0.199)	(0.211)
Observations	535,784	482,170	1,870,428	1,649,796
Control mean men	102.3	102.3	102.3	102.3
Control mean women	103.4	103.4	103.4	103.4

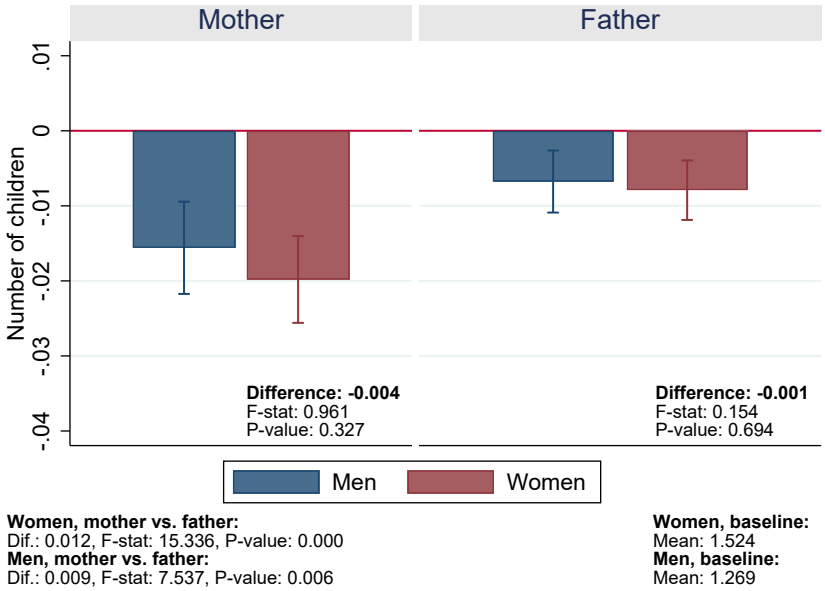
Notes: This table shows the interaction effect of parental wealth and parental death on adult children's earnings by gender. The first two columns show the effect after mothers' death and the last two columns show the effect after fathers' death. Parental wealth includes savings, stocks, etc., as well as the value of any properties owned net of the debt in the property. The value of assets is inflated to 2020 levels.

Figure B.15: Cohabitation and Fertility, mothers' vs. fathers' deaths

(a) Cohabitation



(b) Fertility



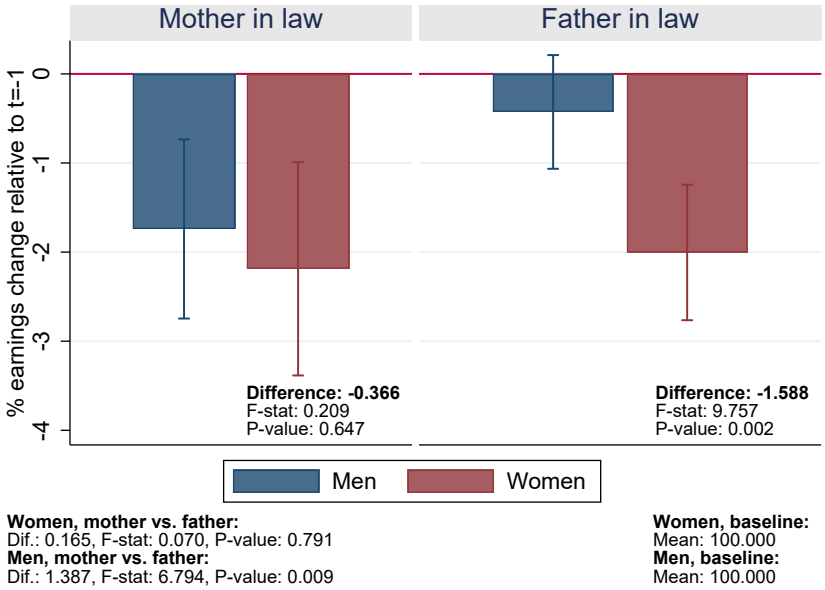
Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's cohabitation rates and the number of children. The sample consists of all unexpected, first parental deaths from 1985 to 2014 and their matched controls. See Table B.2 for details on the sample. Effects are within 5 years after the first parental death. 95%-confidence interval indicated.

Table B.5: Firm, sector, and occupation

	(1)	(2)	(3)	(4)	(5)	(6)
	Occ. switch		Firm-to-firm trans.		Public sector if employ.	
VARIABLES	Men	Women	Men	Women	Men	Women
Treatment	0.000523	-0.000618	0.000809	-0.000893	-0.00185*	0.00162
	(0.00114)	(0.00120)	(0.000922)	(0.000911)	(0.00108)	(0.00147)
Observations	2,246,648	1,984,424	2,406,212	2,131,966	2,011,851	1,781,872
Pre-period mean	0.306	0.308	0.144	0.119	0.204	0.463

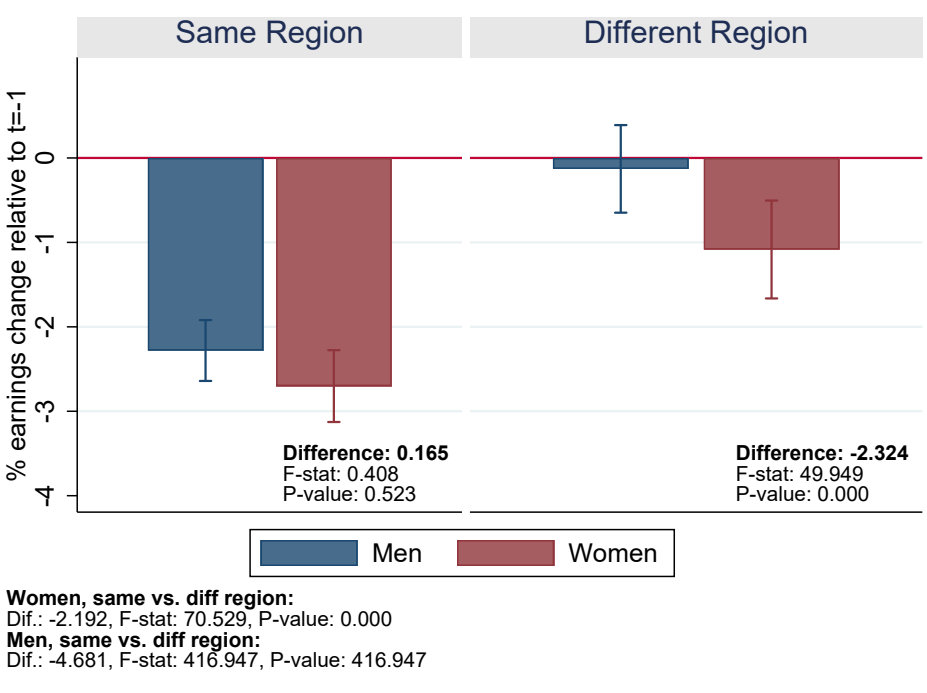
Notes: This table shows the effect of parental death on adult children's job switching behavior by gender. The first two columns show the effect of parental death on whether the treated individual switching to another occupation, the following two columns show the effect on whether the treated individual switching to another firm and the last two columns show the effect on whether the treated individual working in a public sector.

Figure B.16: Effects of parents-in-law death



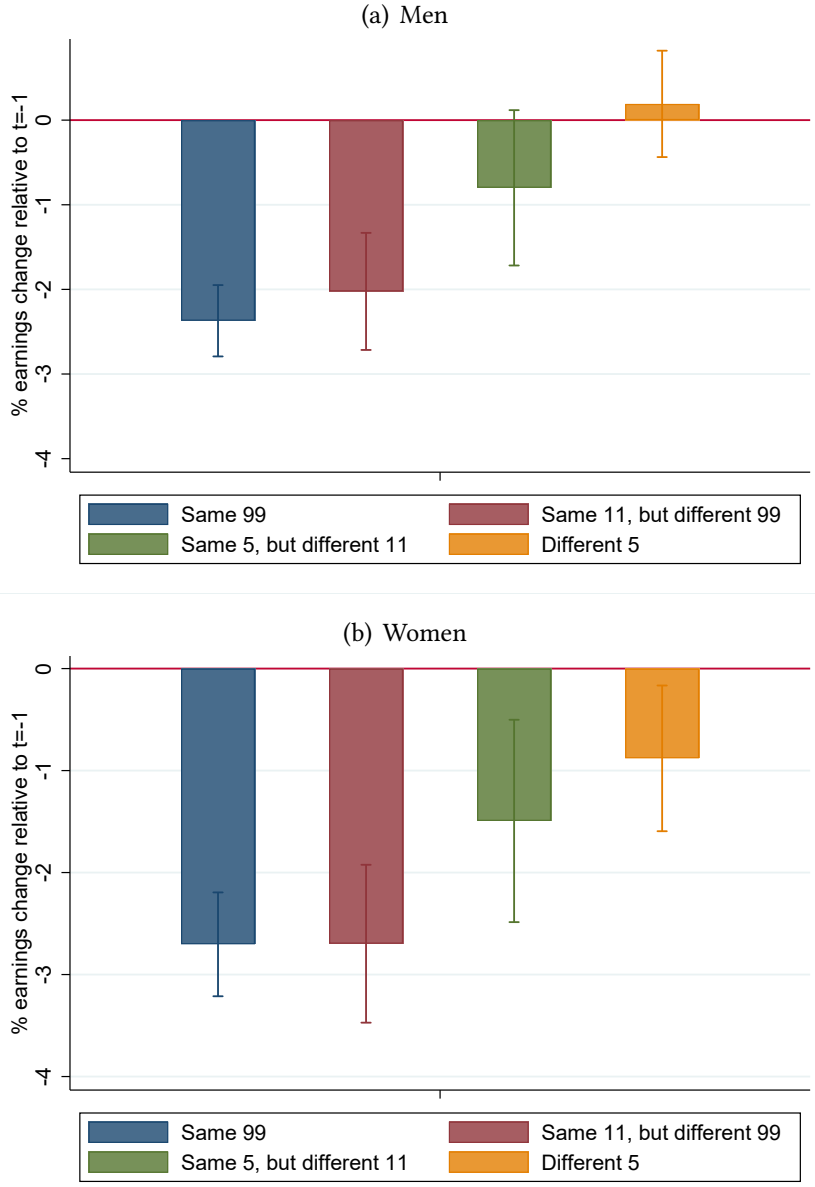
Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's earnings, but considering the death of a parent-in-law instead. The sample is restricted to men and women with young children, i.e., below age 6. Effects are within 5 years after the first parental death. 95%-confidence interval indicated. Standard errors are clustered at the individual-by-match ID level.

Figure B.17: Heterogeneity in treatment effect on earnings by home region



Notes: This figure plots the estimated coefficients from Equation 3 for men's and women's earnings, but where we split the sample depending on whether or not the children live in the same region as their deceased parent. There are 5 regions in Denmark. Earnings are indexed by the average earnings of men and women one year before parental death. Detailed regional data are available from 1985. See Table B.2 for details on the sample. Effects are within 5 years after the first parental death. 95%-confidence interval indicated.

Figure B.18: Heterogeneity in treatment effect on earnings by regional proximity to parents



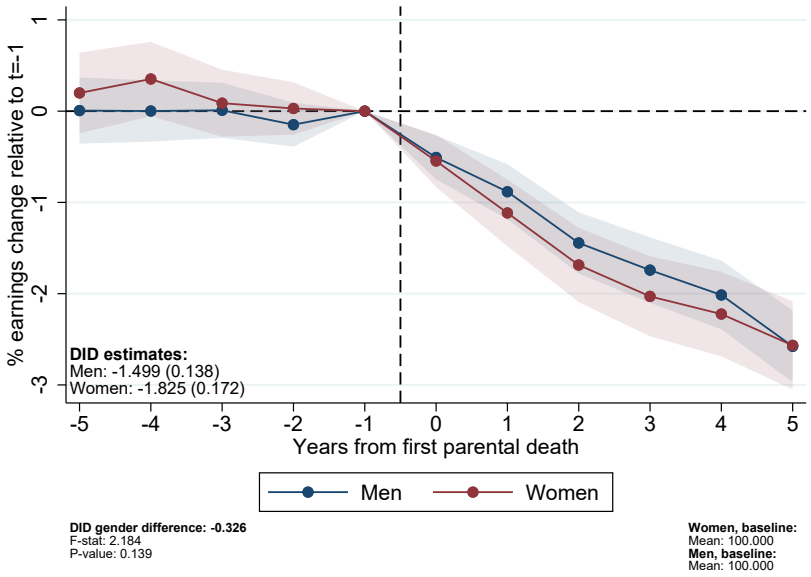
Notes: This figure plots the estimated coefficients from Equation 3 for men's and women's earnings, but where we split the sample depending on children's regional proximity to their deceased parent. We create an intensive measure of distance, that is whether parents and adult children live in the: 1) same municipality (**99** regions), 2) same NUTS3 region (but not same municipality; there are **11** NUTS3 regions in Denmark), 3) same NUTS2 region (but not same NUTS3 region; there are **5** NUTS2 regions in Denmark), 4) further distance than that. This approach gives us four levels of distance, increasing from the left to the right in the figure. Detailed regional data are available from 1985. See Table B.2 for details on the sample. Effects are within 5 years after the first parental death. 95%-confidence interval indicated.

Table B.6: Heterogeneity in treatment effect

Dependent variable: Indexed earnings, % change relative to t=-1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Men	Women	Men	Women	Men	Women	Men	Women
Treat., heart	-1.666***	-2.025***						
	(0.162)	(0.187)						
Treat., stroke	-0.924***	-2.136***						
	(0.243)	(0.288)						
Treat., respiratory	-1.587	-0.196						
	(2.122)	(2.153)						
Treat., accident	-1.849***	-1.950***						
	(0.407)	(0.473)						
Treat., parent $\leq$ 70 years			-2.139***	-2.520***				
			(0.183)	(0.215)				
Treat., parent $>$ 70 years			-0.865***	-1.533***				
			(0.183)	(0.209)				
Treat., child $\leq$ 38 years					-1.749***	-2.180***		
					(0.189)	(0.223)		
Treat., child $>$ 38 years					-1.259***	-1.888***		
					(0.190)	(0.216)		
Treat., death years 1985-1994							-1.472***	-1.842***
							(0.227)	(0.254)
Treat., death years 1995-2004							-1.166***	-1.696***
							(0.200)	(0.238)
Treat., death years 2005-2014							-2.072***	-2.701***
							(0.255)	(0.289)
Observations	2,406,212	2,131,966	2,406,212	2,131,966	2,406,212	2,131,966	2,406,212	2,131,966
R-squared	0.775	0.778	0.775	0.778	0.775	0.778	0.775	0.778

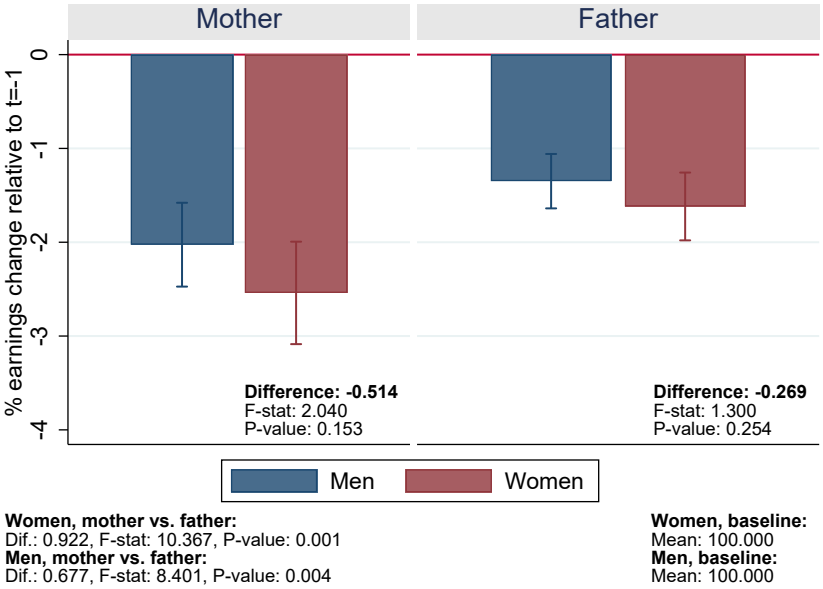
Notes: This table shows heterogeneity in treatment effect by parental cause of death, by age of death parents, by age of children, and by time periods. Earnings are indexed by the average earnings of men and women one year before parental death. The sample consists of all unexpected, first parental deaths from 1985 to 2014 and their matched controls for children aged 25-50 in the year of first parental death and with two known parents. See Table B.2 for details on the sample. Effects are within 5 years after the first parental death. Standard errors clustered at the individual-by-match ID level in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Figure B.19: Alternatively specification: Earnings



Notes: This figure plots the estimated coefficients from Equation 2 for men's and women's earnings. Earnings are indexed by the average earnings of men and women one year before parental death. To construct an alternative control group, we follow Fadlon and Nielsen (2021) and use individuals who are treated 6 years later as controls for those treated in any given year. The average effects are within 5 years after the first parental death. 95%-confidence interval indicated. Standard errors are clustered at the individual level in parentheses.

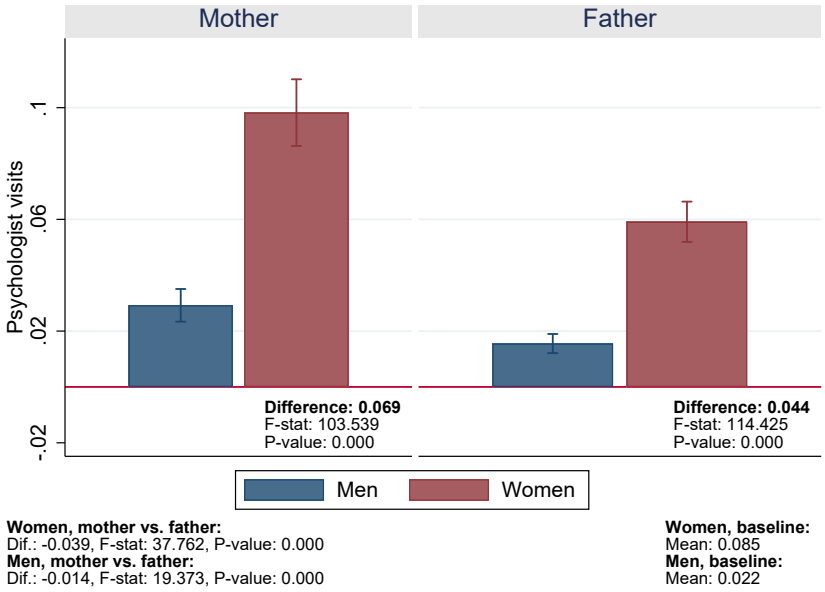
Figure B.20: Alternatively specification: Earnings, mothers' vs. fathers' deaths



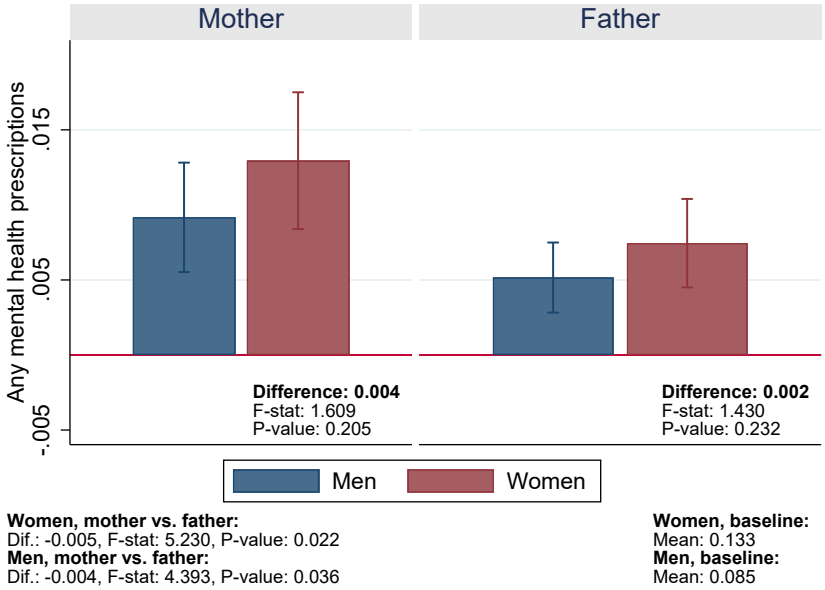
Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's earnings. Earnings are indexed by the average earnings of men and women one year before parental death. To construct an alternative control group, we follow Fadlon and Nielsen (2021) and use individuals who are treated 6 years later as controls for those treated in any given year. The average effects are within 5 years after the first parental death. 95%-confidence interval indicated. Standard errors are clustered at the individual level in parentheses.

Figure B.21: Alternatively specification: Psychologist visits and prescriptions

(a) Psychologist visits



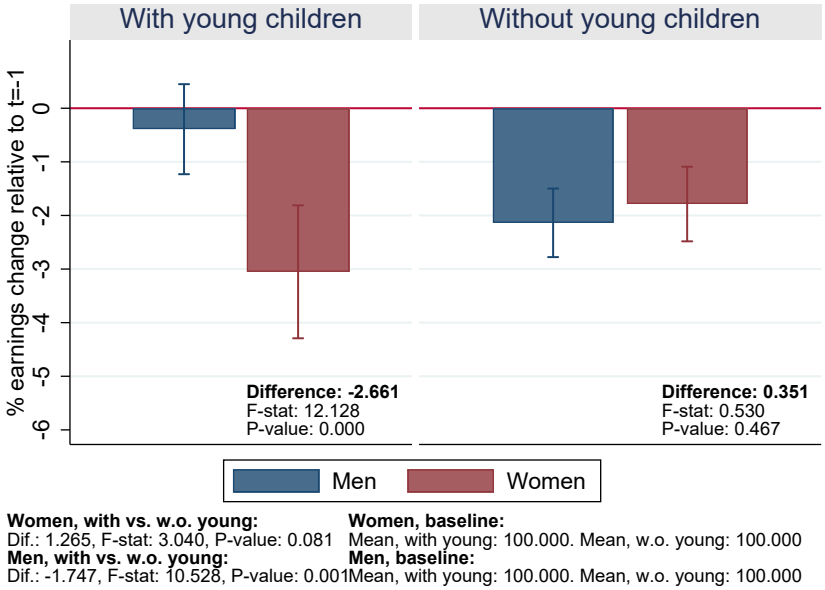
(b) Any mental health prescriptions



Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's number of psychologist visits and any mental health prescriptions. To construct an alternative control group, we follow Fadlon and Nielsen (2021) and use individuals who are treated 6 years later as controls for those treated in any given year. Average effects are within 5 years after the first parental death. 95%-confidence interval indicated. Standard errors clustered at the individual level in parentheses.

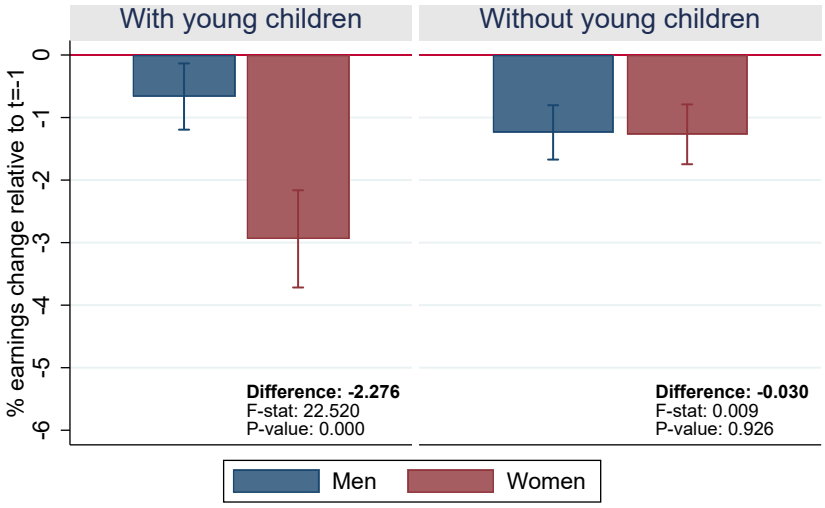
Figure B.22: Alternatively specification: Without or without young children

(a) Mother's death



Women, with vs. w.o. young:
Dif.: 1.265, F-stat: 3.040, P-value: 0.081
Men, with vs. w.o. young:
Dif.: -1.747, F-stat: 10.528, P-value: 0.001
Women, baseline:
Mean, with young: 100.000. Mean, w.o. young: 100.000
Men, baseline:
Mean, with young: 100.000. Mean, w.o. young: 100.000

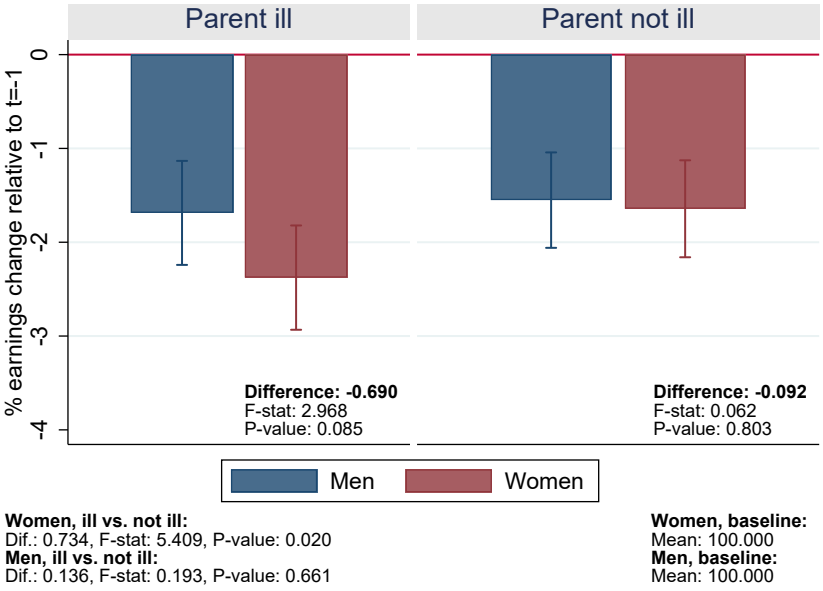
(b) Father's death



Women, with vs. w.o. young:
Dif.: 1.672, F-stat: 12.906, P-value: 0.000
Men, with vs. w.o. young:
Dif.: -0.573, F-stat: 2.693, P-value: 0.101
Women, baseline:
Mean, with young: 100.000. Mean, w.o. young: 100.000
Men, baseline:
Mean, with young: 100.000. Mean, w.o. young: 100.000

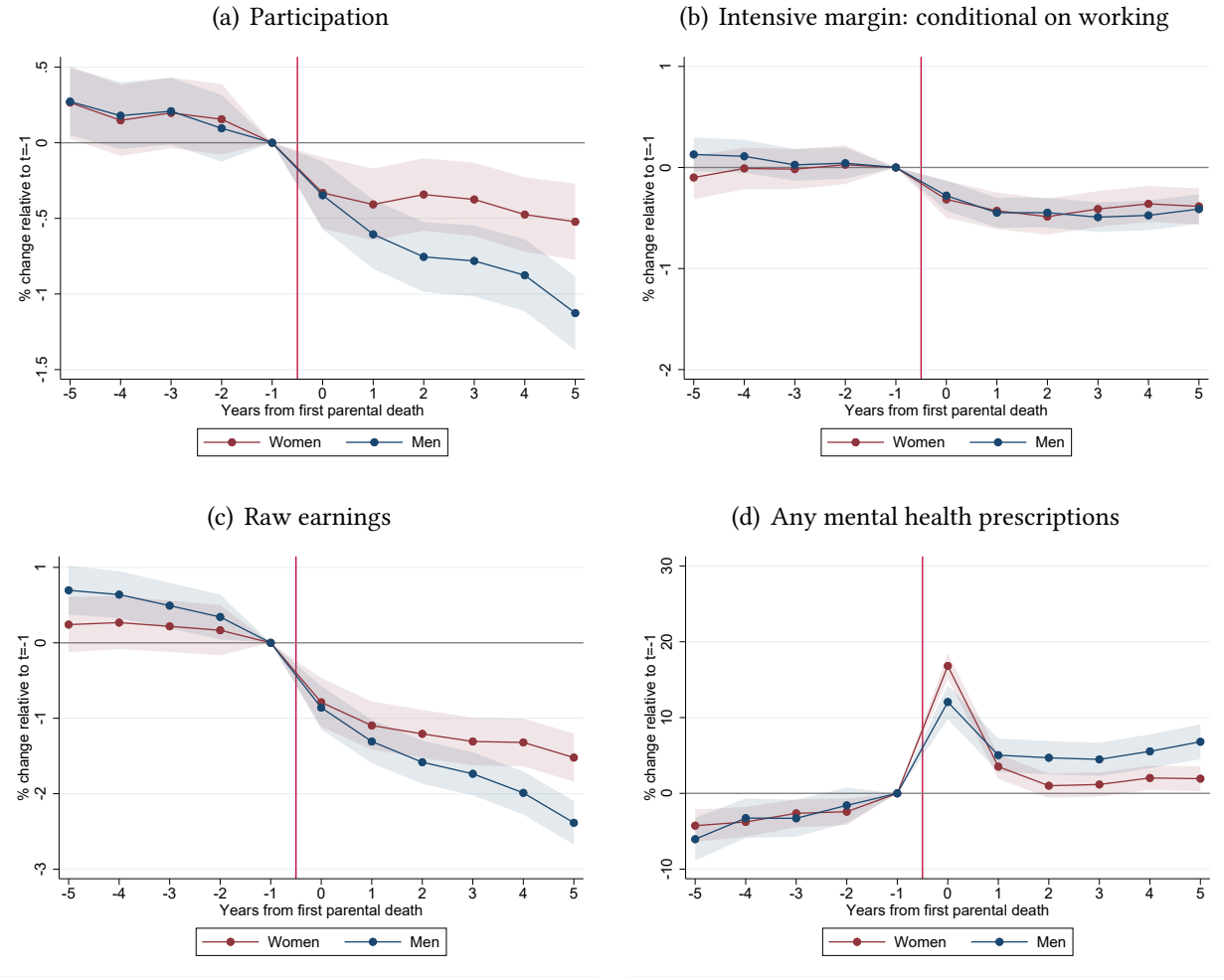
Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's earnings by with or without young children. To construct an alternative control group, we follow Fadlon and Nielsen (2021) and use individuals who are treated 6 years later as controls for those treated in any given year. Average effects are within 5 years after the first parental death. 95%-confidence interval indicated. Standard errors clustered at the individual level in parentheses.

Figure B.23: Alternatively specification: Surviving parent ill or not



Notes: This figure plots the estimated coefficients from Equation 4 for men's and women's earnings by surviving parents ill or not. To construct an alternative control group, we follow Fadlon and Nielsen (2021) and use individuals who are treated 6 years later as controls for those treated in any given year. Average effects are within 5 years after the first parental death. 95%-confidence interval indicated. Standard errors clustered at the individual level in parentheses.

Figure B.24: Descriptives: Effect of non-sudden parental death



Notes: This figure plots the estimated coefficients from Equation 1 for men's and women's labor market outcomes and if using any mental health prescriptions, but focusing on **non-sudden** deaths only. We follow Kleven *et al.* (2019, p. 188) and convert the estimated coefficients into percentage change relative to the baseline. Participation is measured as strictly positive ATP contributions. The intensive margin is based on ATP contributions, similar to Kleven *et al.* (2019). ATP-pension contributions are paid proportionally to hours worked. Earnings are inflated to 2020 levels and include earnings from both employment and self-employment. The sample consists of all non-sudden, first parental deaths from 1985 to 2014 for children aged 25-50 in the year of first parental death and with two known parents. The prescription data are available from 1995. 95%-confidence intervals indicated.