Effects of Parental Death on Youth*

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Abstract

Early-life shocks, such as the loss of a parent, can have lasting effects on inequality and human capital development. We study the effects of parental death during adolescence on both immediate and long-term outcomes, including education, mental health, criminal behavior, teenage pregnancy, and labor market performance. Using four decades of population-wide Danish administrative data and a difference-in-differences design with soon-to-be-treated children as controls, we provide causal evidence that parental death reduces high school graduation rates and tertiary educational enrollment while increasing the uptake of mental health treatment. Behavioral responses to parental death differ by gender: girls show an increased risk of teenage pregnancy, while boys demonstrate a higher likelihood of engaging in criminal activity. These more immediate effects lead to a long-term reduction in annual earnings. We find that living closer to grandparents, higher school quality, and a greater share of female teachers can mitigate some of these negative effects.

JEL classifications: D64, J10, J16
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"...losing a parent is something like driving through a plate-glass window. You didn't know it was there until it shattered, and then for years to come you're picking up the pieces – down to the last glassy splinter." Saul Bellow (1996) in a letter to Martin Amis who had recently lost his father.

1 Introduction

Losing a parent during childhood is a common experience worldwide. In 2021, 2.9 million U.S. children under the age of 18 – 4.2% of all children – had lost a parent or primary caregiver (Villaveces *et al.*, 2025). Danish administrative data from 1980 to 2020 show that 5% of children lose their first parent before turning 18. Research across various fields highlights the distressing nature of childhood bereavement and its impact on numerous aspects of life, including (but not limited to) mental health, suicide, substance abuse, education, cognitive and non-cognitive skills, and interpersonal relationships (see, e.g., Adda *et al.*, 2011; Gould *et al.*, 2020; Aaskoven *et al.*, 2022; Böckerman *et al.*, 2023; Corak, 2001; Hiyoshi *et al.*, 2022). Understanding the consequences of losing a parent during adolescence is not only critical for affected children, but also provides broader insight into how early-life shocks shape inequality and human capital development.

Parental mortality is markedly higher during a child's teenage years than in early childhood (Figure A1). At the same time, adolescence is a pivotal period for the development of cognitive and socio-emotional skills, the formation of behavioral patterns, and the making of consequential decisions about education, careers, relationships, and peer groups (Cunha and Heckman, 2007). Policy and sociological research further emphasize the critical role of family and school networks in shaping adolescent trajectories (Foster *et al.*, 2017; Rosenfeld *et al.*, 2000). Yet, we still lack a comprehensive understanding of how losing a parent during adolescence influences both immediate and long-term outcomes, as well as the social and environmental factors that may mediate these effects. Understanding these factors is essential for implementing effective policies to mitigate the negative effects of parental death.

In this paper, we examine the effects of parental death during a child's teenage years (ages 12–18) on a range of immediate outcomes and long-term scarring effects, including academic performance, mental health, criminal behavior, teenage pregnancy, and labor market outcomes. We analyze heterogeneity in these effects by cause of parental death, parent-child gender combinations, family socioeconomic status, and household relationship status. Additionally, we investigate whether proximity to grandparents, the presence of older siblings, school quality, and the gender composition of teachers mitigate these adverse impacts.

The primary challenge in identifying the impacts of parental death on children's outcomes lies in the non-random nature of such events. Many observable and unobservable factors may simultaneously influence both the likelihood of parental death and children's outcomes, potentially biasing the estimates. We leverage four decades of population-wide Danish administrative data

and a difference-in-differences design to identify the causal effect of parental death on multiple youth outcomes. Specifically, we restrict our sample to individuals who lost a parent early in life and exploit variation in the timing of that loss to estimate its immediate and long-run impacts. Following Fadlon and Nielsen (2021), we use children who will experience parental loss slightly later in life, the "soon-to-be-treated," as our control group. We compare outcomes measured in the same calendar year of children born in the same cohort, where one lost a parent at age a (treatment) and the other lost a parent at age $a + 5$ (control). The treatment and control groups are comparable in their individual and family characteristics prior to parental death and thus differ only in the timing of the loss.

Using this identification strategy, we examine both the short- and long-run effects of losing a parent during adolescence. In the short run, we first find that losing a parent during adolescence significantly affects children's educational attainment. Specifically, losing a parent between the ages of 12 and 18 reduces high school graduation rates by 1.46 percentage points (pp) and college/university enrollment by 0.72 pp at age 20, which represent 3.75% and 6.37% relative to the baseline means, respectively. In addition, it decreases the likelihood of the affected child being enrolled in school by 1.55 pp within four years of the parent's death.

Second, turning to short-run effects on mental health and behavior, children who experience parental death during adolescence show an approximately 0.8 pp increase in the use of mental health prescriptions in the year of the loss – a 30% increase relative to the baseline. This effect persists, remaining 0.5 pp higher than the control group even four years after the parent's death. Affected children are also more likely to engage in criminal behavior, with the probability of being charged with a crime increasing by 0.41 pp (a 20% rise relative to the baseline) within four years. This effect is primarily driven by boys. In contrast, the likelihood of teenage fertility increases by 0.12 pp – equivalent to a 114.28% rise relative to the control group mean – and is specifically driven by girls.

We find that these short-run effects lead to long-run scarring effects: there are persistent negative effects of experiencing parental death in adolescence on children's education, mental health, criminal behavior, and labor market outcomes at age 35, i.e. more than 10 years after experiencing parental loss. Specifically, individuals who experienced parental death during adolescence have 0.05 fewer years of education (0.34% relative to the control group mean), remain 0.47 pp more likely to receive mental health treatment (4.20% relative to the control group mean), and experience 0.48 pp higher rates of criminal charges (2.25% relative to the control group mean), all measured at age 35. Parental loss in adolescence also affects long-term labor market outcomes, as affected children experience a 0.53 pp reduction in labor force participation and annual income losses of 3,871 DKK, approximately 1.26% relative to the control group earnings at age 35.

To better understand the underlying dynamics of our results, we further examine the het-

erogeneous effects of parental death by cause of death (cancer vs. sudden death), by the gender interactions of both the deceased parent and the affected child, by household socioeconomic background, and by household structure. We find that adverse effects are more pronounced when the death is sudden, affecting a wide range of short-run and long-run outcomes more severely than non-sudden loss. This pattern likely reflects the different nature of these deaths: while cancer-related deaths often involve a period of illness leading up to death, allowing for potential psychological preparation for the impending loss, sudden deaths are typically unexpected and may generate a more acute emotional shock for children.

When considering parent-child gender interactive effects, we find that: 1) the death of a father leads to significant short-run declines in boys' educational attainment and mental health; 2) the death of a mother has a larger impact on boys' criminal behavior in the short run and on their income in the long run; 3) for girls, the death of a father significantly reduces high school completion rates and worsens mental health and increases the likelihood of teenage pregnancy in the short run; 4) we do not find significant effects of either parent's death on girls' long-run earnings.

Next, we document that the effects of parental death vary across families' socioeconomic backgrounds. We measure socioeconomic status by the deceased parent's education level. We find that the increases in short-run mental health prescriptions and teenage pregnancy, as well as the decline in long-run earnings, are driven entirely by children from families where the deceased parent did not have a college education.

The effects of parental death also vary by household structure. Children from two-biological-parent households who lose one biological parent experience significant deterioration in educational attainment, mental health, criminal behavior, and long-term earnings. The effects are even more pronounced for children who lose a biological parent who was partnered with a non-biological parent of the child. In this group, we observe the largest reductions in student status (3.69 pp) and the highest increases in mental health treatment (1.72 pp) and criminal charges (1.13 pp).

Finally, we examine the role of family and school networks – specifically, proximity to grandparents, the presence of older siblings, school quality, and the gender composition of teachers – in mitigating the negative impact of parental death. We find that children who live close to their grandparents are less adversely affected. Adolescents without nearby grandparents experience larger declines in high school completion (3.18 pp) and increases in criminal charges (0.56 pp), while those with nearby grandparents exhibit smaller and statistically insignificant educational disruptions and more modest increases in criminal behavior. Moreover, adolescents without access to nearby grandparents suffer substantial long-term income losses of 59,220 DKK (16.95% relative to the control group mean). In contrast, we find no evidence that the presence of an older

sibling mitigates the negative effects of parental loss.

With respect to school networks, we find that students in higher-quality schools experience larger declines in high school completion following parental death (2.44 pp vs. 1.35 pp in lower-quality schools), while students in lower-quality schools face more negative effects on criminal behavior, teenage fertility, and long-run earnings. We also find evidence that the gender composition of teachers has a differential impact: boys in schools with above-median shares of male teachers and girls in schools with above-median shares of female teachers experience smaller adverse effects of parental death across several outcomes. This suggests that the presence of same-gender teachers may play a mitigating role.

Our paper contributes to several strands of literature. First, our methodology and topic are related to a broader literature examining the effects of losing a family member (spouses, children, parents, etc.) on individual outcomes (Fadlon and Nielsen, 2021; Fadlon *et al.*, 2025; van den Berg *et al.*, 2017; Jensen and Zhang, 2024). We build on the empirical strategy from Fadlon and Nielsen (2021) and apply it to study the effect of parental death on the outcomes of teenagers. While Jensen and Zhang (2024) study the effect of parental death during adulthood on labor market outcomes, we examine the immediate and long-term scarring effects of parental death during adolescence on a range of educational, behavioral, and labor market outcomes.

Second, we add to the research on the effect of parental health shocks and death on children's outcomes (see e.g., Aaskoven *et al.*, 2022; Alam, 2015; Adda *et al.*, 2011; Chen *et al.*, 2009; Corak, 2001; García-Miralles and Gensowski, 2023; Kristiansen, 2021; Aaskoven *et al.*, 2022; De Giorgi *et al.*, 2023; Gould *et al.*, 2020).[1] There are several gaps in the existing literature. Most existing studies focus on childhood aggregate effects (e.g., children below age 18 or 14) and overlook age-specific or adolescent-specific impacts. Prior research also often limits outcomes to cognitive skills, schooling, and mental health measures, whereas parental death can affect behaviors such as criminal activity and teenage pregnancy. Moreover, data limitations in earlier studies also restrict most analyses to short-term effects, leaving gaps in understanding the long-term consequences of parental death. We fill these gaps by studying comprehensive short-run and long-run effects of parental death on teenagers. Finally, existing literature uses several empirical strategies to address the endogeneity of parental death, including matching, sibling fixed effects, sudden parental death shocks, and econometric assumptions about selection bias. Instead, we follow a new literature that uses soon-to-be-treated individuals as controls to identify causal effects (Fadlon and Nielsen, 2021).

Third, we also contribute to the broader child development literature by examining the so-

[1]Outside economics, a wide range of literature also examines the impact of parental health/death shocks on children, e.g., Brent *et al.* (2009); Brewer and Sparkes (2011); Krattenmacher *et al.* (2013); Appel *et al.* (2016); Pham *et al.* (2018); Morris *et al.* (2020), though these studies rarely rely on causal identification.

cioeconomic factors that can mitigate the negative impact of early life shocks on children's development (Almond *et al.*, 2018; Smith, 2015; Almond and Currie, 2011). These works typically study the effects of various childhood shocks – such as parental incarceration (Arteaga, 2023), exposure to welfare cuts (Dustmann *et al.*, 2024), or changes in the social safety net (Bailey *et al.*, 2024) – on children's outcomes with limited discussion of the socioeconomic factors that can mitigate the negative effects of adverse shocks. In this paper, we study the effect of parental death and examine how family and school networks can mitigate the effect of parental death.

Lastly, our analysis is related to the literature that examines the effect of parental divorce on children's outcomes (Johnston *et al.*, 2025; Dasgupta *et al.*, 2025; Corak, 2001; Amato and Sobolewski, 2001; Laird *et al.*, 2020). Our analysis is similar to this literature in terms of the outcomes and mechanisms considered, namely mental health, education, behavior, and career outcomes affected due to parental absence. However, compared to divorce, parental death can be considered a more severe and distressing event. We find our estimates, as expected, to be larger than those found in that literature.

The remainder of this paper is organized as follows. Section 2 describes the institutional context in Denmark. Section 3 presents our data and descriptive statistics. Section 4 outlines our identification strategy. Section 5 presents our main results on short-run and long-run effects. Section 6 shows heterogeneous effects across subgroups. Section 7 examines mitigating factors. Section 8 compares the effects of parental death in adolescence to those on younger children. The last section concludes.

2 Institutional Details

Pertinent to our analysis are the provision and cost of health care for potentially ill parents, the physical and mental health care offered to surviving spouses and children, and the income insurance provided to the spouses and children of deceased family members. We discuss each of these aspects below, followed by a discussion of the educational system in Denmark.

2.1 Health and Mental Care Provision

Denmark's healthcare system is characterized by its universal access and comprehensive coverage. It operates as a tax-funded healthcare system that offers free access to general medical services, including those provided by general practitioners (GPs), specialists, and public hospitals. Denmark's universal health insurance covers nearly all medical expenses, allowing families to receive necessary care without incurring a significant financial burden.[2]

[2]Exceptions include services like dental care, chiropractic treatments, and prescription medications. Prescribed medications involve a co-payment that decreases proportionally with the total amount spent on medications over

For adult mental health, the system employs a stepped-care model, where treatment is tailored to the severity of the condition. Mild cases are primarily managed by GPs and psychologists, while more severe conditions necessitate care from psychiatrists or psychiatric hospitals (Danish Health Authority, 2022; Ly, 2024). The Danish mental health system has specific provisions for children and adolescents. Mental health services for this demographic are delivered through multidisciplinary approaches, including outpatient and inpatient services provided by psychiatric hospitals and private practitioners. In addition, free grief counseling is offered by municipalities, along with support groups for bereaved children that are often organized through schools or local organizations.

As discussed in Lytje (2018), in the 1990s, the Danish Cancer Society developed a standardized approach for how schools should respond when a student experiences bereavement. The system allows schools to create customized bereavement response plans (b-plans) from a template, adapting them to each school's specific context. In 2018, nearly all Danish schools (98%) had their own b-plan. These plans typically outline who contacts bereaved families, who needs to be informed about the loss, and how to communicate with other students.

In 2020, the Danish government recognized that mental health and social care services were hindered by a lack of coordination and cooperation, insufficient quality, inadequate interventions, and a lack of prevention and early intervention for those with mental health issues. In response, they allocated substantial resources to mental health care and implemented a 10-year plan aimed at reducing waiting times and enhancing service quality. Acknowledging the unique needs of adolescents, this plan emphasizes holistic and integrated care models that span education, social services, and health sectors (Danish Health Authority, 2022).

2.2 Income Insurance and Child Benefits

Fadlon and Nielsen (2021) offer a detailed overview of Denmark's income insurance systems, which we summarize here. Income insurance mechanisms relevant to spousal death in Denmark include Social Disability Insurance (Social DI), employer-based insurance policies, and private life insurance. Social DI provides permanent, non-earnings-based benefits to surviving spouses who cannot maintain their standard of living independently after their partner's death, available until they transition to old-age pensions. Employer-based insurance policies, frequently integrated into collective labor agreements, may include life insurance components that offer benefits to surviving spouses. However, these policies are often limited in scope and are more prevalent among workers in unionized sectors. Private life insurance also plays a role but is constrained

the course of a year. Once an annual expenditure threshold is reached (of about $750 in 2024), medications become free of charge. Medications administered in hospitals are provided to patients at no cost, see Jensen and Zhang (2024) for details.

by health screenings. A notable gap in Denmark's system is the absence of a universal survivor's insurance program, which leaves many surviving spouses vulnerable to financial shocks. As discussed in Fadlon and Nielsen (2021), in the absence of comprehensive coverage, survivors often rely on informal mechanisms such as increasing their labor supply or drawing on savings to mitigate the financial impact of spousal death.

Although income insurance for surviving spouses is limited, surviving spouses with children receive financial assistance through the Danish state's provision of additional child benefits for both single parents and children who have lost a parent before the age of 18. In 2025, the additional quarterly child benefits for lone caregivers of children amount to DKK 1,666 per child, plus DKK 1,698 per quarter paid regardless of the number of children. For children with deceased parent(s), the government provides additional child benefits of DKK 4,809 per quarter per deceased parent, or about $2600 per year.[3] The additional child benefits are universal, i.e. paid independent of income and region of residence; they cease in the quarter following a child's 18th birthday. In addition, lone caregivers of children qualify for an additional tax credit if employed (similar to the US EITC for single parents).[4]

2.3 Education

In Denmark, children are required to attend nine years of compulsory schooling, typically from ages 7 to 16. As they approach the end of primary education, Danish students participate in a national exam that helps them determine their next educational step. Students demonstrating academic aptitude can choose to attend a gymnasium for their secondary schooling, which allows them to specialize in subjects like languages, science, or mathematics, effectively preparing them for university studies. Universities are publicly funded and free of charge. The government also offers generous student grants and optional student loans with favorable terms.

On the other hand, students may choose to attend a vocational school instead of a gymnasium, where they can learn skills such as mechanics and carpentering. Students may also decide to postpone the choice between gymnasium and trade school for a year by enrolling in an efterskole (after school). See e.g. Antikainen (2006) for more details on the Danish education system.

As pointed out by Aaskoven *et al.* (2022), the effects of parental death in Denmark are likely to be a lower bound compared to countries in which education and healthcare are predominantly private and/or where the social safety net is less comprehensive.

[3] See https://www.borger.dk/familie-og-boern/familieydelser-oversigt/boernetilskud for details. All child benefits are excempt from income taxation.

[4] See https://skat.dk/borger/fradrag/arbejdsrelaterede-fradrag/beskaeftigelses-og-jobfradrag for details.

2.4 Youth Crime

In Denmark, the age of criminal responsibility is 15, meaning individuals below this age cannot be formally prosecuted or imprisoned for criminal offenses.[5] Prior to turning 15, Danish minors are exempt from judicial proceedings related to criminal acts. Although the police may temporarily detain a child for questioning, this is limited to a maximum of six hours and must be carried out in the presence of a social worker. No formal judgment of criminal guilt is made, regardless of the nature of the offense (Landersø *et al.*, 2017).

From age 15 onward, adolescents are held fully accountable under the criminal law. They can be tried in the standard court system and sentenced accordingly, although incarceration typically occurs in facilities separate from those housing adults (Dustmann and Landersø, 2021). The juvenile justice system in Denmark, however, emphasizes preventive and rehabilitative strategies rather than punitive measures. A key institutional feature is the SSP framework – a coordinated effort among schools, social services, and police – to prevent youth delinquency. This network operates at the municipal level and focuses on early intervention, information sharing, and joint casework to address risk factors among vulnerable youths (Landersø *et al.*, 2017).

Criminal behavior among adolescents is typically recorded through formal charges or court convictions, rather than arrests, which are rare in Denmark. Data on charge rates over time indicate that patterns of youth criminality by age closely mirror those observed in arrest statistics from countries like the United States (Dustmann and Landersø, 2021).

3 Data and Descriptive Analysis

3.1 Data

We leverage Denmark's comprehensive population-level administrative data to examine the impact of parental death during adolescence on a broad array of economic and behavioral outcomes. From 1970 onward, we observe individual death records, including the exact date of each parent's death. All the relevant datasets can be linked using unique personal identifiers. As such, information on parental death can be linked to a large set of child outcomes, including educational attainment, mental health, criminal behavior, fertility, as well as employment and earnings. We use these data to follow the trajectories of children around parental death. The extensive child-parent linkages and longitudinal coverage of the entire population since 1980 provide an ideal

[5] A notable exception occurred between July 2010 and March 2012, when the age of criminal responsibility was temporarily lowered to 14 Damm *et al.* (2025). This threshold is relatively high in a global context: for example, children can be held criminally liable from the age of 10 in England, and in several U.S. states, the minimum age falls between 6 and 12 years (Dustmann and Landersø, 2021; Landersø *et al.*, 2017).

foundation for investigating how adolescent exposure to parental death shapes individual trajectories across multiple domains. Below, we provide details on each data source.

Demographics, Death, and Birth Weight: Starting in 1980, we can observe several demographic data on the entire Danish population (in the FAIN- and BEF-register). These include birthdays, parent-child links, home address IDs, home regions, etc. The demographic registers also allow us to determine if a person is residing in Denmark. We also observe individuals' birth weights (available in the FTBARN-register for children born in 1973 onwards). Starting already in 1970, we can observe all deaths in Denmark as well as the reason of death (in the DODSAARS/DODSAARG-registers). By using parent-child links from the demographic data, these data allow us to identify each parental death.

Education: Our primary educational outcomes include high school completion and educational attendance/enrollment. Starting in 1980, we observe completed education in the UDDA-register. Data on completed education allow us to determine whether individuals have finished high school by age 20. Since 1995, we can also observe enrollment spells at all relevant educational institutions in Denmark through the KOTRE-register.

Mental Health: The LMDB-register contains records of all fulfilled medical prescriptions starting in 1995. These data include detailed ATC-codes for each prescription, allowing us to separately consider medical prescriptions related to the treatment of psychoses (ATC-codes N05A*), anxiety (ATC-codes N05B*), insomnia (ATC-codes N05C*), depression (ATC-codes N06A*), and psychostimulants (ATC-codes N06B*).[6] We consider both the extensive and intensive margins of mental health treatment; that is, whether a person has received *any* prescription related to these conditions within a given year, as well as the *number* of prescriptions related to these conditions within each year.

Crime: Danish administrative data also provide rich information on criminal behavior through individual-level police records, allowing for analyses of the effects of parental death on adolescent participation in crime. Although partial data on criminal charges are available from 1980, complete data on criminal charges are only available starting in the early 1990s (in the KRSI-register).[7]

[6]Note that prescriptions related to depression (ATC-codes N06A*) include the widely used selective serotonin re-uptake inhibitors – in addition to the treatment of depression, these are also used to treat e.g. generalized anxiety disorder.

[7]From 1991 to 1992 the structure of the data on criminal charges changes from having one observation for each combined case in KRSI to having an observation for each relevant sub-case. In addition, the the decision/verdict codes change in KRAF in the early 1990s.

To ensure a consistent time series on criminal behavior, we focus on outcomes from 1995 onward and exclude traffic offenses, as these typically rely on individuals having access to a car and possessing a driver's license. We consider two sets of crime outcomes: 1) all criminal charges, and 2) those charges for which an individual has been found guilty (information on sentences/verdicts/fines are available in the KRAF- and KRKO-registers).

Fertility: We obtain information on the number of children from the FAIN- (1980-1984) and BEF-registers (1985-2020). For each calendar year, we count the number of children born in that year or earlier.

Employment and Income: Employment and income records extend our analysis into adulthood, providing insights into the long-term economic consequences of adolescent parental loss on labor market outcomes. Information on income and employment is available starting in 1980 in the IND- and IDAP-registers, respectively.[8] The income and employment data are utilized both as outcomes when considering the long-term effects of parental death and to characterize household outcomes around parental death.

School Quality: We utilize data on the Danish National Tests Scores provided by the Ministry of Children and Education. Denmark conducts a comprehensive standardized testing program implemented across public schools. The Danish National Tests consist of ten mandatory tests administered to students in grades 2 through 8, covering subjects including reading (administered every second year starting from grade 2), mathematics (in grades 3 and 6), and subject-specific assessments in English, geography, biology, and physics/chemistry in grades 7 and 8. We use test scores from academic year 2012/2013 through 2019/2020. The tests are administered online and are self-scoring, eliminating potential teacher bias in evaluation. See Beuchert and Nandrup (2018) for a comprehensive discussion of this data.

In order to define a school quality measure, we follow several steps. First, we standardize test scores within year, subject, grade level, and domain (e.g. we standardize within the domain of language comprehension in the subject of 8th grade reading in 2015). Second, we average these over domains within a subject-grade-year (e.g. calculate the average 8th grade 2015 standardized reading test score as the average across the standardized skills in language comprehension, decoding, and reading comprehension of 8th graders in 2015) and standardize these within grade-subject-year. Third, we calculate the average student score within each school within the period

[8]The IDAP-register also includes a proxy for hours worked, making it possible to consider the intensive margin of labor supply and wages. Hours worked are proxied by ATP-pension payments which are paid by employers proportional to hours worked. This appropriateness of this proxy is discussed in Kleven *et al.* (2019).

of 2012/2013 though 2019/2020 and define high quality schools as those whose average student test score is above the 50th percentile.

School Teacher Gender Composition: From the UUDINST-register, we obtain employer IDs for each school from 2008-2021. Further, we use monthly employment data (from the BFL-register) to calculate hours worked at each school for all teaching staff (2-digit ISCO code equal to 23). We observe each teacher's gender in the demographic register (BEF). This combination of data allow us to we calculate the female share of all teaching hours worked within each school, in each calendar year from 2008 to 2021.

3.2 Summary Statistics and Descriptives

Before outlining our empirical strategy, we first present descriptive facts on the nature of parental death, considering the causes of death, the timing of death, and gender of first deceased parent. Next, we describe the child and family characteristics one year before parental death.

Age of Children at the Time of First Parental Death: In Figure A1, we show the cumulative probability of experiencing parental death by child age. By age 18, approximately 5% of children have experienced their first parental death, with the steepest increases occurring during adolescence – a sensitive and critical period for cognitive and non-cognitive skill formation and life-changing decisions (see, e.g., Cunha and Heckman, 2007).

Next, in Figure A2, we zoom in on the causes of parental death in adolescence. While the fraction of parental deaths due to cancers is steadily increasing from age 12 to 18, the fraction of sudden deaths reduces slightly. Figure A3 further shows the causes of parental death by gender. Specifically, the first parental death is more likely to be paternal death (68% vs. 32%). Fathers are more likely to die from sudden and other reasons, while mothers are more likely to die from cancers.

Child and Family Characteristics: In Table 1, we provide an overview of the baseline characteristics of our treatment group compared to the general adolescent population. We compare children who subsequently experience their first parental death during adolescence (ages 12-18) in Column 1 to all teenagers aged 12-18 with both parents alive, using 2012 as a reference year in Column 2.

Panel A considers children's characteristics measured prior to parental death. We see that the treatment group has a similar age and gender composition (51% male). Children who will experience parental death during adolescence have completed slightly more years of education (9.51 vs. 9.14 years) and show lower mental health treatment utilization (3% vs. 4%) at baseline. However,

Table 1: Summary Statistics

	(1) Treatment	(2) Teenagers (12-18) with both parents alive in 2012	(3) p-value
Panel A: Children's Characteristics			
Male	0.5108	0.5131	0.2852
Age	14.4371	15.0293	0.0000
Years of Education	9.5120	9.1437	0.0000
Any Mental Health	0.0258	0.0389	0.0000
Any Charge	0.0215	0.0138	0.0000
Any Guilty	0.0176	0.0116	0.0000
Number of Siblings	1.5846	1.6170	0.0000
Birth Weight (kg)	3.2617	3.4935	0.0000
Standardized Test Score	-0.2411	-0.0025	0.0000
Panel B: Parental Characteristics			
Father's Age	48.2127	47.2048	0.0000
Mother's Age	43.6702	44.5148	0.0000
Father's College	0.1734	0.3178	0.0000
Mother's College	0.2148	0.3906	0.0000
Father's Employment	0.5945	0.7952	0.0000
Mother's Employment	0.6545	0.8029	0.0000
Father's Income (K)	257.5193	443.1412	0.0000
Mother's Income (K)	182.7575	301.2894	0.0000
Household Income (K)	585.8068	812.7716	0.0000
Number of Observations	61,759	482,894	544,653

Notes: This table presents summary statistics comparing children who experienced parental death during adolescence (Column 1) with all teenagers aged 12-18 who had both parents alive, using 2012 as a reference year for comparison (Column 2). Panel A reports children's characteristics and Panel B presents parental characteristics. P-values are reported for t-tests comparing differences in means between the two groups. For treatment group, characteristics are measured one year prior to parental death.

they exhibit higher rates of criminal involvement, with 2% having any charges compared to 1% in the comparison group. They also have significantly lower birth weights (3.26 kg vs. 3.49 kg) and lower standardized school test scores (-0.24 vs. -0.17), suggesting some pre-existing differences in health and academic performance.

Panel B shows some differences in parental characteristics between the two groups as well. While fathers in the treatment group are slightly older (48.21 vs. 47.20 years), mothers are slightly younger (43.67 vs. 44.51 years). Parents in families experiencing adolescent parental death are substantially less educated, with only 17% of fathers holding college degrees compared to 32% in the comparison group, and 21% vs. 39% of mothers, respectively. Employment rates are significantly lower for both fathers (59% vs. 80%) and mothers (65% vs. 80%). These employment disparities translate into large income gaps: fathers earn on average 257.52K DKK vs. 443.14K DKK, mothers earn 182.76K vs. 301.29K DKK, and total household income is substantially lower (585.81K vs. 812.77K DKK). These systematic baseline differences highlight the socioeconomic disadvantages that characterize families at risk of parental death. Our identification strategy, which uses soon-to-be-treated individuals as a control group, aims to address these selection concerns.

4 Empirical Strategy

It is challenging to estimate the causal effect of parental death during adolescence on subsequent outcomes. Both observable and unobservable factors, such as socioeconomic status, parental health status, and parenting practices, can simultaneously influence both the probability of parental death and children's outcomes, potentially biasing estimates. The existing literature usually adopts propensity score matching, sibling fixed effects, considers only sudden parental health shocks, or imposes some structure on the bias in order to estimate the effect of parental death (Gertler *et al.*, 2004; Chen *et al.*, 2009; Kalil *et al.*, 2016; Glaser and Pruckner, 2023; De Giorgi *et al.*, 2023; Adda *et al.*, 2011). While these empirical strategies may address endogeneity concerns to some degree, they introduce additional interpretive challenges. Matching can only control for observable differences between treatment and control groups; sibling fixed effects restrict the sample to families with multiple children and may suffer from spillover effects; focusing on sudden parental death yields smaller samples and captures only one potentially heterogeneous type of effect; and econometric assumptions about selection bias make interpretation sensitive to the imposed model structure.

We avoid the above issues and estimate causal effects by constructing counterfactuals using soon-to-be-treated individuals in a similar manner as Fadlon and Nielsen (2021). Specifically, we compare affected adolescents to peers of the same gender from the same birth cohort who also

experienced the death of a parent of the same gender and from the same causes of death, but at Δ years later. If we believe that the timing of parental death within narrowly defined temporal windows is exogenous, a direct comparison of treated to soon-to-be-treated individuals, with year fixed effects, will yield the causal effects of parental death. We proceed more conservatively by additionally controlling for cause of death, gender of deceased parent, gender of affected children, and birth year of affected children, and in some exercises, following various difference-in-differences strategies.[9]

Table 2: Balance Test

	(1) Treatment	(2) Control	(3) p-value	(4) SMD
Panel A: Children's Characteristics				
Male	0.5108	0.5141	0.2093	0.0066
Age	14.4371	14.3949	0.0000	0.0214
Years of Education	9.5120	9.4998	0.2844	0.0113
Any Mental Health	0.0258	0.0227	0.0085	0.0201
Any Charge	0.0215	0.0206	0.4396	0.0063
Any Guilty	0.0176	0.0171	0.6360	0.0038
Number of Siblings	1.5846	1.5893	0.4521	0.0039
Birth Weight	3.2617	3.2787	0.0001	0.0254
Standardized Test Score	-0.2411	-0.1833	0.0221	0.0550
Panel B: Parental Characteristics				
Father's Age	48.2127	47.8817	0.0000	0.0419
Mother's Age	43.6702	43.5122	0.0000	0.0264
Father's College	0.1734	0.1764	0.1273	0.0079
Mother's College	0.2148	0.2125	0.2881	0.0056
Father's Employment	0.5945	0.6572	0.0000	0.1298
Mother's Employment	0.6545	0.6877	0.0000	0.0707
Father's Income	257.5193	286.2399	0.0000	0.0767
Mother's Income	182.7575	194.3006	0.0000	0.0669
Household Income	585.8068	602.8336	0.0000	0.0390
Number of Observations	61,759	90,676	152,435	152,435

Notes: This table presents a comparison of characteristics and baseline outcomes between treatment and control groups one year prior to parental death. The treatment group consists of individuals who experienced parental death during adolescence (ages 12-18), while the control group includes individuals who experienced parental death 5 years later. P-values are reported for t-tests comparing differences in means between the two groups. SMD refers to standardized mean differences.

Formally, the treatment group consists of individuals who experienced the death of a parent between the ages of 12 and 18. The research design forms a control groups of adolescents

[9]We break from Fadlon and Nielsen (2021) here as the group of parents whose death we consider are much younger than the groups considered by them. Although the timing of sudden death can be reasonably considered exogenous, this is less the case with cancer at these young ages.

based on birth cohort, year and causes of of parental death, and gender of both affected children and deceased parents. Incorporating gender into the matching process is essential, as key outcomes – such as educational attainment, labor market participation, and criminal behavior – exhibit pronounced gender-specific dynamics. The choice of Δ reflects an important methodological trade-off: a smaller Δ enhances the comparability of treatment and control groups, while a larger Δ enables identification of longer-run effects, as the estimation framework yields dynamic treatment effects up to $\Delta - 1$ years after treatment. We set $\Delta = 5$ years and present a balance table comparing our treatment and control groups in Table 2 and by causes of death in Table A1. We find that our treatment and control groups are comparable in terms of their own and family characteristics, especially after splitting the sample by causes of death.[10] We also plot the raw means of student status, mental health, criminal behavior, and fertility for the treatment and control groups 3 years before and 7 years after treated children lost their parents in Figure 1. We find parallel pre-trends for all of these variables and a sharp difference in mental health and criminal behavior for the early affected children.[11]

To estimate the causal effect of parental death, we employ two complementary empirical strategies. First, for outcomes measured at fixed ages, we implement a cross-sectional difference framework to recover the impact of parental death. These include educational attainment measured at age 20, as well as mental health, criminal behavior, fertility, and labor market outcomes measured at age 35. Specifically, we estimate the following regression:

$$Y_{i,t} = \beta_0 + \beta_1 \cdot D_i + \mu_t + \mu_{block} + \varepsilon_{i,t} \tag{1}$$

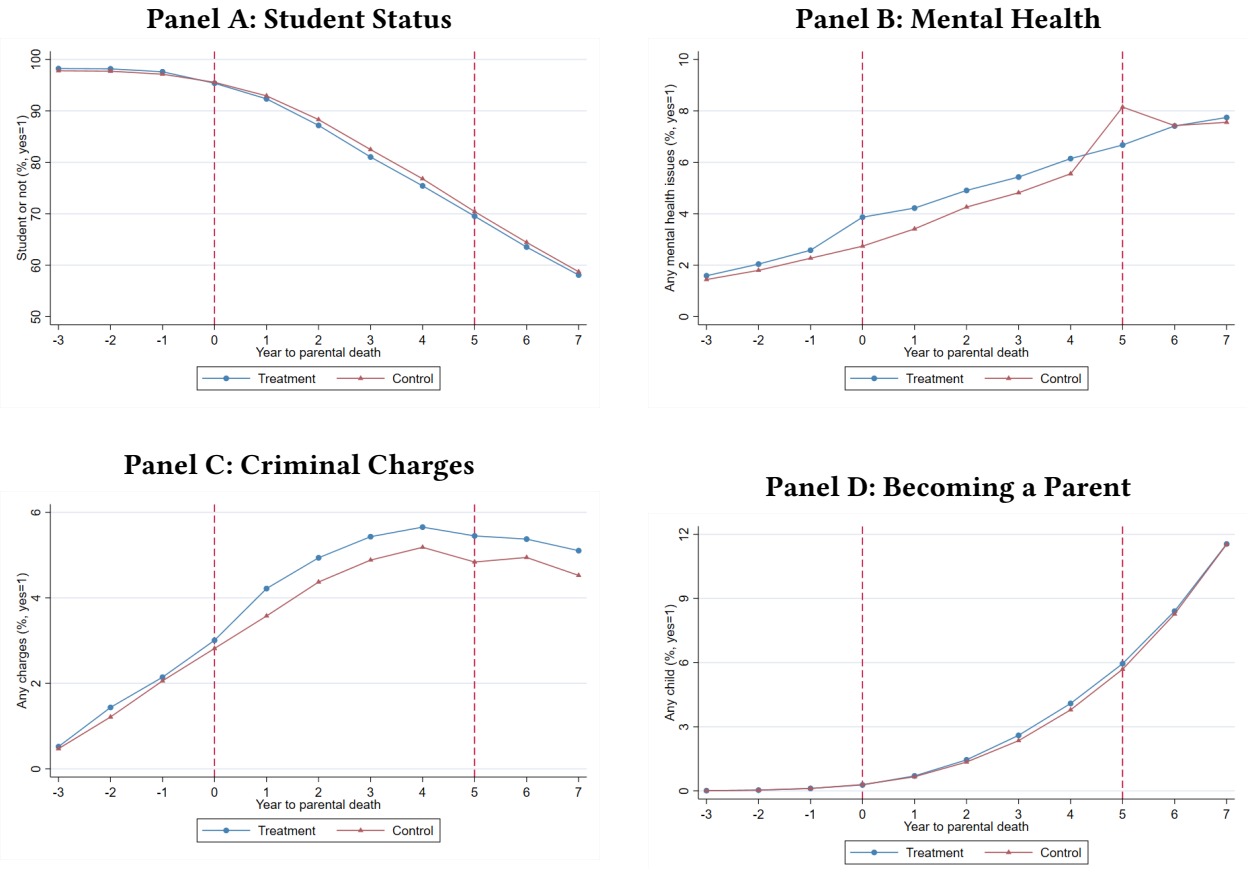
In this specification, $Y_{i,t}$ denotes the outcome of interest for individual i at time t, and D_i is an indicator for whether the individual is in the treatment group, i.e. losing their first parent between age 12-18. The term μ_{block} captures group fixed effects, where blocks are defined by the interaction of birth year, child gender, gender of the deceased parent, and cause of parental death. Calendar year fixed effects are captured by μ_t. The coefficient of interest, β_1, identifies the average effect of parental death on adolescent outcomes, conditional on group and time fixed effects. In some households, multiple adolescents experience parental death, so we cluster standard errors at the household level.

Second, for student status, mental health outcomes, criminal behavior, and teenage fertility, we construct a balanced panel for each individual around the time of parental death for treated individuals and their soon-to-be-treat controls. This approach enables us to estimate a generalized

[10] We see slight level differences in parental employment and income, but our main results are similar if we control for these pre-death differences directly or include individual fixed effects in specifications.

[11] We assess the sensitivity of our results to this choice and find them robust to variations in Δ. Additional details on these robustness checks are provided in Appendix B.

Figure 1: Evolution of Outcomes Before and After Parental Death



Notes: This figure presents the raw means of key outcomes for treatment and control groups around the time of parental death. The x-axis denotes time relative to parental death, where period 0 is when the actual parental death occurs for treatment group; for the control group, period 0 is when a "placebo" event occurs (while their actual parental death occurs in period 5). Panel A shows the effects on student status, Panel B presents mental health treatment utilization, Panel C displays criminal charges, and Panel D examines the probability of becoming a parent.

difference-in-differences model:

$$Y_{i,t,k} = \sum_{j=-3, j\neq -1}^{4} (\beta_j \cdot \mathbb{1}[j = k] \cdot D_i + \gamma_j \cdot \mathbb{1}[j = k]) + Age_{i,t} + \mu_t + \delta_i + \varepsilon_{i,t,k} \tag{2}$$

The notation follows Equation 1, with the addition of individual fixed effects δ_i and age fixed effects $Age_{i,t}$. Here, $Y_{i,t,k}$ denotes the outcome of interest (e.g., whether taking mental health prescriptions) for adolescent i in calendar year t, where the first parental death occurred $k = -3, \ldots, 4$ years relative to year t. The indicator for $k = -1$ (the year before the event) is omitted and serves as the reference category. The coefficients of interest, β_j, capture the effect of parental death relative to the counterfactual trajectory and the omitted baseline year.

In addition, to obtain aggregate estimates of how parental death affects our outcomes of interest, we estimate a standard difference-in-differences model. This approach allows us to estimate the average effect of parental loss within 4 years after parental death. We estimate the following equation:

$$Y_{i,t} = \beta_0 + Post_{i,t} + \beta_1 \cdot D_i \times Post_{i,t} + Age_{i,t} + \mu_t + \delta_i + \varepsilon_{i,t} \tag{3}$$

The specification follows the notation from Equations 1 and 2, and $Post_{i,t}$ is an indicator equal to one in periods following parental death. The sample is restricted to three years before and four years after the event. The coefficient of interest, β_1, captures the average effect of parental death on the outcome of interest relative to their soon-to-be-treated controls.

When analyzing heterogeneous effects and potential mitigating factors, for outcomes measured at fixed ages, we estimate:

$$Y_{i,t} = \beta_0 + \sum_{g\in\mathcal{G}} \gamma_g \cdot \text{Group}_{i,g} + \sum_{g\in\mathcal{G}} \beta_g \cdot D_i \times \text{Group}_{i,g} + \mu_t + \mu_{\text{block}} + \varepsilon_{i,t} \tag{4}$$

For dynamic outcomes analyzed using our difference-in-differences framework, we estimate:

$$Y_{i,t} = \beta_0 + \sum_{g\in\mathcal{G}} \gamma_g \cdot \text{Post}_{i,t} \times \text{Group}_{i,g} + \sum_{g\in\mathcal{G}} \beta_g \cdot D_i \times \text{Post}_{i,t} \times \text{Group}_{i,g} + Age_{i,t} + \mu_t + \delta_i + \varepsilon_{i,t} \tag{5}$$

where $\text{Group}_{i,g}$ represents indicator variables for different subgroups g within each dimension of analysis.

5 Results

In this section, we present our results on the effect of parental death on a range of adolescent outcomes. We begin by presenting the short-run effects on educational and mental health out-

comes, followed by behavioral outcomes, including criminal behavior and teenage fertility. We then examine the long-run effects on labor market outcomes.

5.1 Short-run Outcomes

Education: We begin by analyzing the educational outcomes of children measured at age 20, focusing on four key indicators: (a) a binary variable indicating whether the individual completed academic high school, (b) a binary variable denoting college enrollment, (c) a binary variable for university enrollment, and (d) a binary variable for college and above enrollment, which combines college and university education. We choose age 20 because the vast majority of adolescents have completed their secondary education by this age. The results of these analyses are reported in Table 3. The results using the whole sample (Panel A) indicate that adolescents who experienced parental death exhibit a 1.46 pp reduction (3.75% relative to the control group mean) in the probability of completing academic high school by age 20. Moreover, these individuals are significantly less likely to pursue higher education – by approximately 0.31 pp for college attendance, 0.41 pp for university enrollment, and 0.72 pp (6.37% relative to the control group mean) for college and above enrollment.

Since our educational outcomes are measured at age 20 and our treatment group experiences parental death starting at age 12, different margins (the extensive margin of parental death and the intensive margin of length of exposure to parental death) may affect the results differently. To distinguish between different margins, we stratify our sample by the age at which parental death occurred: ages 12-14 vs. ages 16-18. For adolescents who lose their first parent at ages 16-18, their soon-to-be-treated controls are children who lost their first parent at ages 21-23, whose educational outcomes measured at age 20 should be unaffected by parental death (extensive margin). Whereas for adolescents who lose their first parent at ages 12-14, their soon-to-be-treated controls are children who lost their first parent at ages 17-19, whose educational outcomes measured at age 20 should be affected by parental death but exposed to parental death for different lengths (intensive margin).[12] Using this sample stratification, we find that the adverse effects on high school completion are similar across different margins. However, the negative effects on higher education become more pronounced when parental death occurs during ages 16-18, particularly for university enrollment and overall tertiary education attainment, potentially reflecting the critical importance of this period for college preparation and decision-making, and less time to recover from the immediate shock of experiencing parental death.

Student Status: In addition to examining educational attainment at age 20, we also explore the

[12]We exclude age 15 from both groups because the corresponding control group would experience parental death at age 20, the same age at which we measure educational outcomes, making it difficult to establish a clean margin.

Table 3: Effects of Parental Death on Educational Attainment and Enrollment (at age 20)

	(1) Academic High School	(2) College	(3) University	(4) College and above
Panel A: Whole Sample				
Treatment	-0.0146***	-0.0031**	-0.0041***	-0.0072***
	(0.0029)	(0.0012)	(0.0015)	(0.0018)
Observations	94,089	94,089	94,089	94,089
Baseline mean	0.389	0.0449	0.0679	0.113
Panel B: Younger Cohort (aged 12-14)				
Treatment	-0.0140***	-0.0053**	0.0001	-0.0052
	(0.0051)	(0.0022)	(0.0027)	(0.0033)
Observations	36,669	36,669	36,669	36,669
Baseline mean	0.387	0.0464	0.0640	0.110
Panel C: Older Cohort (aged 16-18)				
Treatment	-0.0143***	-0.0011	-0.0067***	-0.0078**
	(0.0047)	(0.0020)	(0.0024)	(0.0031)
Observations	43,703	43,703	43,703	43,703
Baseline mean	0.390	0.0441	0.0703	0.114
Year FE	Yes	Yes	Yes	Yes
Block FE	Yes	Yes	Yes	Yes

Notes: This table reports the effects of parental death on educational attainment (high school) and enrollment (college and university) measured at age 20 estimated by Equation (1). Panel A presents results for the full sample; Panel B restricts to individuals aged 12–14 at the time of parental death; and Panel C focuses on those aged 16–18. Outcomes include academic high school completion, college attendance, university enrollment, and a combined measure of college and above enrollment. Baseline mean refers to the control group mean at the measurement age. Standard errors, clustered at the household level, are reported in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

dynamic effects of parental death by analyzing whether affected adolescents discontinue their studies. Panel A of Figure 2 presents the event study results where we consider enrollment in any educational program as the outcome. The dynamic analysis indicates that, following parental death, adolescents are significantly less likely to remain students. To explore whether the affected adolescents instead take up employment, we consider the dynamic effects on *Not in Education, Employment or Training* (NEET). Appendix Figure A5 shows that following parental death, adolescents are substantially more likely to become NEET. Using our difference-in-differences specification from Equation 3, Table A2 shows that parental death is associated with a statistically significant 1.55 pp decrease in the probability of maintaining student status (a 1.59% decline relative to the baseline mean) and a 1.18 pp increase in the probability of becoming NEET (a 54.38% increase relative to the baseline mean).

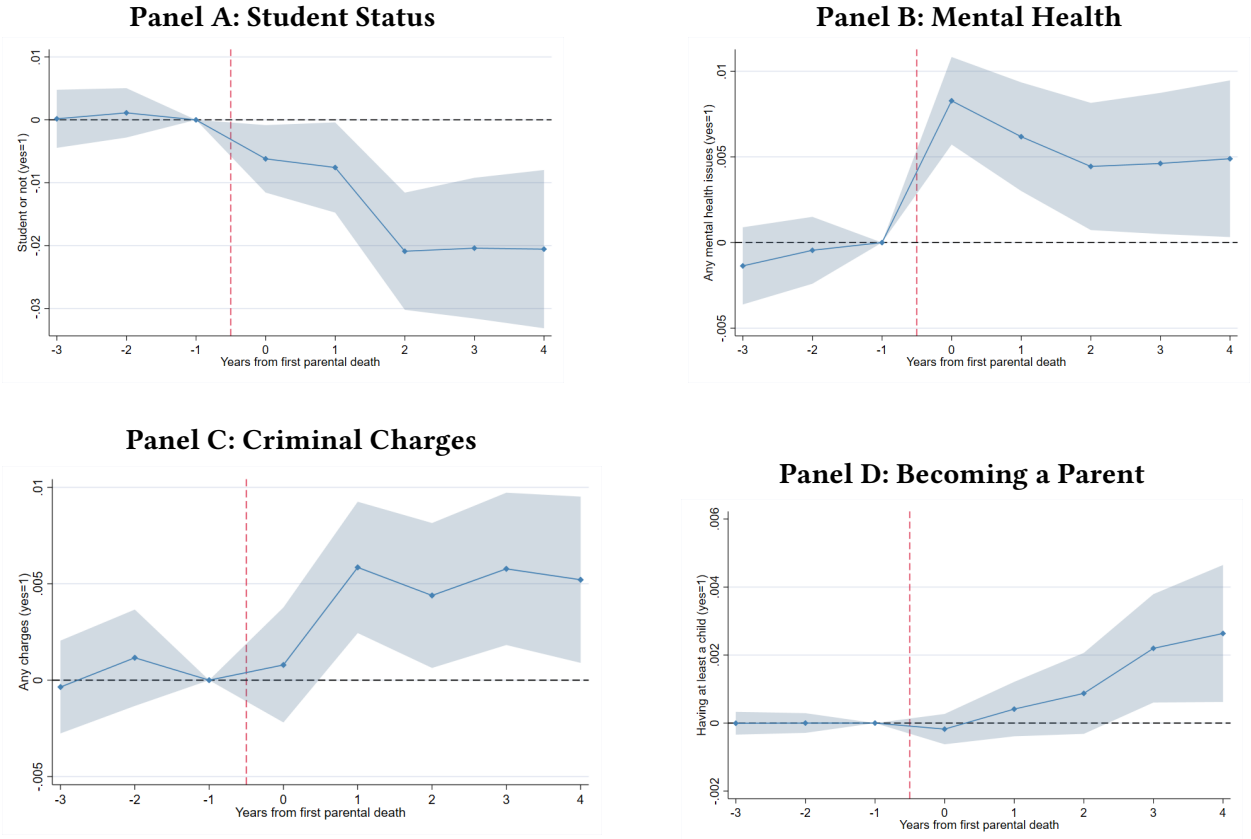
Mental Health: We also investigate the mental health consequences of parental death, focusing particularly on the four-year window immediately following the event. Leveraging administrative prescription data, we first analyze the dynamic effects using an event-study approach specified by Equation 2. The results are shown in Panel B of Figure 2. We observe that there is an immediate increase in the probability of taking mental health prescriptions by approximately 0.8 pp at the time of parental death, with the magnitude of the response attenuating slightly in subsequent years. This persistence suggests that the psychological impact of parental loss is not merely transitory but have long-lasting effects on mental health well into late adolescence or early adulthood.

We also assess both the extensive and intensive margins of mental health treatment utilization on average (see Panel A and Panel B of Appendix Table A3, respectively).[13] Our analysis demonstrates that the death of a parent is associated with a statistically significant increase of 0.63 pp in the probability of receiving at least one mental health-related prescription on average, which is 25.10% relative to the baseline mean. To provide a more granular understanding of the psychological impact, Table A3 further disaggregate mental health conditions into five clinically distinct categories: psychosis, anxiety, insomnia, depression, and psychostimulant-related disorders. When disaggregating by diagnosis category, we find that this increase is primarily driven by increases in prescriptions related to insomnia and depression. Turning to the intensive margin, we observe a comparable pattern.

Criminal Behaviors: We continue to examine whether the experience of parental death during adolescence has implications for criminal behavior. Losing a parent could potentially both increase the likelihood of children engaging in criminal activity due to the loss of parental disci-

[13]The extensive margin captures whether an individual received any mental health-related prescription within a given year, while the intensive margin measures the total number of such prescriptions issued annually.

Figure 2: Dynamic Effects of Parental Death on Adolescents' Outcomes



Notes: This figure presents the dynamic effects of parental death on a wide range of outcomes estimated by Equation (2). Panel A shows the effects on student status, Panel B presents mental health treatment utilization, Panel C displays criminal charges, and Panel D examines the probability of becoming a parent. All panels show 95% confidence intervals, with standard errors clustered at the household level.

pline or make them more vulnerable to becoming victims. To investigate this further, we track the evolution of criminal charges over time relative to the year before parental death. We observe a sharp and immediate rise in the probability of being charged with a criminal offense following parental loss, and this elevated risk does not attenuate over time: even four years after the event, individuals who experienced parental loss during adolescence remain 0.5 pp more likely to be charged with a crime in the given year compared to their peers (Panel C of Figure 2).

Table A4 confirms these results, indicating a statistically significant increase in criminal involvement among adolescents who have experienced parental loss. The annual probability of being charged with a criminal offense rises by 0.41 pp on average in the four-year post-treatment period, or approximately 20% relative to the baseline mean. We further analyze the intensive margin of criminal behavior. The data shows that adolescents who lost a parent are, on average, charged with 0.0238 additional criminal cases during the four-year post-treatment period.[14] We also examine the effect of parental death on the likelihood of becoming victims and find no significant impact.

Fertility: Furthermore, we examine whether experiencing parental death during adolescence has implications for adolescents' short-term fertility behavior. As with criminal involvement, the loss of a parent could plausibly lead to increased vulnerability or reduced parental oversight, thereby affecting teenage pregnancy. We present dynamic effects using an event-study approach. The results in Panel D of Figure 2 show an increased fertility rate among adolescents following parental death, with effects emerging short after the loss and persisting over time.

The average treatment effects reported in Table A5 indicate a statistically significant increase in the probability of becoming a parent among adolescents who experienced parental loss. Specifically, the probability of having at least one child within four years rises by 0.12 pp, representing approximately 114.28% relative to the baseline mean.[15]

5.2 Long-run Scarring Effects

Having established the immediate impacts of parental death on adolescent outcomes, we now turn to examine whether these effects persist into adulthood or represent merely transitory disruptions. To assess the long-term consequences of adolescent parental loss, we analyze the same set of outcomes – educational attainment, mental health, criminal behavior, and fertility – measured at age 35, when individuals have typically completed their education and established their

[14]The likelihood of conviction increases by 0.36 pp, or about 21% relative to the baseline mean. On the intensive margin, adolescents who lost a parent are convicted in 0.0121 additional cases during the four-year post-treatment period on average.

[15]We have also considered the probability of medical consultations related to abortions and find no relevant effects.

careers. Additionally, we extend our analysis to include labor market performance, examining employment status and earnings to capture the broader economic implications of early parental loss. Our treatment group remains individuals experiencing parental death in adolescence, while our control group is those who experience parental death five years later. Therefore, our control group will also have experienced parental death by age 35, effectively becoming later-treated controls. This comparison allows us to establish whether experiencing parental death in adolescence is relatively worse for long-term outcomes compared to experiencing parental death later in life.[16]

Education, Health, and Behavioral Outcomes: We first consider long-run effects on educational attainment measured at age 35 in Column (1) in Panel A of Table 4. We find that individuals who experienced adolescent parental loss complete, on average, 0.0481 fewer years of education. This reduction represents approximately 0.34% relative to the control group mean of 13.95 years, suggesting that the educational disruptions observed in the immediate aftermath of parental death persist well into adulthood.

Beyond examining educational attainment, we investigate the long-run mental health consequences of adolescent parental loss. Column (2) in Panel A of Table 4 indicates that individuals who experienced parental death during adolescence remain significantly more likely to receive mental health-related prescriptions even at age 35. Specifically, we observe a 0.47 pp higher probability of mental health treatment utilization, representing 4.20% relative to the control group mean.

In addition to educational and mental health outcomes, we examine whether adolescent parental loss has lasting implications for criminal behavior in adulthood. To avoid measurement bias associated with outcomes at any specific age, we aggregate criminal cases recorded between ages 30 and 35. Column (3) in Panel A of Table 4 shows that individuals who experienced parental death during adolescence exhibit significantly higher rates of criminal involvement in adulthood. Specifically, they are 0.48 pp more likely to be charged with a criminal offense, representing increases of 2.25% relative to the control group means.

We further investigate whether adolescent parental loss has lasting implications for fertility decisions measured in adulthood. The last column in Panel A of Table 4 presents the corresponding estimates for the probability of having at least one child by age 35. Contrary to the immediate effects documented in Section 5.1, we find no statistically significant impact of adolescent parental loss on completed fertility by age 35. This null result suggests that the elevated fertility observed in the immediate aftermath of parental death represents a shift in the timing of

[16]Note that our control group will have had 5 years less to "recover" from potential temporary effects of parental death. As such our estimates of the differential impact of adolescent parental will be lower bounds in the presence of temporary medium-run effects.

Table 4: Long-run Scarring Effects of Parental Death

	(1)	(2)	(3)	(4)
Panel A: Education, Health, and Behavioral Outcomes				
	Years of education	Mental health	Charge	Any Child
Treatment	-0.0481***	0.0047***	0.0048**	-0.0020
	(0.0148)	(0.0018)	(0.0023)	(0.0026)
Observations	102,077	106,712	98,762	102,908
Baseline mean	13.95	0.112	0.213	0.693
Panel B: Labor Market Performance				
	Participation	Hours worked	Wage	Total income
Treatment	-0.0053**	-7.6400***	-3.7575***	-3.8706***
	(0.0023)	(2.8364)	(1.2528)	(1.3582)
Observations	97,070	97,070	97,070	97,070
Baseline mean	0.822	844	295.4	307.5
Year FE	Yes	Yes	Yes	Yes
Block FE	Yes	Yes	Yes	Yes

Notes: This table reports the long-run scarring effects of parental death measured at age 35 estimated by Equation (1). Panel A reports key outcomes including years of education, mental health prescriptions (extensive margin), criminal charges, and fertility decisions (having any child by age 35). Panel B reports labor market performance, including participation, hours worked, wage, and total income. Our earliest birth cohort is from 1963, reaching age 35 in 1998. Data availability varies by outcome: educational outcomes span 1995-2020; mental health prescriptions cover 1995-2021; criminal behavior data spans 1995-2018; and fertility and labor market outcomes cover 1980-2020. Individuals with missing labor market records are excluded from those analyses. Baseline mean refers to the control group mean at the measurement age. Standard errors, clustered at the household level, are reported in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

childbearing rather than a permanent change in completed family size.

Labor Market Performance: Finally, we examine the long-term labor market consequences of adolescent parental loss, focusing on employment outcomes and earnings measured at age 35. We analyze labor force participation along both extensive and intensive margins, as well as annual income. Panel B of Table 4 presents the corresponding results. Individuals who experienced parental death during adolescence exhibit a 0.53 pp reduction in labor force participation and work approximately 1% fewer hours compared to their counterparts who experienced parental loss five years later. These employment effects translate into meaningful income losses: we observe reductions of 3,758 DKK in wage income and 3,871 DKK in total personal income, representing approximately 1.27% and 1.26% relative to their respective control group means. While these income effects may appear modest in percentage terms, they represent substantial

cumulative losses over an individual's working life. The persistence of labor market penalties into adulthood demonstrates that the educational disruptions and behavioral changes induced by adolescent parental loss have lasting economic consequences.

6 Heterogeneous Effects

In this section, we present heterogeneous effects by causes of death, parental and child gender, household socioeconomic background, and family structure, highlighting the variation in these responses across different subgroups. Throughout this section, we focus on four representative outcomes: high school completion, mental health treatment, criminal charges, and total income. Heterogeneity in additional outcomes – e.g. student status and fertility – as well as heterogeneous effects by household wealth – are presented in Tables A7- A10.

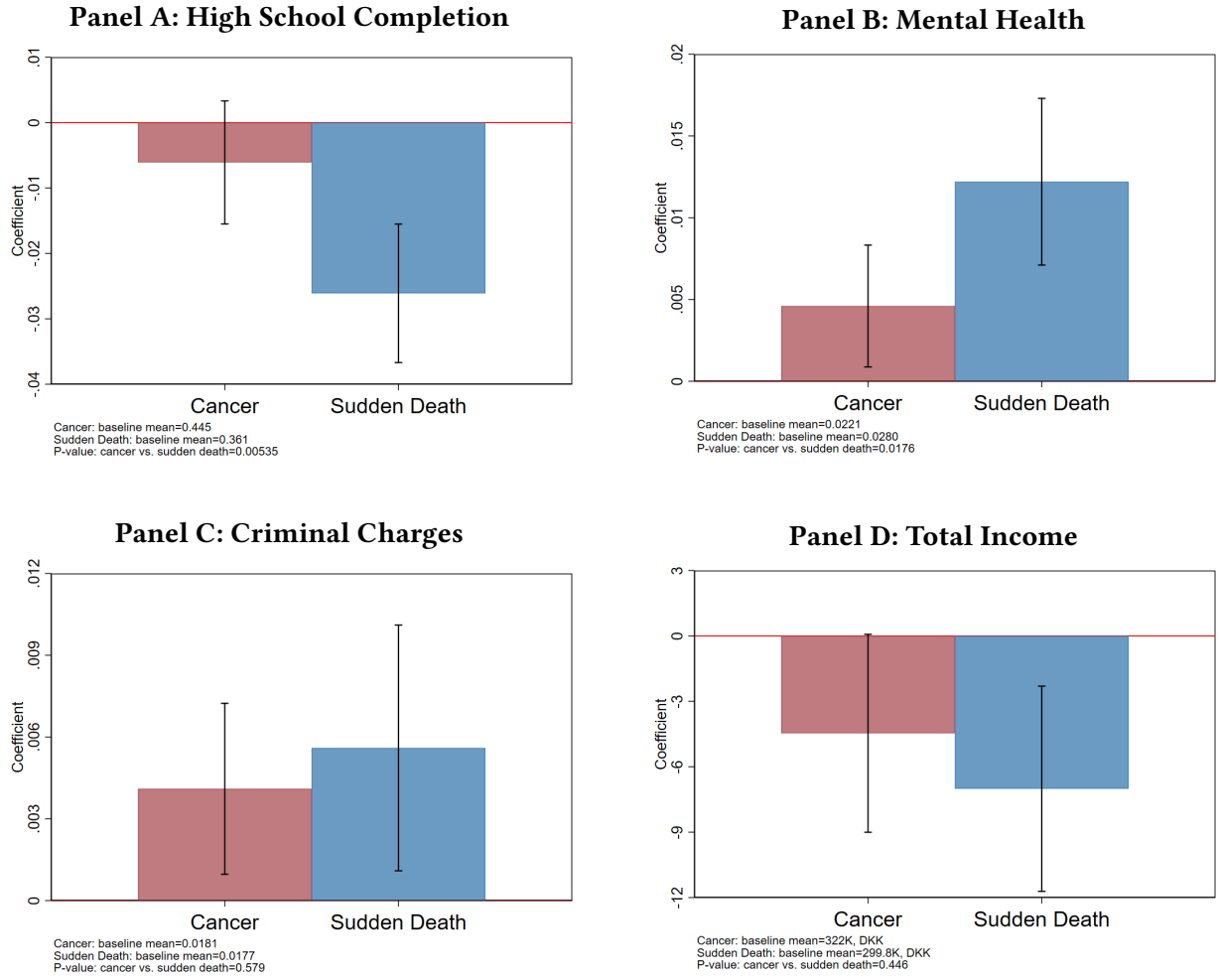
6.1 Causes of Death

We start by examining whether the effects of parental death vary systematically depending on the underlying cause of death. This analysis provides insights into the mechanisms through which parental loss affects adolescent development and helps illuminate the heterogeneity in responses to different types of family shocks. Specifically, we distinguish between deaths caused by cancer – representing relatively prolonged and often anticipated illnesses – and sudden deaths, including cardiovascular diseases and accidents, which occur unexpectedly. This categorization allows us to differentiate between anticipated and unexpected parental loss. Cancer deaths typically involve prolonged illness periods that may enable gradual family adjustment and anticipatory grief processes, while sudden deaths generate acute distress and household disruption. By comparing outcomes across these groups, we can partially disentangle the pure bereavement effect from the anticipatory stress that accompanies terminal illness.

Figure 3 presents results stratified by cause of death and shows systematic differences in the magnitude and pattern of effects across causes of death. For educational attainment measured at age 20, adolescents who lost a parent due to cancer show no significant reduction in high school completion. In contrast, sudden parental death leads to much larger negative effects, reducing high school completion by 2.61 pp. Regarding mental health outcomes, both cancer-related and sudden parental deaths significantly increase the probability of adolescents taking mental health prescriptions, but the effect is more pronounced following sudden deaths (1.22 pp vs. 0.46 pp). For criminal behavior, adolescents experiencing either type of parental loss show an increase in criminal charges.

Examining the long-term consequences at age 35, we find that while both groups experience significant income reductions, the magnitude is slightly larger for sudden deaths (7,009 DKK vs. 4,

Figure 3: Heterogeneous Effects of Parental Death (by Cause of Death)



Notes: This figure presents heterogeneous effects of parental death by cause of death. Cancer refers to all cancer-related parental deaths. Sudden deaths include cardiovascular diseases (heart disease and stroke) as well as accidents. For educational outcomes (Panel A) and labor market performance (Panel D), measured at ages 20 and 35 respectively, we estimate the coefficients from Equation (4). For mental health (Panel B) and criminal behavior (Panel C), we use Equation (5) to estimate the effects up to four years post-treatment. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. All panels show 95% confidence intervals, with standard errors clustered at the household level.

466 DKK). The consistently larger effects observed for sudden deaths across most outcomes suggest that the shock and lack of preparation time may be critical factors determining the severity of long-term consequences for adolescent development.

6.2 Child and Deceased Parent Gender

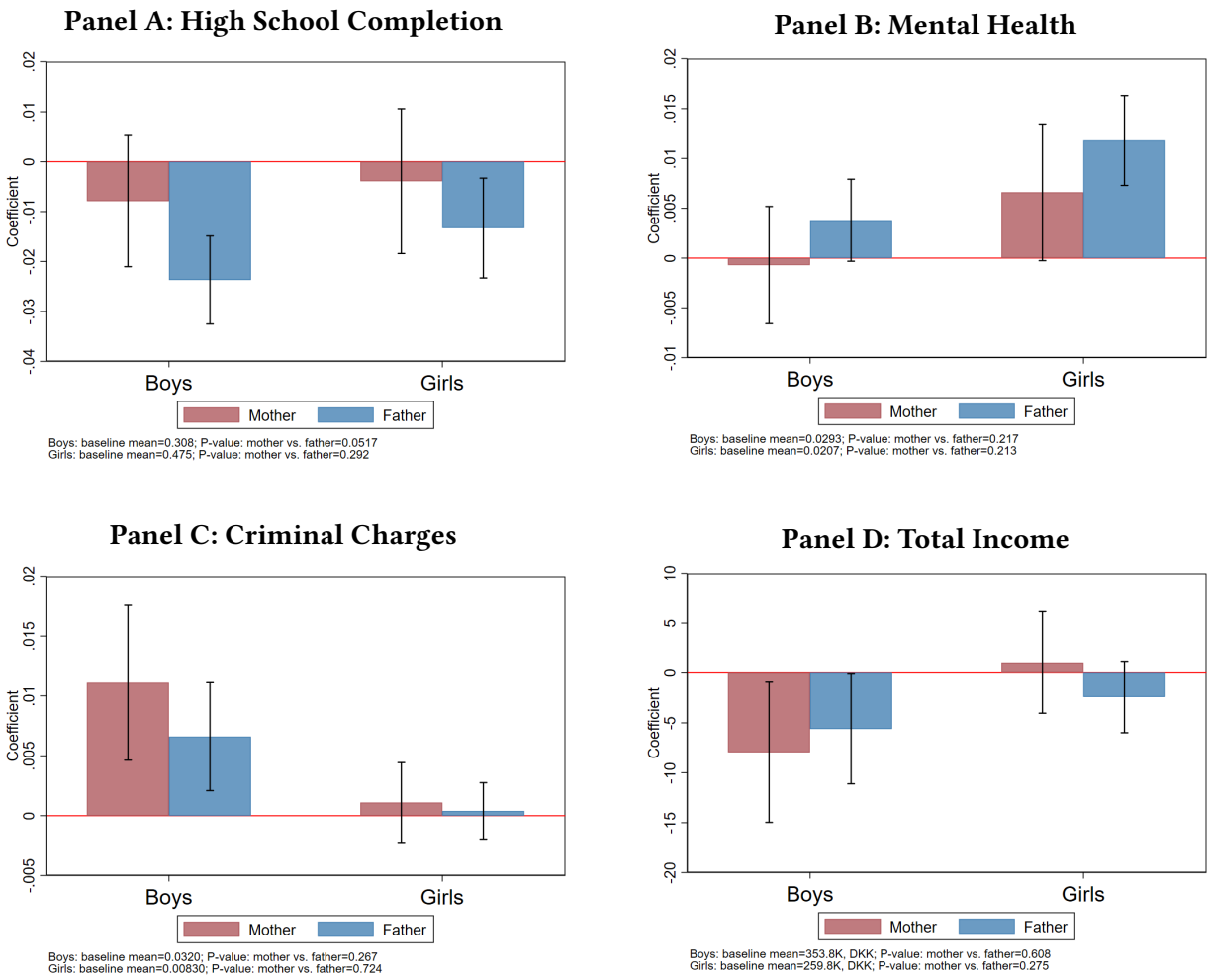
To further understand the heterogeneous impact of parental death, we estimate the effects of parental death by both the gender of the deceased parent and the gender of the affected child. The death of a mother vs. father may carry different implications given their typically distinct roles in household production, caregiving, emotional support, and income provision. These functional differences, combined with parent-child bonding patterns and role modeling effects, may result in asymmetric consequences for adolescent development. Additionally, boys and girls may respond differently to parental loss due to gender-specific emotional processing patterns, social expectations, and adaptive behaviors. Figure 4 presents results stratified by child gender.

For boys, paternal death leads to a larger negative effect compared to maternal death. Father death significantly reduces high school completion by 2.37 pp. Boys experiencing paternal loss also take more mental health prescriptions. In contrast, maternal death among boys shows minimal impact on educational outcomes but has a larger effect on criminal behavior compared to paternal death, with criminal charges increasing by 1.11 pp. Notably, both types of parental loss result in substantial long-term income reductions for boys, suggesting persistent economic consequences regardless of which parent dies.

For girls, the pattern of effects differs from that of boys. Paternal death significantly reduces educational attainment, with high school completion declining by 1.33 pp. Girls experiencing paternal death also show more mental health treatment utilization, with a 1.18 pp increase. Maternal death among girls only marginally affects the mental health outcomes. Neither mothers' nor fathers' death affects girls' long-term earnings.

Importantly, the results suggest striking gender differences in criminal behavior responses. Boys show significant increases in criminal involvement following the death of either parent, with particularly pronounced effects after maternal loss. In contrast, girls exhibit virtually no increase in criminal behavior regardless of which parent dies, suggesting that boys may be more susceptible to behavioral problems following parental loss. Table A8 show results for remaining outcomes, e.g. that only girls experiencing paternal death show significant increases in early fertility.

Figure 4: Heterogeneous Effects of Parental Death (by Gender)



Notes: This figure presents heterogeneous effects of parental death by the gender of child and the gender of deceased parent. For educational outcomes (Panel A) and labor market performance (Panel D), measured at ages 20 and 35 respectively, we estimate the coefficients from Equation (4). For mental health (Panel B) and criminal behavior (Panel C), we use Equation (5) to estimate the effects up to four years post-treatment. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. All panels show 95% confidence intervals, with standard errors clustered at the household level.

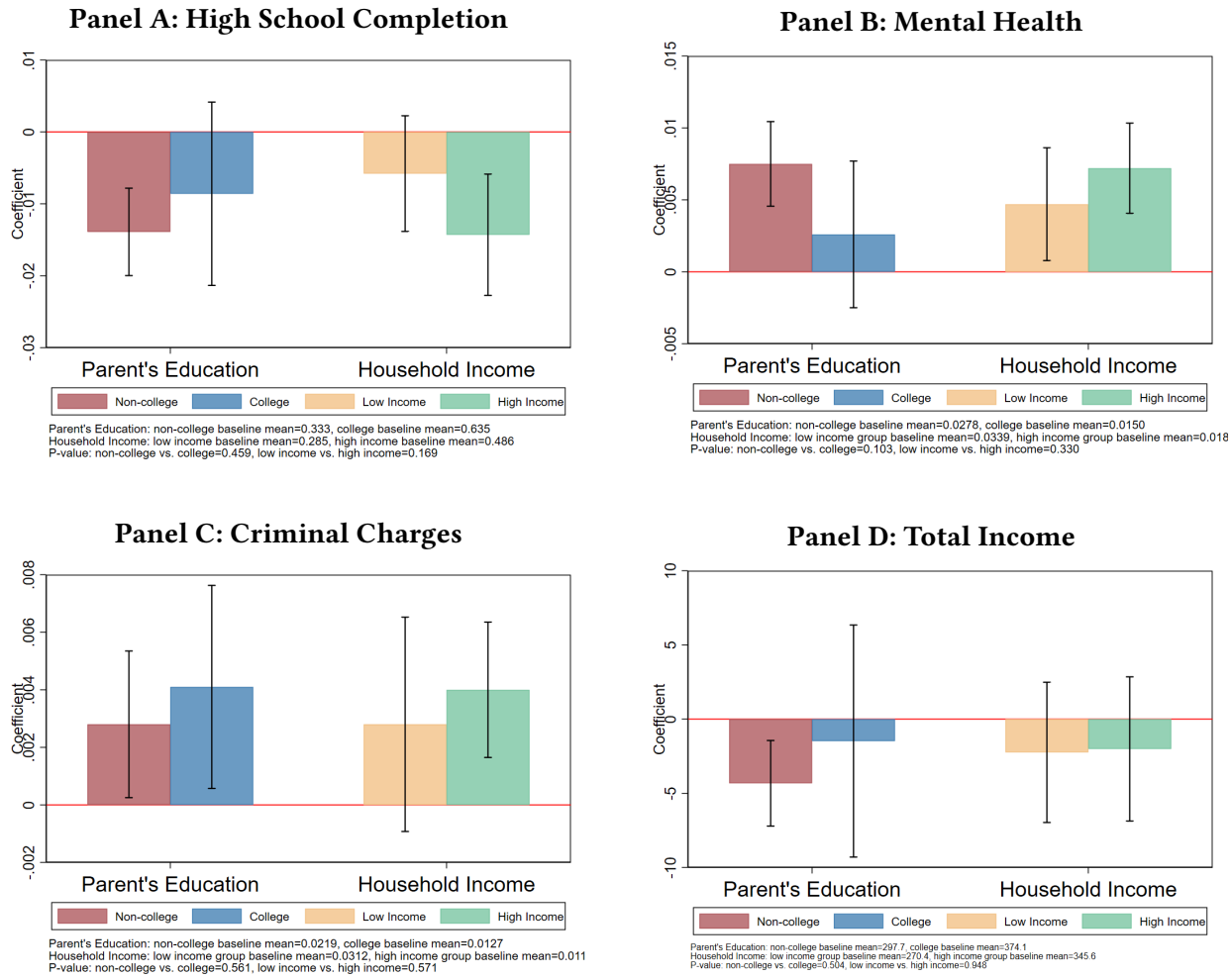
6.3 Household Socioeconomic Background

We next examine how the effects of parental death vary across different dimensions of household socioeconomic status. Specifically, we estimate heterogeneous effects across two key dimensions of socioeconomic status: the deceased parent's educational level and pre-death household income. For each dimension, we interact our treatment indicator with binary measures of high vs. low socioeconomic status, defined as with or without a college degree and above or below the median household income.

Effects by Parental Education: The left part of each panel in Figure 5 presents results by the educational level of the deceased parent. We distinguish between families with a deceased parent who had a college/university degree and those without one. For children's educational outcomes, those from non-college families experience significant declines in high school completion rates (1.39 pp). In contrast, children from college-educated families show non-significant reductions in high school completion (0.86 pp). For mental health outcomes, both groups show increased mental health treatment utilization, but the effects are more pronounced among children from non-college families (0.75 pp increase) compared to those from college-educated families (0.26 pp, not statistically significant). Both groups show increased criminal behavior following parental death, with children from non-college families experiencing increases in criminal charges by 0.28 pp and those from college-educated families by 0.41 pp. Turning to the long-term labor market consequences, the results demonstrate stark differences by parental education. Children from non-college families experience significant reductions in annual income (4,327 DKK). In contrast, children from college-educated families show minimal and non-significant effects on income (1,479 DKK).

Effects by Pre-Death Household Income: The right part of each panel in Figure 5 examines heterogeneity by household income measured in the year prior to parental death. While both income groups experience educational disruptions, children from high-income families experience larger negative effects on high school completion (1.43 pp vs. 0.58 pp declines). We also find that children from high-income families show significant increases in mental health treatment (0.72 pp) and criminal charges (0.40 pp). Children from low-income families also experience increased mental health problems and criminal behaviors, but the effects are generally smaller in magnitude and tend not to be statistically significant. For household income, children from high-income households experience a larger drop in overall household income after parental loss, in both absolute and relative terms (see Figure A6). This suggests that part of the greater impact on children from high-income families may be driven by a significant loss of household economic resources.

Figure 5: Heterogeneous Effects of Parental Death (by Household Socioeconomic Background)



Notes: This figure presents heterogeneous effects of parental death by socioeconomic background. Left part of each panel examines differential effects by the educational attainment of the deceased parent (college degree vs. no college degree). Right part for each panel presents heterogeneous effects across families with above-median household income. For educational outcomes (Panel A) and labor market performance (Panel D), measured at ages 20 and 35 respectively, we estimate the coefficients from Equation (4). For mental health (Panel B) and criminal behavior (Panel C), we use Equation (5) to estimate the effects up to four years post-treatment. Household income data are available from 1985 onwards, restricting the analysis to cohorts for whom pre-death financial information is observed, which explains the smaller sample sizes compared to Panel A, particularly for labor market performance. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. All panels show 95% confidence intervals, with standard errors clustered at the household level.

6.4 Household Relationship Status

Finally, we examine how the effects of parental death vary across different family structures measured one year prior to the death event. We analyze heterogeneous effects across four distinct family structures: single-parent households where the biological parent living with the child dies; single-parent households where the biological parent cohabits with a non-biological parent and the biological parent dies; two-parent households where both biological parents live with the child and one dies; and cases where a non-cohabiting parent dies. Figure 6 shows corresponding results.

We find that for high school completion, children in two-parent families experience the most severe disruption, with completion rates declining by 1.78 pp – a highly significant effect that represents the largest magnitude across all family types. Non-cohabiting parental death has minimal impact.

Mental health effects demonstrate significant impacts across most family structures, though with important variations in magnitude. Children in single-parent households with non-biological partners show the largest increases in mental health treatment at 1.72 pp, which is slightly higher than the 1.32 pp increase experienced by children in single-parent families. Children in two-parent families show even smaller increases in mental health treatment (0.69 pp). In contrast, when non-cohabiting parents die, mental health impacts are minimal and non-significant.

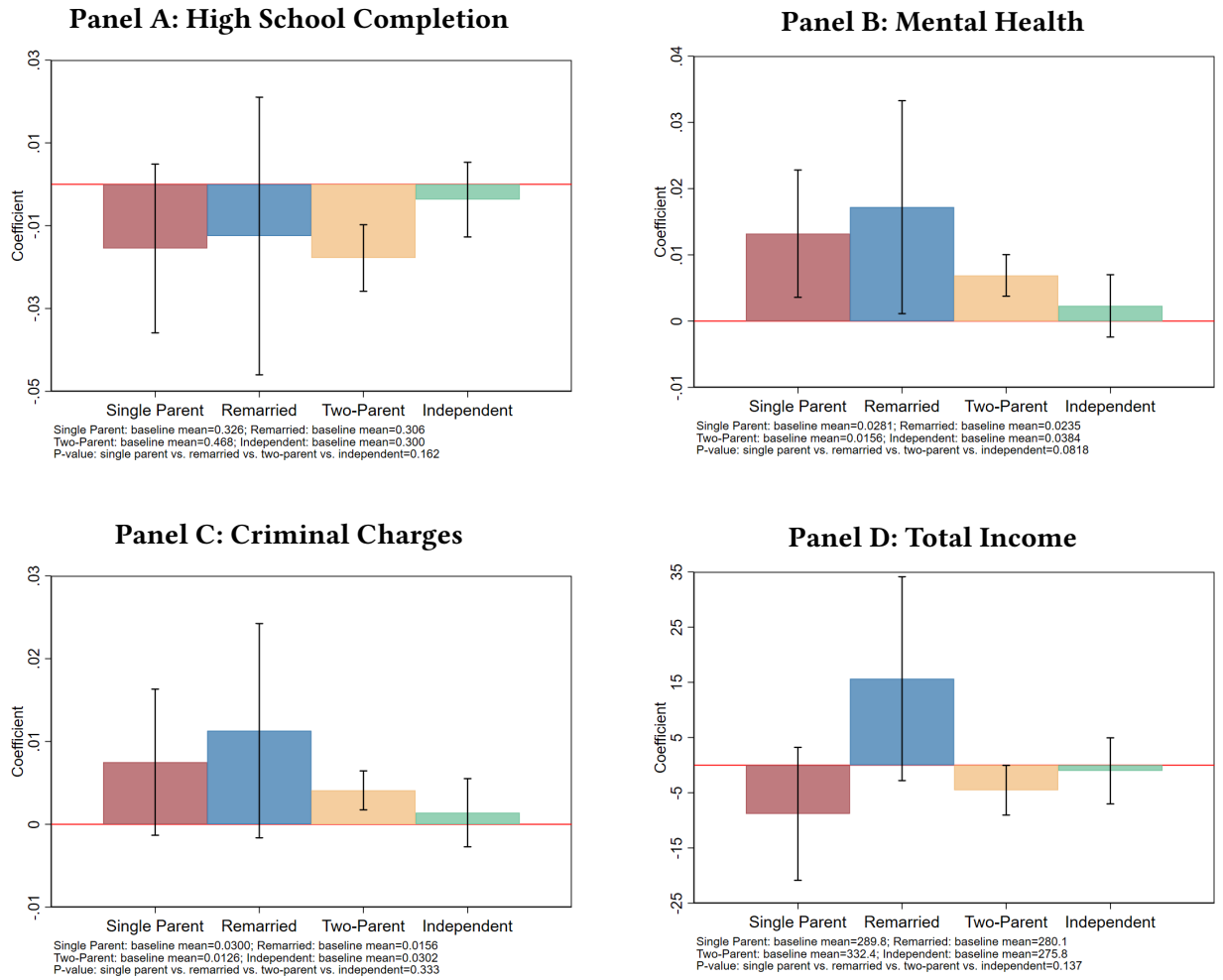
In terms of criminal behavior effects, children in single-parent households with non-biological partners exhibit significant increases in criminal charges (1.13 pp). Children in two-parent families also demonstrate significant increases in criminal charges (0.41 pp). Children in single-parent families show marginally significant increases in charges (0.75 pp). Finally, children in two-parent families suffer significant long-term labor market penalties, with labor force participation declining by 0.58 pp and income falling by 4,541 DKK (approximately 1.37% of the control group mean earnings).

7 Mitigating Channels

Having documented the adverse effects of parental death, we now examine factors that may mitigate these impacts. This section investigates the role of grandparent proximity, the presence of older siblings, the effects of school quality, and the influence of teacher gender composition. Again, we focus on four representative outcomes: high school completion, mental health treatment, criminal charges, and total income. Table Tables A11-A14 presents additional results – including outcomes such as student status and becoming a parent.[17]

[17]For comparison, Table A15 further presents the overall results without child gender separation.

Figure 6: Heterogeneous Effects of Parental Death (by Family Structure and Remarriage)



Notes: This figure presents heterogeneous effects of parental death by family structure measured one year prior to the death event. We distinguish between four family configurations at the time of measurement: single-parent households where the biological parent living with the child dies (Single Parent), single-parent households where the biological parent cohabits with a non-biological partner and the biological parent dies (Remarried), two-parent households where both biological parents live with the child and one dies (Two-Parent), and cases where a non-cohabiting parent dies (Independent). For educational outcomes (Panel A) and labor market performance (Panel D), measured at ages 20 and 35 respectively, we estimate the coefficients from Equation (4). For mental health (Panel B) and criminal behavior (Panel C), we use Equation (5) to estimate the effects up to four years post-treatment. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. All panels show 95% confidence intervals, with standard errors clustered at the household level.

7.1 Proximity to Grandparents

We examine whether the presence of grandparents within the same municipality moderates the effects of parental death on adolescent outcomes. Extended family networks, particularly grandparents, may serve as crucial sources of support following parental loss. To construct our measure of grandparent presence, we link grandparents to children through parental identification codes in the administrative records, allowing us to trace intergenerational family connections and determine geographic proximity at the time of parental death.[18] We distinguish between families where grandparents live within the same municipality and can provide regular, accessible support vs. families where grandparents are either absent from the local area or deceased. Figure 7 shows the corresponding results.

Adolescents without local grandparent support experience severe declines in high school completion, with rates falling by 3.18 pp, approximately 7.74% relative to the baseline mean. In contrast, adolescents with grandparents in the same municipality show much smaller and non-significant declines in high school completion (1.34 pp). The effect of parental death on mental health is similar for those with or without nearby grandparents. Turning to behavioral outcomes, we find that adolescents without local grandparent experience larger increases in criminal charges (0.56 pp), compared to those with local grandparents (0.44 pp).

For long-term labor market outcomes, adolescents without a grandparent in the same municipality experience severe long-term penalties, with income falling by a substantial 59,220 DKK – representing approximately 16.95% of the control group earnings. In contrast, adolescents with a grandparent present in the same municipality show no negative effects on long-term outcomes.[19]

7.2 Presence of Older Siblings

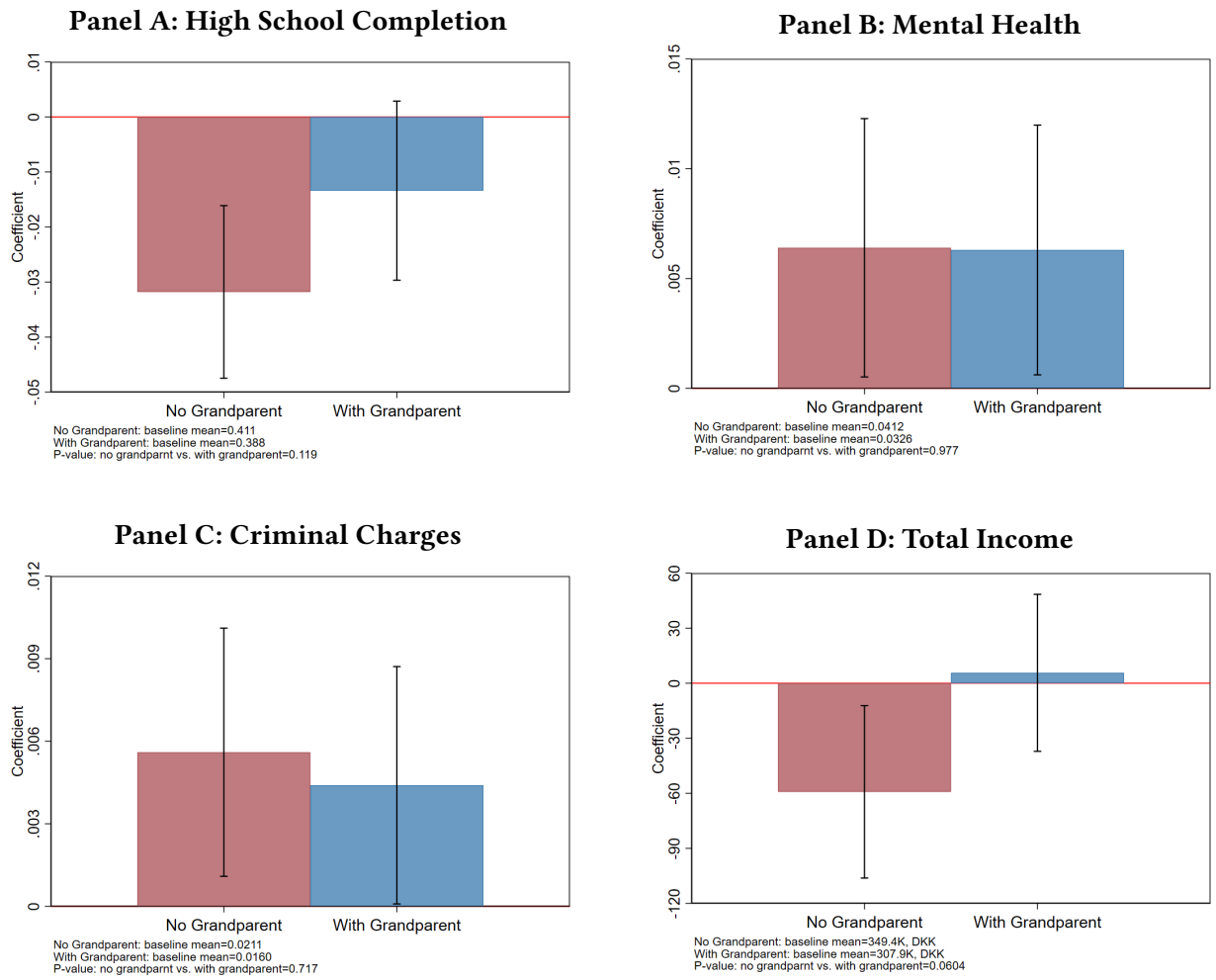
We next examine whether the presence of older siblings mitigates the effects of parental death on adolescent outcomes. Older siblings may serve as important sources of support after parental loss; that is, they might take on more responsibilities to care for younger siblings. Alternatively, older siblings might themselves be struggling with the loss, which could limit their capacity to provide support, or family resources might be spread more thinly across multiple children experiencing grief simultaneously.

To assess this channel, we categorize children into three distinct groups based on their position within the family child composition: Only Child (children with no siblings), Oldest Child

[18]We restrict the analysis to families where both father and mother were born after 1955, as child-parent linkages in the administrative data become more complete from this year onwards, enabling precise identification of grandparent information.

[19]The limited sample size for labor market outcomes (919 observations) reflects the constraint that children of parents born after 1955 would likely be born after 1980 (assuming parents have children around age 25) and only reach age 35 by 2015, with our data spanning 1980-2020.

Figure 7: Mitigating Channels (by Proximity to Grandparents)



Notes: This figure presents heterogeneous effects of parental death by the presence of grandparents within the same municipality. For educational outcomes (Panel A) and labor market performance (Panel D), measured at ages 20 and 35 respectively, we estimate the coefficients from Equation (4). For mental health (Panel B) and criminal behavior (Panel C), we use Equation (5) to estimate the effects up to four years post-treatment. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. All panels show 95% confidence intervals, with standard errors clustered at the household level.

(children who are the oldest among multiple siblings), and Younger Child (children with at least one older sibling). Figure A4 presents results by child gender, as the effects of sibling relationships may differ between boys and girls.

If the boy is the only child in the family, parental death has relatively modest effects across most outcomes for them, with a marginally significant increase in criminal charges (0.87 pp) and a long-run income decrease of 10,226 DKK. Oldest children, who lack older siblings to provide support, experience the largest negative effects on educational attainment, with high school completion declining by 2.97 pp. They also show an increase in criminal behavior (0.65 pp increase in charges). On the other hand, the effect of parental death on educational attainment for younger boys with older siblings is smaller. However, they exhibit significant increases in mental health treatment (0.40 pp), and the largest increases in criminal behavior among all groups (0.86 pp increase in charges). They also show significant negative effects on earnings of 7,399 DKK at age 35.

For girls, there is limited impact of parental death on children from one-child families. Oldest girls show significant increases in mental health treatment (1.15 pp) and criminal charges (0.47 pp). Younger girls with older siblings experience significant declines in high school completion (1.59 pp) and significant increases in mental health prescriptions (1.10 pp). Altogether, these results suggest that the effects of parental death differ based on the composition of children within a family, but we do not find strong evidence that older siblings can significantly mitigate the negative impact of parental death on younger siblings.

7.3 School Quality

We examine how school quality moderates the effects of parental death on adolescent outcomes. Educational institutions may play a central role in buffering against adverse outcomes by offering emotional support, identifying at-risk students, and maintaining academic continuity during family crises. Higher-quality schools, in particular, may be better equipped to provide structured environments, access to mental health services, and individualized attention during periods of family disruption. Conversely, the higher expectations and more competitive environments characteristic of high-quality schools might create additional stress for adolescents already coping with family trauma.

To assess this channel, we use National Test Scores (NTS) as a proxy for school quality. However, NTS data are only available from 2010 onward, which restricts our analysis to a subset of students who attended schools that can be quality measured in the post-2010 period. This limitation reduces our sample size compared to previous analyses, as we can only include adolescents whose schools at the time of parental death remained measurable after 2010. For each institution, we standardize test scores by subject and year and compute the average standardized

score across all subjects and years. Schools with average scores above the median are categorized as high-quality institutions, while those below the median are classified as lower-quality institutions. We link this school quality measure to the institution in which each adolescent was enrolled during the year of parental death, allowing us to examine differential treatment effects across school environments. Figure 8 shows the corresponding results.

We find that students in high-quality schools experience more severe declines in high school completion by age 20, with rates falling by 2.44 pp. In contrast, students in lower-quality schools show smaller reductions in completion rates (1.35 pp). This pattern may reflect several mechanisms. High-quality schools often have more demanding academic requirements and competitive environments that become particularly challenging for students dealing with family distress. Lower-quality schools, while potentially offering fewer resources, may have more flexible academic expectations that allow distressed students to remain enrolled.

For mental health, students in lower-quality schools experience increases in mental health prescriptions of 0.44 pp (not significant), while those in high-quality schools show smaller increases (0.18 pp, not significant). Regarding criminal behavior outcomes, both school environments demonstrate significant increases in criminal behavior following parental death. Students in lower-quality schools experience an increase in criminal charges of 0.62 pp, while those in high-quality schools exhibit smaller effects (0.48 pp).

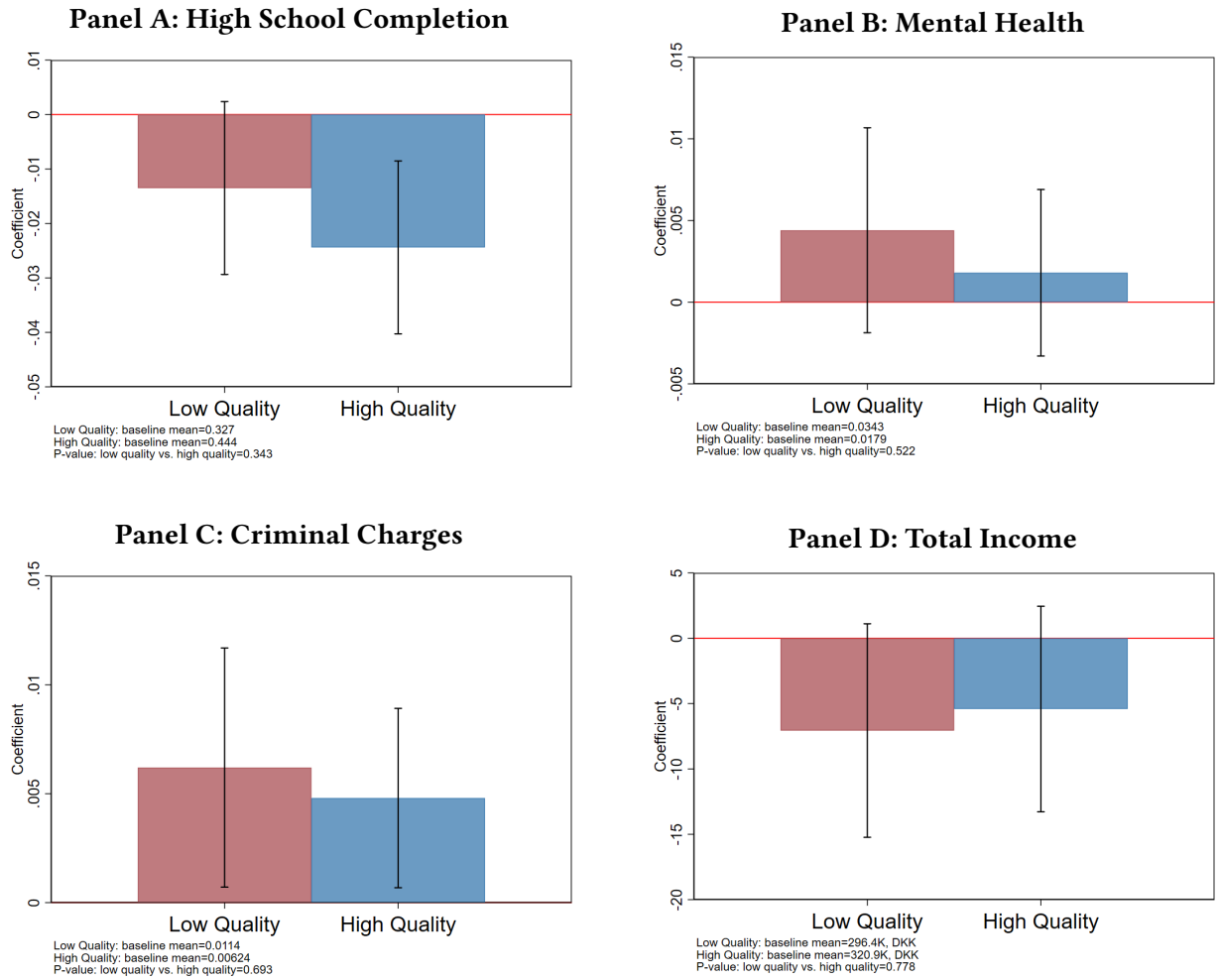
Finally, long-run labor market performance demonstrates negative effects in both school environments. Students in lower-quality schools experience marginally significant income losses of 7,064 DKK, while those in high-quality schools exhibit smaller, non-significant income reductions of 5,415 DKK.

7.4 Teachers' Gender Ratio

Finally, we explore whether the gender composition of teaching staff moderates the effects of parental death during adolescence. This channel may be especially relevant in light of our earlier findings that the impacts of parental death differ by child gender, as schools with different gender compositions among staff may vary in the types of emotional or institutional support they provide. To assess this channel, we utilize teacher gender ratio data obtained from school employee records. However, these employee records are only accessible from 2008 onwards, which restricts our analysis to students who attended schools that remained operational and measurable in the post-2008 period. This limitation reduces our sample size compared to previous analyses. Schools with female teacher proportions above the median are categorized as high female ratio institutions, while those below the median are classified as low female ratio schools. Figure 9 presents the results separated by child gender.

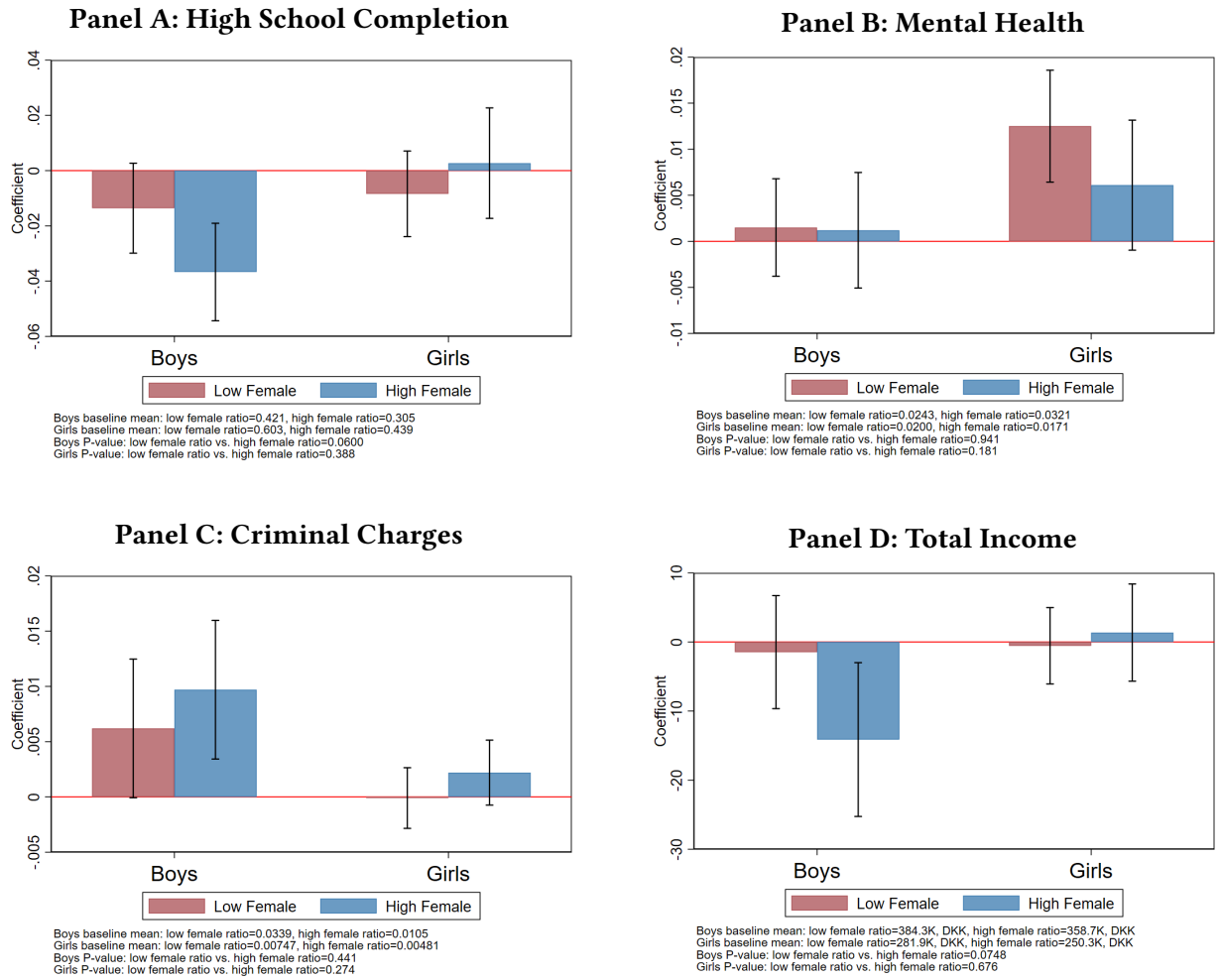
The effects on educational attainment demonstrate different patterns by child gender. For

Figure 8: Mitigating Channels (by School Quality)



Notes: This figure presents heterogeneous effects of parental death by school quality at the time of parental death. School quality is measured using National Test Scores (NTS), with schools classified as high quality if their average standardized test scores across subjects and years are above the median. School quality is measured using National Test Scores (NTS), which are only available from 2010 onwards, restricting our analysis to students who attended schools that remained operational and measurable in the post-2010 period. For educational outcomes (Panel A) and labor market performance (Panel D), measured at ages 20 and 35 respectively, we estimate the coefficients from Equation (4). For mental health (Panel B) and criminal behavior (Panel C), we use Equation (5) to estimate the effects up to four years post-treatment. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. All panels show 95% confidence intervals, with standard errors clustered at the household level.

Figure 9: Mitigating Channels (Female Teacher Ratio, by Gender)



Notes: This figure presents how teacher gender composition moderates the effects of parental death, with results stratified by child gender. Teacher gender ratio data are obtained from school employee records, which are only accessible from 2008 onwards, restricting our analysis to students who attended schools that remained operational and measurable in the post-2008 period. Schools are classified as having high female teacher ratios if the proportion of female teachers is above the median across all schools.For educational outcomes (Panel A) and labor market performance (Panel D), measured at ages 20 and 35 respectively, we estimate the coefficients from Equation (4). For mental health (Panel B) and criminal behavior (Panel C), we use Equation (5) to estimate the effects up to four years post-treatment. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. All panels show 95% confidence intervals, with standard errors clustered at the household level.

boys, those in high female ratio schools experience larger declines in high school completion, with rates falling by 3.67 pp compared to 1.36 pp (not significant) in low female ratio schools. For girls, high school completion effects are modest across both environments.

In addition, boys show small, non-significant increases in taking mental health prescriptions in both low (0.15 pp) and high (0.12 pp) female ratio schools. However, girls in low female ratio schools experiencing significant increases in mental health treatment utilization (1.25 pp) compared to smaller increases in high female ratio schools (0.61 pp, marginally significant). For criminal behavior, boys in schools with a high female teacher ratio experience a large, significant increases in criminal charges (0.97 pp) compared to a marginally significant effect in low female ratio schools (0.62 pp).

Finally, boys in low female ratio schools experience small negative effects on income (1,470 DKK). In contrast, boys in high female ratio schools have substantial and significant income losses (14,128 DKK). For girls, labor market effects are consistently small and non-significant across both school environments. Altogether, these findings suggest that same-gender representation among teaching staff may provide varying degrees of support depending on the specific outcome domain and the gender of the affected child. Note, however, that our smaller sample size (2008 onward), limits the statistical power to detect significant differences in these effects.

8 Comparison to Young Children

To better understand how the developmental stage at which parental death occurs affects children's outcomes, we extend our analysis to examine the effects of parental death on young children aged 6-12. This comparison allows us to assess whether the negative consequences of parental death significantly differ based on developmental stages.[20] Using the same identification strategy as in our main specification, we present the results in Table A6. We find that, compared to adolescents, younger children have no economically meaningful differential impact on education, mental health, and labor market outcomes. However, there are some behavioral differences for children who lose their parents at different ages: compared to children who lose their parents during adolescence, children who lose their parents between the ages of 6-12 are 1.2 pp more likely to have criminal charges and 1 pp less likely to have children. In this paper, we primarily focus on the effects for children who lost their parents during adolescence, given the elevated risk of losing a parent and its significance as a transitional developmental stage for children.

[20]Compared to adolescences, younger children (ages 6-12) are typically more dependent on parental supervision and guidance, have less autonomy in decision-making, and are in the early stages of formal education.

9 Conclusions and policy implications

Parental death is an experience that the vast majority of us will have to endure. Although parental death and the resulting grief are ultimately unavoidable, some of the sustained negative effects of parental death on children could potentially be mitigated if appropriately addressed by policymakers and caregivers. To address these negative effects, it is essential to first understand the dynamics and mechanisms involved.

This paper provides new causal evidence on the effects of parental death during adolescence. We concentrate on adolescence, a formative period in the development of human capital and socio-emotional well-being, and thus, consequential for long-term outcomes. Leveraging Danish administrative data and a difference-in-differences design using soon-to-be-treated controls, we estimate both dynamic trajectory of youths' outcomes from the immediate aftermath of parental death through early adulthood. This approach allows us to document not only short-run disruptions but also long-term scarring effects that persist more than a decade after parental death. We examine some of the most consequential outcomes during adolescence: mental health, fertility, criminal behavior, and education. Our findings reveal that adolescent parental death can lead to significant reductions in educational attainment, a deterioration in mental health, and an increased risk of criminal behavior and teenage pregnancy. These effects persist into adulthood and co-occur with sustained labor market penalties resulting from experiencing parental death in adolescence. These effects vary by gender and family structure and are only partially mitigated by extended family or school-based support.

To place our findings in context, we benchmark them against recent causal evidence on the effects of parental divorce. Johnston *et al.* (2025), using U.S. tax and Census data, find that experiencing divorce in adolescence (ages 11–15) reduces income at age 27 by 2.84 percentile points. In terms other adult outcomes, divorce also increases the risk of teen birth by 0.9 pp (a 77% rise), lowers college residence by 5 pp (55% relative to the baseline mean), and increases incarceration rates by 0.259 pp (56% relative to baseline). These estimates align closely with our results, suggesting that parental death – a more extreme disruption than divorce – has comparable, and for some outcomes, larger effects. Together, the evidence from both settings show how family disruption and loss – whether through death or divorce – have sustained effects on children's trajectories.

Our findings also reveal heterogeneity in the effects of parental death across key dimensions, as well as mitigating environments. We show that the effects of parental death vary by socioeconomic status and by household structure. Children from less-educated households experience larger long-term consequences. However, proximity to grandparents significantly mitigates the impacts on education and criminal behavior. Similarly, we find smaller effects of parental death

when the gender composition of teachers matches that of the affected child, especially for behavioral and mental health outcomes.

Our results suggest that policies aimed at helping grieving adolescents following parental death should be two-fold. First, interventions should address both internalizing and externalizing responses to grief. Expanding access to youth mental health services – for example, school-based counseling or preventive screenings – could help mitigate both short-run and long-run effects of parental death. At the same time, behavioral interventions for affected adolescents – such as mentorship programs and early-warning systems to identify at-risk students – could potentially reduce criminal behavior and the discontinuation of education. Second, since we find evidence of socio-economic gradients in the effects of parental death and that the presence of grandparents mitigates these effects, financial and caregiving support for surviving families could be beneficial, especially when grandparents or other secondary caregivers are absent. Although Denmark already provides extensive support, identifying and further supporting at-risk youth could potentially limit long-term effects of parental death further. In countries with less social support, more substantial interventions may be warranted.

In conclusion, our results confirm that early-life shocks, including those that are unpreventable like parental death, affect individuals' life trajectories across multiple domains. We find such effects even in an extensive welfare state like Denmark. Designing effective policies – whether in schools, health systems, or family policy – may prevent grief from becoming a lifelong disadvantage. By reducing the negative effects on the approximately 5% of children who lose a parent before adulthood, we may reduce long-run inequality, crime, and mental illness, while improving educational attainment and productivity to the benefit of society as a whole.

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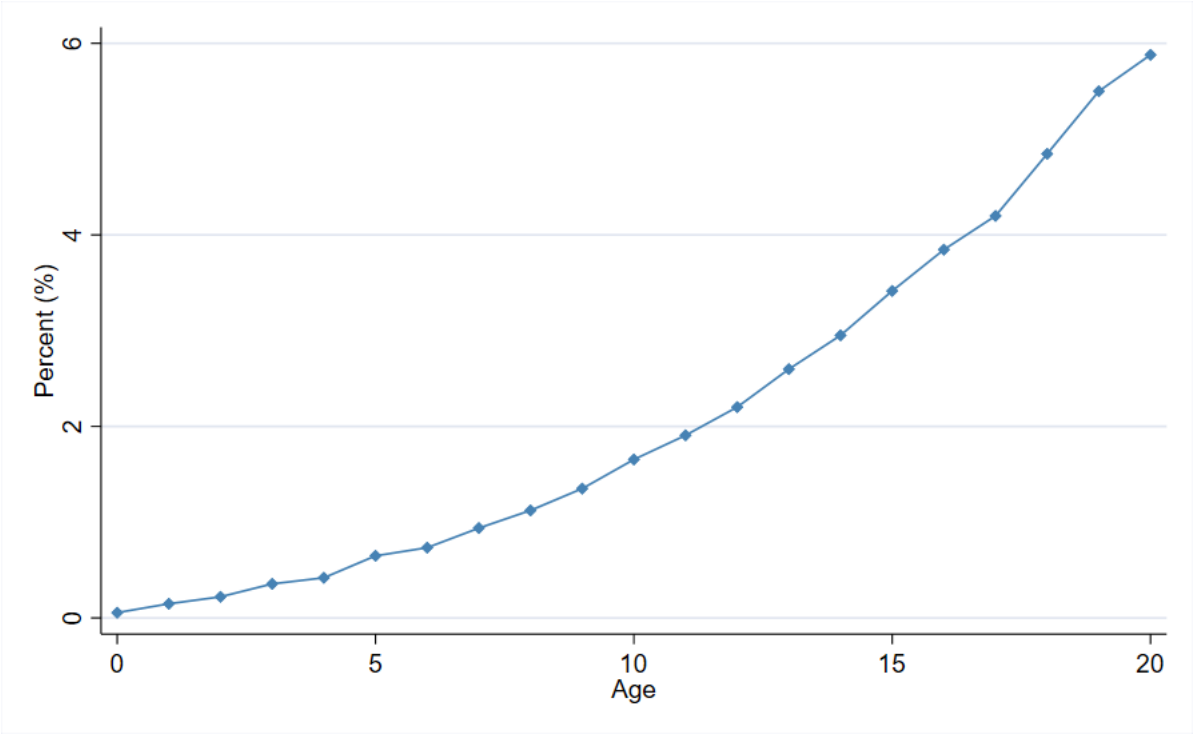
Online Appendix

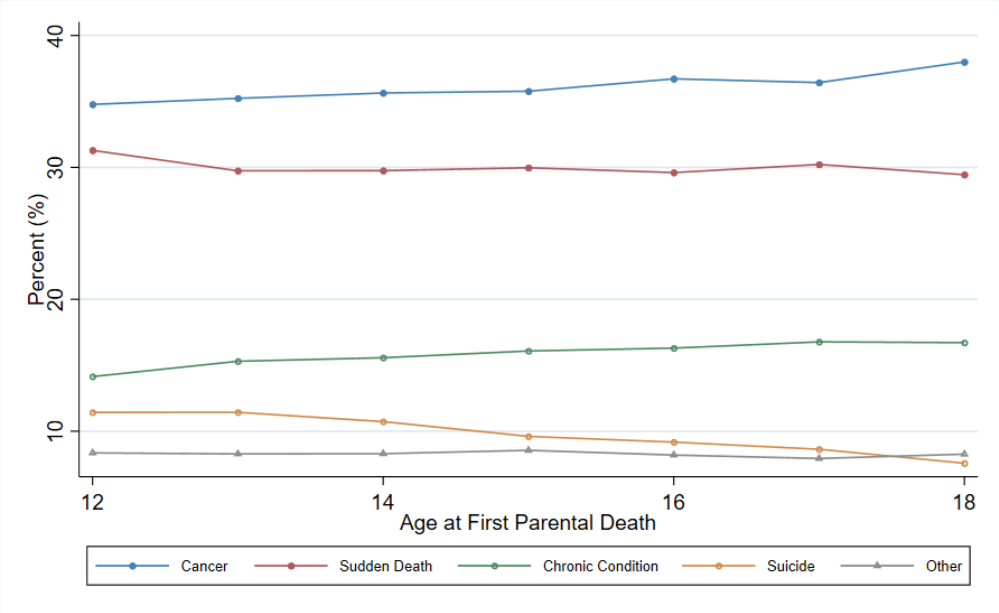
A Table and Figures

Figure A1: Cumulative Probability of Parental Death by Child Age



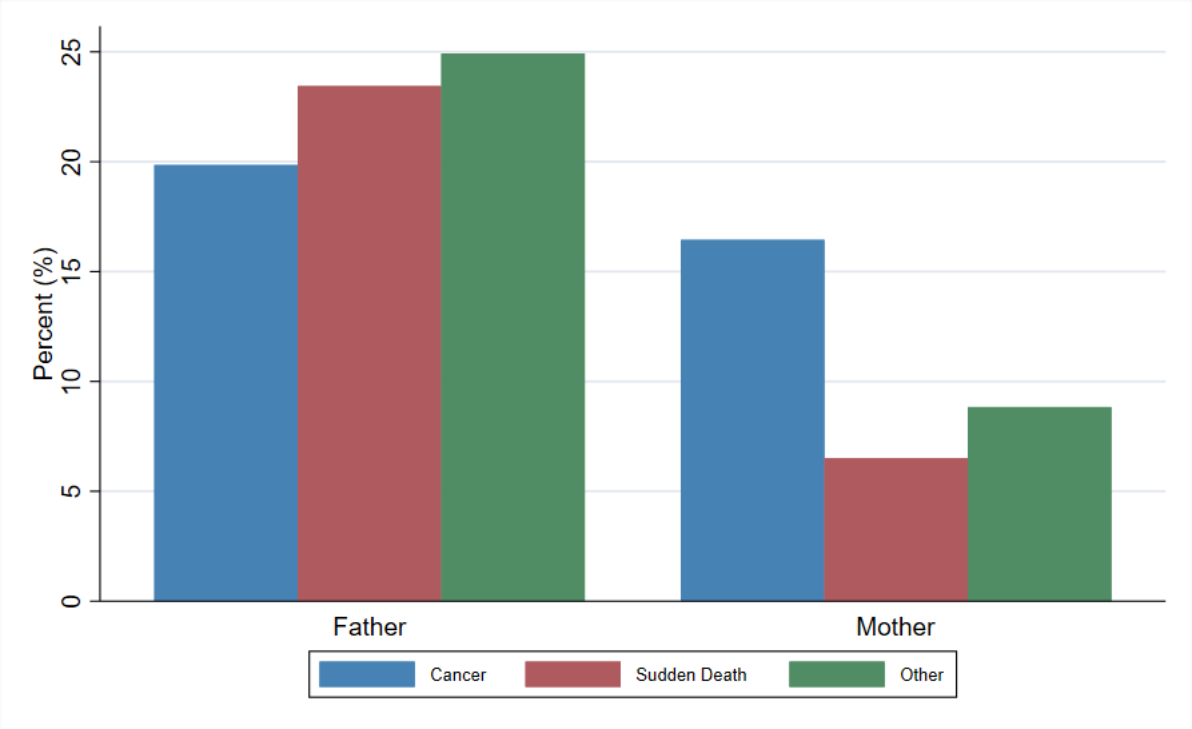
Notes: This figure shows the cumulative probability of experiencing first parental death by child age, using data from the year 2000 as a cross-sectional example, based on administrative data from Statistics Denmark.

Figure A2: Cause of Parental Death by Child Age Group



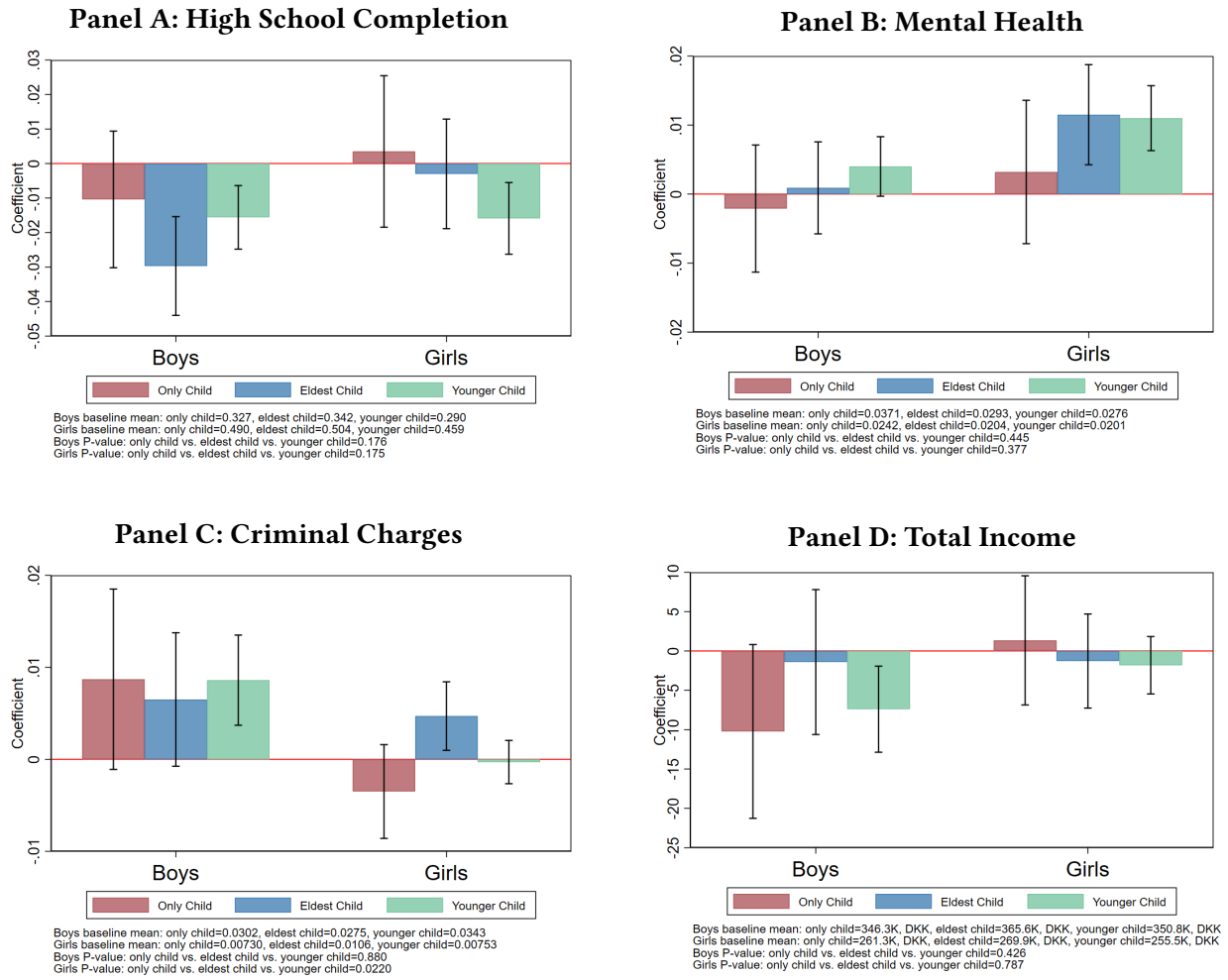
Notes: This figure shows the distribution of parental death causes across different child ages, based on administrative data from Statistics Denmark. Death causes are categorized as follows: Cancer includes all cancer-related fatalities; Sudden Death encompasses cardiovascular diseases (heart attacks, strokes) and accidents; Chronic Condition refers to other long-term illnesses such as respiratory diseases, digestive system disorders, and other progressive conditions; Suicide includes intentional self-harm; and Other covers remaining causes. The analysis demonstrates that cancer and sudden death account for approximately two-thirds of parental deaths during adolescence, with cancer being the leading cause across most age groups.

Figure A3: Causes of Death by Parent's Gender



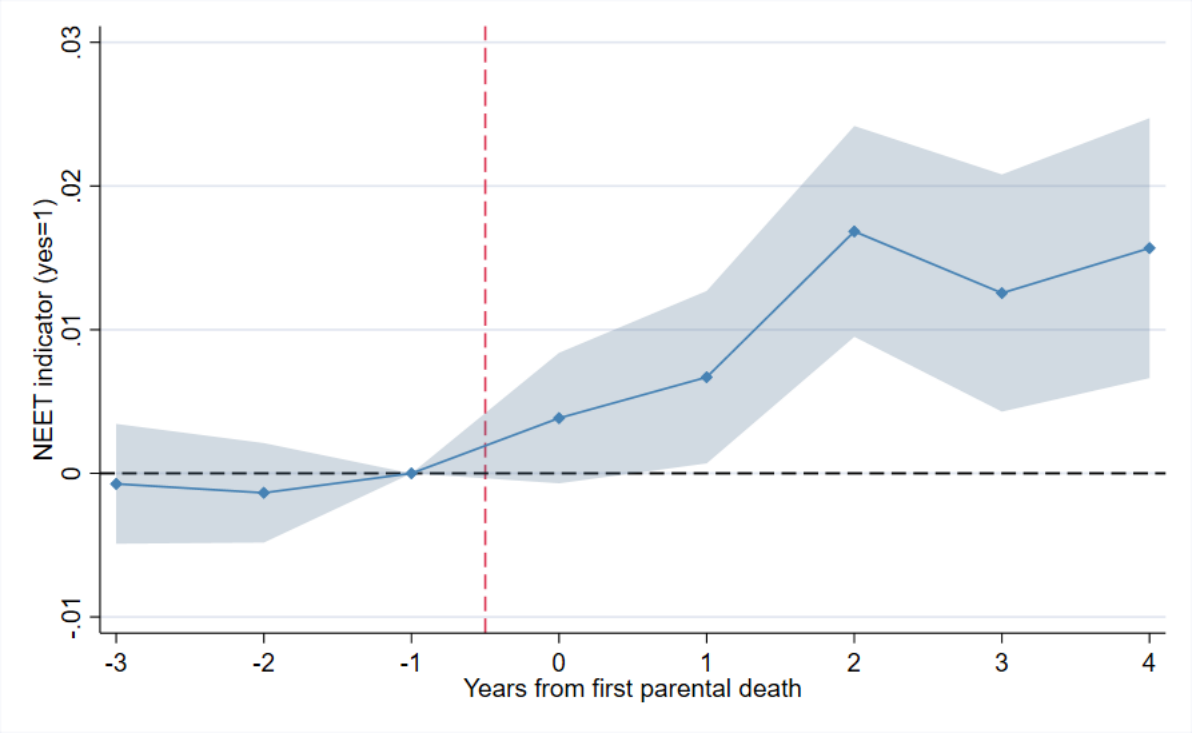
Notes: This figure shows the distribution of parental death causes by the gender of the deceased parent, based on administrative data from Statistics Denmark covering 1980-2020. Death causes are categorized into three main groups: Cancer (all cancer-related fatalities), Sudden Death (cardiovascular diseases and accidents), and Other (including chronic conditions, suicide, and remaining causes).

Figure A4: Mitigating Factors (the Role of Older Siblings)



Notes: This figure presents the role of sibling structure in mitigating the effects of parental death. We categorize children into three groups based on their sibling structure: Only Child (children with no siblings), Eldest Child (children who are the oldest among multiple siblings), and Younger Child (children who have at least one older sibling). For educational outcomes (Panel A) and labor market performance (Panel D), measured at ages 20 and 35 respectively, we estimate the coefficients from Equation (4). For mental health (Panel B) and criminal behavior (Panel C), we use Equation (5) to estimate the effects up to four years post-treatment. Data availability varies by outcome: educational data span 1995-2020; mental health prescriptions cover 1995-2021; criminal behavior records span 1995-2018; fertility and labor market data cover 1980-2020. Individuals with missing labor market records are excluded from respective analyses. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. All panels show 95% confidence intervals, with standard errors clustered at the household level.

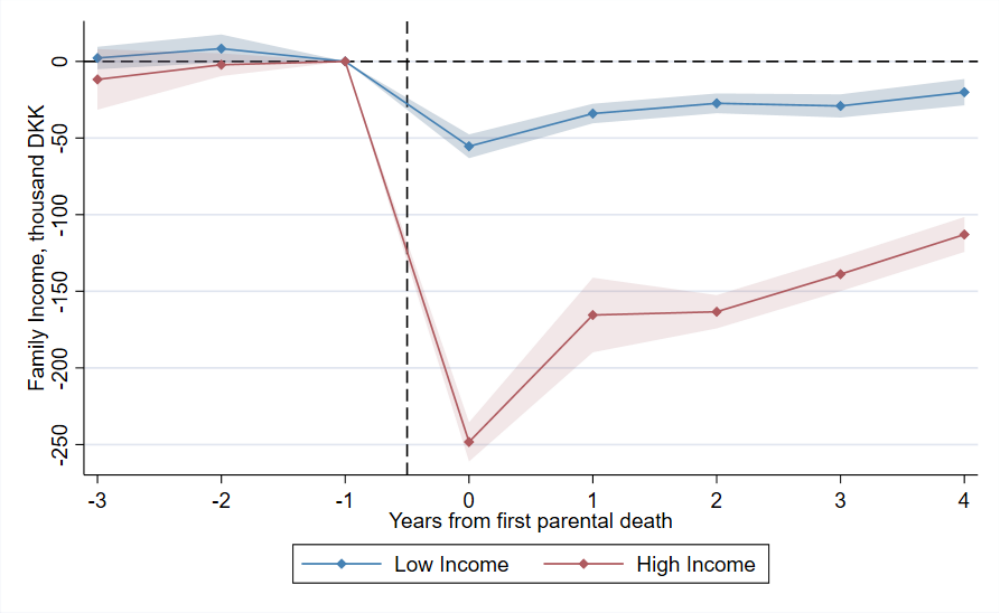
Figure A5: Dynamic Effects of Parental Death on NEET



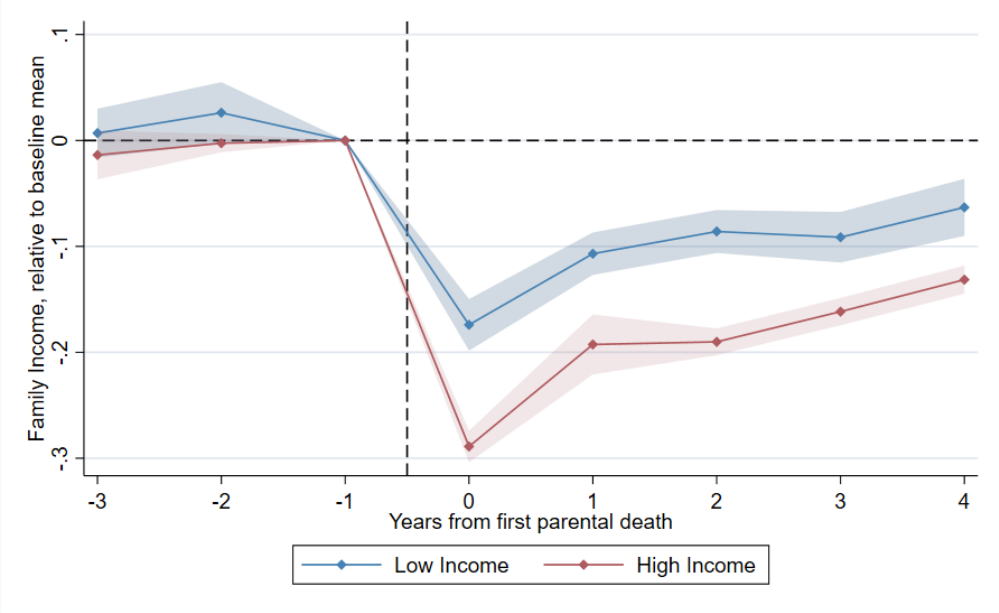
*Notes:*This figure presents the dynamic effects of parental death on NEET (Not in Education, Employment or Training) status using Equation (2). The figure shows 95% confidence intervals, with standard errors clustered at the household level.

Figure A6: Dynamic Effects of Parental Death on Household Income

Panel A: Absolute Value



Panel B: Relative Value



Notes: This figure presents the dynamic effects of parental death on household income, stratified by pre-death household income levels (high-income vs. low-income families). We estimate the results using Equation (2). Panel A shows the absolute changes in household income (in thousand DKK), while Panel B presents the relative changes as a proportion of baseline household income. Both panels show 95% confidence intervals, with standard errors clustered at the household level.

Table A1: Balance Test (Cancer vs. Sudden Death)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Cancer				Sudden Death			
	Treatment	Control	p-value	SMD	Treatment	Control	p-value	SMD
Panel A: Children's Characteristics								
Male	0.5073	0.5125	0.2243	0.0104	0.5094	0.5195	0.0366	0.0202
Age	14.4978	14.4468	0.0024	0.0260	14.4195	14.3853	0.0751	0.0172
Years of Education	9.5255	9.5037	0.2234	0.0200	9.4959	9.4822	0.5506	0.0127
Any Mental Health	0.0228	0.0201	0.1261	0.0186	0.0246	0.0248	0.9380	0.0013
Any Charge	0.0162	0.0178	0.3324	0.0124	0.0215	0.0184	0.1493	0.0222
Any Guilty	0.0129	0.0153	0.0957	0.0204	0.0170	0.0153	0.3942	0.0135
Number of Siblings	1.5615	1.5627	0.8981	0.0011	1.6581	1.6654	0.5611	0.0056
Birth Weight	3.3182	3.3240	0.3924	0.0088	3.2377	3.2505	0.1280	0.0189
Standardized Test Score	-0.1520	-0.1093	0.2731	0.0409	-0.2915	-0.2349	0.2800	0.0529
Panel B: Parental Characteristics								
Father's Age	49.2021	48.3943	0.0000	0.1077	48.2743	48.1508	0.1315	0.0145
Mother's Age	44.7963	44.2576	0.0000	0.0942	43.3205	43.3418	0.7239	0.0034
Father's College	0.2101	0.2073	0.4111	0.0069	0.1410	0.1498	0.0098	0.0250
Mother's College	0.2423	0.2362	0.0906	0.0143	0.1838	0.1841	0.9383	0.0008
Father's Employment	0.6728	0.7225	0.0000	0.1084	0.5832	0.6319	0.0000	0.0999
Mother's Employment	0.6729	0.7261	0.0000	0.1162	0.6573	0.6692	0.0097	0.0252
Father's Income	314.4261	335.8739	0.0000	0.0473	241.7120	265.4724	0.0000	0.0732
Mother's Income	195.6079	213.1383	0.0000	0.0976	176.6933	181.3013	0.0037	0.0282
Household Income	666.5616	666.5522	0.9983	0.0000	557.4741	574.6968	0.0001	0.0449
Number of Observations	22,023	36,080	58,103	58,103	18,776	24,825	43,601	43,601

Notes: This table presents a comparison of demographic characteristics and baseline outcomes between treatment and control groups one year prior to parental death, stratified by cause of death. The treatment group consists of individuals who subsequently experienced parental death during adolescence (ages 12-18), while the control group includes individuals who experienced parental death 5 years later. Cancer deaths include all cancer-related fatalities, while sudden deaths encompass cardiovascular diseases, accidents, and other unexpected causes. P-values are reported for t-tests comparing differences in means between the two groups within each cause-of-death category. SMD refers to standardized mean differences.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A2: Effects of Parental Death on Student Status and NEET

	(1) Student	(2) NEET
Treatment × Post	-0.0155***	0.0118***
	(0.0032)	(0.0027)
Observations	134,536	134,536
Baseline mean	0.973	0.0217
Year FE	Yes	Yes
Age FE	Yes	Yes
Individual FE	Yes	Yes

Notes: This table reports the effects of parental death on student status and NEET. The sample is restricted to observations from 2007 onward, as earlier records on student status are incomplete and may bias the estimates. The first column reports the effects on student status; the last column reports the effects on NEET status. We estimate the results from Equation (3). Baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses.

Table A3: Effects of Parental Death on Children's Health Condition

	(1)	(2)	(3)	(4)	(5)	(6)
	Overall	by Category				
	Mental health	Psychosis	Anxiety	Insomnia	Depression	Psychostimulant
Panel A: Extensive Margin						
Treatment × Post	0.0063***	0.0006	0.0006	0.0021***	0.0052***	-0.0010
	(0.0013)	(0.0006)	(0.0004)	(0.0005)	(0.0009)	(0.0007)
Observations	490,072	490,072	490,072	490,072	490,072	490,072
Baseline mean	0.0251	0.00512	0.00310	0.00257	0.00761	0.0114
Panel B: Intensive Margin						
Treatment × Post	0.0259**	0.0058	0.0022	0.0045**	0.0223***	-0.0089
	(0.0112)	(0.0051)	(0.0019)	(0.0019)	(0.0049)	(0.0063)
Observations	490,072	490,072	490,072	490,072	490,072	490,072
Baseline mean	0.153	0.0248	0.00853	0.00620	0.0314	0.0819
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the effects of parental death on adolescent mental health, measured by mental health prescription records. Panel A presents results for the extensive margin (any prescription), while Panel B examines the intensive margin (number of prescriptions). The sample is restricted to data from 1995 onward, as earlier records on mental health prescriptions are unavailable.We estimate the results from Equation (3). In Column (1), we consider prescriptions for any mental health condition. In Columns (2)–(6), we disaggregate prescriptions into specific categories: psychosis, anxiety, insomnia, depression, and psychostimulants. Baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses.

Table A4: Effects of Parental Death on Children's Criminal Behaviors

	(1)	(2)	(3)	(4)	(5)	(6)
	Extensive Margin			Intensive Margin		
	Charge	Conviction	Victims	Charge	Conviction	Victims
Treatment × Post	0.0041***	0.0036***	-0.0005	0.0238***	0.0121**	0.0004
	(0.0011)	(0.0010)	(0.0008)	(0.0075)	(0.0052)	(0.0009)
Observations	490,072	490,072	490,072	490,072	490,072	490,072
Baseline mean	0.0205	0.0171	0.0122	0.0529	0.0361	0.0144
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the effects of parental death on adolescent criminal behaviors, measured by criminal charge, conviction, and victimization records. The sample is restricted to data from 1995 onward, as earlier records on criminal behavior are unavailable. We estimate the results from Equation (3). The extensive margin presents results for any criminal charge, conviction, or victimization are reported in the first three columns, while the intensive margin examines the number of criminal charges, convictions, or victimizations are reported in the last three columns. Baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses.

Table A5: Effects of Parental Death on Fertility Decisions

	(1)	(2)	(3)
	Becoming Parent		Pregnancy (Female Only)
	Any Child	Number of Children	Pregnancy dummy
Treatment × Post	0.0012**	0.0012**	0.0006
	(0.0005)	(0.0006)	(0.0010)
Observations	1,106,232	1,106,232	238,336
Baseline Mean	0.00105	0.00106	0.00767
Year FE	Yes	Yes	Yes
Age FE	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes

Notes: This table reports the effects of parental death on adolescent fertility decisions. The sample for outcomes related to becoming a parent is restricted to data from 1980 onward, as earlier records are unavailable. For the pregnancy outcome (female only), we include both pregnancies and abortions. The pregnancy sample is restricted to data from 1995 onward, as abortion records are only available from that year. We estimate the results from Equation (3). Columns (1) and (2) report the effects on becoming a parent, measured at the extensive and intensive margins, respectively. Column (3) reports the effects on female pregnancy decisions. Baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses.

Table A6: Long-run scarring effects of parental death (children 6-12)

	(1)	(2)	(3)	(4)
Panel A: Education, Health, and Behavioral Outcomes				
	Years of education	Mental health	Charge	Any Child
Treatment	0.0081	0.0004	0.0118***	-0.0098**
	(0.0252)	(0.0031)	(0.0040)	(0.0044)
Observations	39,127	41,963	39,597	39,597
Baseline mean	14.05	0.127	0.245	0.678
Panel B: Labor Market Performance				
	Participation	Hours worked	Wage	Total income
Treatment	-0.0052	-4.1942	-1.6129	0.1302
	(0.0039)	(4.7352)	(2.1827)	(2.2910)
Observations	37,197	37,197	37,197	37,197
Baseline mean	0.808	824.8	294	304.4
Year FE	Yes	Yes	Yes	Yes
Block FE	Yes	Yes	Yes	Yes

Notes: This table reports the long-run scarring effects of parental death that happened during ages 6 to 12, measured at age 35. We estimate the results by Equation (1). Panel A reports key outcomes across different domains: years of education, mental health treatment utilization (extensive margin), criminal charges, and fertility decisions (having any child by age 35). Panel B reports labor market performance, including participation, hours worked, wage income, and total income. Data availability varies by outcome: educational data span 1995-2020; mental health prescriptions cover 1995-2021; criminal behavior records span 1995-2018; and fertility and labor market data cover 1980-2020. Individuals with missing labor market records are excluded from those analyses. Baseline mean refers to the control group mean at the measurement age. Standard errors, clustered at the household level, are reported in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A7: Heterogeneous Effects of Parental Death (by Cause of Death)

	(1) High School	(2) College and above	(3) Student	(4) Any Mental Health	(5) Any Charge	(6) Any Child	(7) Participation	(8) Income
Treatment × (Post) × Cancer	-0.0061	-0.0070**	-0.0119**	0.0046**	0.0041***	-0.0005	-0.0090**	-4.4664*
	(0.0048)	(0.0032)	(0.0048)	(0.0019)	(0.0016)	(0.0007)	(0.0036)	(2.3156)
Treatment × (Post) × Sudden Death	-0.0261***	-0.0124***	-0.0133*	0.0122***	0.0056**	0.0027***	-0.0038	-7.0092***
	(0.0054)	(0.0034)	(0.0070)	(0.0026)	(0.0023)	(0.0010)	(0.0042)	(2.4009)
Observations	61,479	61,479	88,888	319,640	319,640	734,512	65,528	65,528
P-Value	0.00535	0.250	0.862	0.0176	0.579	0.00876	0.345	0.446
Cancer Mean	0.445	0.132	0.974	0.0221	0.0181	0.000938	0.844	322
Sudden Death Mean	0.361	0.104	0.970	0.0280	0.0177	0.00101	0.815	299.8
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE			Yes	Yes	Yes	Yes		
Individual FE			Yes	Yes	Yes	Yes		
Block FE	Yes	Yes					Yes	Yes

Notes: This table reports heterogeneous effects of parental death by cause of death. Cancer refers to all cancer-related parental deaths. Sudden deaths include cardiovascular diseases (encompassing heart disease and stroke) as well as accidents. For educational outcomes (columns 1-2) and labor market performance (columns 7-8), measured at ages 20 and 35 respectively, we estimate the results by Equation (1). For student status, mental health, criminal behavior, and fertility outcomes (columns 3-6), we use Equation (3) to estimate the effects up to four years post-treatment. Data availability varies by outcome: educational data span 1995-2020; mental health prescriptions cover 1995-2021; criminal behavior records span 1995-2018; fertility and labor market data cover 1980-2020. Individuals with missing labor market records are excluded from the respective analyses. For cross-sectional comparisons, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A8: Heterogeneous Effects of Parental Death (by Gender)

	(1) High School	(2) College and above	(3) Student Status	(4) Any Mental health	(5) Any Charge	(6) Any Child	(7) Participation	(8) Income
Panel A: Boys								
Treatment× (Post)×Mother Dead	-0.0079	-0.0060	-0.0119	-0.0007	0.0111***	0.0004	-0.0073	-7.9441**
	(0.0067)	(0.0043)	(0.0076)	(0.0030)	(0.0033)	(0.0008)	(0.0056)	(3.5830)
Treatment× (Post) ×Father Dead	-0.0237***	-0.0111***	-0.0149***	0.0038*	0.0066***	-0.0001	-0.0063	-5.6112**
	(0.0045)	(0.0027)	(0.0053)	(0.0021)	(0.0023)	(0.0006)	(0.0039)	(2.8038)
Observations	48,372	48,372	69,104	251,736	251,736	567,968	49,261	49,261
P-value	0.0517	0.324	0.745	0.217	0.267	0.655	0.883	0.608
Baseline Mean	0.308	0.0919	0.973	0.0293	0.0320	0.000520	0.825	353.8
Panel B: Girls								
Treatment ×Mother Dead× (Post)	-0.0039	-0.0040	-0.0227***	0.0066*	0.0011	0.0012	-0.0008	1.0612
	(0.0074)	(0.0051)	(0.0083)	(0.0035)	(0.0017)	(0.0016)	(0.0057)	(2.5978)
Treatment ×Father Dead× (Post)	-0.0133***	-0.0051	-0.0145***	0.0118***	0.0004	0.0029***	-0.0054	-2.4074
	(0.0051)	(0.0034)	(0.0053)	(0.0023)	(0.0012)	(0.0011)	(0.0039)	(1.8276)
Observations	45,717	45,717	65,432	238,336	238,336	538,264	47,809	47,809
P-value	0.292	0.853	0.406	0.213	0.724	0.394	0.508	0.275
Baseline Mean	0.475	0.135	0.974	0.0207	0.00830	0.00161	0.819	259.8
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE			Yes	Yes	Yes	Yes		
Individual FE			Yes	Yes	Yes	Yes		
Block FE	Yes	Yes					Yes	Yes

Notes: This table reports heterogeneous effects of parental death by the gender of child. Panel A reports the estimation for boys and Panel B for girls. For educational outcomes (columns 1-2) and labor market performance (columns 7-8), measured at ages 20 and 35 respectively, we estimate the results by Equation (1). For student status, mental health, criminal behavior, and fertility outcomes (columns 3-6), we use Equation (3) to estimate the effects up to four years post-treatment. Data availability varies by outcome: educational data span 1995-2020; mental health prescriptions cover 1995-2021; criminal behavior records span 1995-2018; fertility and labor market data cover 1980-2020. Individuals with missing labor market records are excluded from the respective analyses. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A9: Heterogeneous Effects of Parental Death (by Household Socioeconomic Background)

	(1) High School	(2) College and above	(3) Student Status	(4) Any Mental health	(5) Any Charge	(6) Any Child	(7) Participation	(8) Income
Panel A: Interaction with Deceased Parent's Education								
Treatment × (Post) × non-college	-0.0139***	-0.0069***	-0.0133***	0.0075***	0.0028**	0.0014**	-0.0054**	-4.3265***
	(0.0031)	(0.0019)	(0.0038)	(0.0015)	(0.0013)	(0.0006)	(0.0026)	(1.4717)
Treatment × (Post) × college	-0.0086	-0.0085	-0.0193***	0.0026	0.0041**	-0.0004	-0.0028	-1.4791
	(0.0065)	(0.0053)	(0.0056)	(0.0026)	(0.0018)	(0.0007)	(0.0051)	(3.9898)
Observations	90,238	90,238	131,264	474,160	474,160	1,055,168	91,358	91,358
P-Value	0.459	0.781	0.379	0.103	0.561	0.0510	0.638	0.504
Non-college Mean	0.333	0.0924	0.974	0.0278	0.0219	0.00119	0.817	297.7
College Mean	0.635	0.200	0.983	0.0150	0.0127	0.000402	0.870	374.1
Panel B: Interaction with Household Income before Parental Death								
Treatment × (Post) × Low Income	-0.0058	-0.0033	-0.0163***	0.0047**	0.0028	0.0005	-0.0027	-2.2419
	(0.0041)	(0.0025)	(0.0052)	(0.0020)	(0.0019)	(0.0009)	(0.0046)	(2.4111)
Treatment × (Post) × High Income	-0.0143***	-0.0082***	-0.0090***	0.0072***	0.0040***	0.0001	0.0001	-2.0109
	(0.0043)	(0.0029)	(0.0035)	(0.0016)	(0.0012)	(0.0006)	(0.0036)	(2.4791)
Observations	92,859	92,859	132,608	483,512	483,512	943,512	65,309	65,309
P-Value	0.169	0.209	0.241	0.330	0.571	0.711	0.641	0.948
Low Group Mean	0.285	0.0857	0.978	0.0339	0.0312	0.00198	0.762	270.4
High Group Mean	0.486	0.138	0.995	0.0180	0.0116	0.000188	0.864	345.6
Panel C: Interaction with Household Wealth before Parental Death								
Treatment × (Post) × Low Wealth	-0.0135***	-0.0040*	-0.0174***	0.0058***	0.0055***	0.0010	-0.0016	-3.8307
	(0.0040)	(0.0024)	(0.0046)	(0.0020)	(0.0018)	(0.0009)	(0.0044)	(2.3296)
Treatment × (Post) × High Wealth	-0.0176***	-0.0103***	-0.0101**	0.0071***	0.0030**	0.0005	-0.0066*	-4.6230*
	(0.0044)	(0.0030)	(0.0042)	(0.0017)	(0.0013)	(0.0006)	(0.0038)	(2.6017)
Observations	92,859	92,859	132,608	483,512	483,512	943,512	65,309	65,309
P-Value	0.505	0.116	0.241	0.626	0.250	0.704	0.403	0.826
Low Group Mean	0.299	0.0826	0.983	0.0296	0.0271	0.00175	0.777	280.7
High Group Mean	0.486	0.145	0.991	0.0212	0.0144	0.000313	0.855	339.6
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE			Yes	Yes	Yes	Yes		
Individual FE			Yes	Yes	Yes	Yes		
Block FE	Yes	Yes					Yes	Yes

Notes: This table reports heterogeneous effects of parental death by household socioeconomic background. Panel A examines differential effects by the educational attainment of the deceased parent (college degree vs. no college degree). Panels B and C present heterogeneous effects across families with above-median household income and wealth prior to the parental death shock, where high income (wealth) is defined as household income (wealth) exceeding the median of the treatment group. For educational outcomes (columns 1-2) and labor market performance (columns 7-8), measured at ages 20 and 35 respectively, we estimate the results by Equation (1). For student status, mental health, criminal behavior, and fertility outcomes (columns 3-6), we use Equation (3) to estimate the effects up to four years post-treatment. Data availability varies by outcome: educational data span 1995-2020; mental health prescriptions cover 1995-2021; criminal behavior records span 1995-2018; fertility and labor market data cover 1980-2020. Individuals with missing labor market records are excluded from the respective analyses. For Panels B and C, household income and wealth data are only available from 1985 onwards, restricting the analysis to cohorts for whom pre-death financial information is observed, which explains the smaller sample sizes compared to Panel A, particularly for labor market performance. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A10: Heterogeneous Effects of Parental Death (by Family Structure and Remarriage)

	(1) High School	(2) College and above	(3) Student Status	(4) Any Mental health	(5) Any Charge	(6) Any Child	(7) Participation	(8) Income
Treatment × (Post) × Single Parent	-0.0155	-0.0116*	-0.0127	0.0132***	0.0075*	0.0015	0.0081	-8.8202
	(0.0104)	(0.0062)	(0.0110)	(0.0049)	(0.0045)	(0.0021)	(0.0116)	(6.1431)
Treatment × (Post) × Remarried	-0.0125	-0.0109	-0.0369**	0.0172**	0.0113*	0.0023	0.0112	15.6500*
	(0.0171)	(0.0106)	(0.0165)	(0.0082)	(0.0066)	(0.0036)	(0.0189)	(9.4171)
Treatment × (Post) × Two-Parent	-0.0178***	-0.0074***	-0.0118***	0.0069***	0.0041***	0.0006	-0.0058*	-4.5414**
	(0.0041)	(0.0028)	(0.0041)	(0.0016)	(0.0012)	(0.0006)	(0.0035)	(2.2988)
Treatment × (Post) × Independent	-0.0037	-0.0029	-0.0111**	0.0023	0.0014	-0.0005	0.0008	-1.0378
	(0.0046)	(0.0028)	(0.0053)	(0.0024)	(0.0021)	(0.0011)	(0.0055)	(3.0528)
Observations	92,859	92,859	132,608	483,512	483,512	943,512	65,309	65,309
P-Value	0.162	0.490	0.509	0.0818	0.333	0.729	0.452	0.137
Single Mean	0.326	0.0900	0.978	0.0281	0.0300	0.000713	0.775	289.8
Remarried Mean	0.306	0.0921	0.991	0.0235	0.0156	0.000955	0.803	280.1
Two-Parent Mean	0.468	0.137	0.993	0.0156	0.0126	0.000411	0.852	332.4
Independent Mean	0.300	0.0859	0.980	0.0384	0.0302	0.00214	0.760	275.8
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE			Yes	Yes	Yes	Yes		
Individual FE			Yes	Yes	Yes	Yes		
Block FE	Yes	Yes					Yes	Yes

Notes: This table reports heterogeneous effects of parental death by family structure measured one year prior to the death event. We distinguish between four family configurations at the time of measurement: single-parent households where the biological parent living with the child dies (Single Parent), single-parent households where the biological parent cohabits with a non-biological partner and the biological parent dies (Remarried), two-parent households where both biological parents live with the child and one dies (Two-Parent), and cases where a non-cohabiting parent dies (Independent). For educational outcomes (columns 1-2) and labor market performance (columns 7-8), measured at ages 20 and 35 respectively, we estimate the results by Equation (1). For student status, mental health, criminal behavior, and fertility outcomes (columns 3-6), we use Equation (3) to estimate the effects up to four years post-treatment. Data availability varies by outcome: educational data span 1995-2020; mental health prescriptions cover 1995-2021; criminal behavior records span 1995-2018; fertility and labor market data cover 1980-2020. Individuals with missing labor market records are excluded from respective analyses. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A11: Mitigating Channels (by Proximity to Grandparents)

	(1) High School	(2) College and above	(3) Student Status	(4) Any Mental health	(5) Any Charge	(6) Any Child	(7) Participation	(8) Income
Treatment × (Post) × no Grandparent	-0.0318***	-0.0114**	-0.0109**	0.0064**	0.0056**	0.0012	-0.0619	-59.2198**
	(0.0080)	(0.0055)	(0.0050)	(0.0030)	(0.0023)	(0.0014)	(0.0410)	(23.9678)
Treatment × (Post) × with Grandparent	-0.0134	-0.0096*	-0.0094*	0.0063**	0.0044**	0.0000	0.0119	5.6591
	(0.0083)	(0.0054)	(0.0048)	(0.0029)	(0.0022)	(0.0013)	(0.0364)	(21.8262)
Observations	27,955	27,955	95,480	228,784	228,784	229,688	919	919
P-Value	0.119	0.821	0.832	0.977	0.717	0.558	0.193	0.0604
No Grandparent Mean	0.411	0.130	0.986	0.0412	0.0211	0.0211	0.782	349.4
with Grandparent Mean	0.388	0.117	0.990	0.0326	0.0160	0.0160	0.759	307.9
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE			Yes	Yes	Yes	Yes		
Individual FE			Yes	Yes	Yes	Yes		
Block FE	Yes	Yes					Yes	Yes

Notes: This table reports heterogeneous effects of parental death by the presence of grandparents within the same municipality. For educational outcomes (columns 1-2) and labor market performance (columns 7-8), measured at ages 20 and 35 respectively, we estimate the results by Equation (1). For student status, mental health, criminal behavior, and fertility outcomes (columns 3-6), we use Equation (3) to estimate the effects up to four years post-treatment. Data availability varies by outcome: educational data span 1995-2020; mental health prescriptions cover 1995-2021; criminal behavior records span 1995-2018; fertility and labor market data cover 1980-2020. Individuals with missing labor market records are excluded from respective analyses. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A12: Mitigating Channels (the Role of Older Siblings)

	(1) High School	(2) College and above	(3) Student Status	(4) Any Mental health	(5) Any Charge	(6) Any Child	(7) Participation	(8) Income
Panel A: Boys								
Treatment × (Post) × Only Child	-0.0104	-0.0052	-0.0095	-0.0021	0.0087*	0.0012	-0.0095	-10.2256*
	(0.0101)	(0.0065)	(0.0117)	(0.0047)	(0.0050)	(0.0011)	(0.0087)	(5.6346)
Treatment × (Post) × Eldest Child	-0.0297***	-0.0189***	-0.0139*	0.0009	0.0065*	-0.0003	0.0013	-1.4089
	(0.0073)	(0.0047)	(0.0081)	(0.0034)	(0.0037)	(0.0009)	(0.0062)	(4.6976)
Treatment × (Post) × Younger Child	-0.0156***	-0.0064**	-0.0150***	0.0040*	0.0086***	0.0000	-0.0094**	-7.3986***
	(0.0047)	(0.0028)	(0.0056)	(0.0022)	(0.0025)	(0.0007)	(0.0040)	(2.7907)
Observations	48,336	48,336	69,104	251,712	251,712	567,432	49,184	49,184
P-Value	0.176	0.0553	0.914	0.445	0.880	0.543	0.327	0.426
Only Child Mean	0.327	0.108	0.966	0.0371	0.0302	0.000542	0.805	346.3
Eldest Child Mean	0.342	0.107	0.964	0.0293	0.0275	0.000553	0.832	365.6
Younger Child Mean	0.290	0.0815	0.978	0.0276	0.0343	0.000502	0.827	350.8
Panel B: Girls								
Treatment × (Post) × Only Child	0.0035	0.0139*	0.0007	0.0032	-0.0035	0.0020	-0.0034	1.3457
	(0.0112)	(0.0079)	(0.0118)	(0.0053)	(0.0026)	(0.0021)	(0.0091)	(4.1873)
Treatment × (Post) × Eldest Child	-0.0030	0.0013	-0.0234***	0.0115***	0.0047**	0.0004	0.0058	-1.2830
	(0.0081)	(0.0059)	(0.0085)	(0.0037)	(0.0019)	(0.0017)	(0.0065)	(3.0500)
Treatment × (Post) × Younger Child	-0.0159***	-0.0109***	-0.0183***	0.0110***	-0.0003	0.0032***	-0.0078*	-1.8163
	(0.0053)	(0.0035)	(0.0057)	(0.0024)	(0.0012)	(0.0012)	(0.0041)	(1.8605)
Observations	45,670	45,670	65,432	238,320	238,320	537,480	47,702	47,702
P-Value	0.175	0.00712	0.240	0.377	0.0220	0.389	0.207	0.787
Only Child Mean	0.490	0.143	0.974	0.0242	0.00730	0.000993	0.805	261.3
Eldest Child Mean	0.504	0.152	0.979	0.0204	0.0106	0.00139	0.819	269.9
Younger Child Mean	0.459	0.127	0.972	0.0201	0.00753	0.00182	0.821	255.5
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE			Yes	Yes	Yes	Yes		
Individual FE			Yes	Yes	Yes	Yes		
Block FE	Yes	Yes					Yes	Yes

Notes: This table examines the role of sibling structure in mitigating the effects of parental death. We categorize children into three groups based on their sibling structure: Only Child (children with no siblings), Eldest Child (children who are the oldest among multiple siblings), and Younger Child (children who have at least one older sibling). For educational outcomes (columns 1-2) and labor market performance (columns 7-8), measured at ages 20 and 35 respectively, we estimate the results by Equation (1). For student status, mental health, criminal behavior, and fertility outcomes (columns 3-6), we use Equation (3) to estimate the effects up to four years post-treatment. Data availability varies by outcome: educational data span 1995-2020; mental health prescriptions cover 1995-2021; criminal behavior records span 1995-2018; fertility and labor market data cover 1980-2020. Individuals with missing labor market records are excluded from respective analyses. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A13: Mitigating Channels (by School Quality)

	(1) High School	(2) College and above	(3) Student Status	(4) Any Mental health	(5) Any Charge	(6) Any Child	(7) Participation	(8) Income
Treatment × (Post) × Low Quality	-0.0135*	-0.0137***	-0.0068	0.0044	0.0062**	0.0028**	-0.0062	-7.0642*
	(0.0081)	(0.0050)	(0.0046)	(0.0032)	(0.0028)	(0.0011)	(0.0073)	(4.1666)
Treatment × (Post) × High Quality	-0.0244***	-0.0101*	0.0050	0.0018	0.0048**	0.0007	0.0051	-5.4151
	(0.0081)	(0.0054)	(0.0037)	(0.0026)	(0.0021)	(0.0007)	(0.0064)	(4.0118)
Observations	29,175	29,175	60,760	163,752	163,752	334,856	27,157	27,157
P-Value	0.343	0.626	0.0462	0.522	0.693	0.125	0.241	0.778
Low Group Mean	0.327	0.0915	0.994	0.0343	0.0114	0.000257	0.813	296.4
High Group Mean	0.444	0.122	0.999	0.0179	0.00624	0.000229	0.841	320.9
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE			Yes	Yes	Yes	Yes		
Individual FE			Yes	Yes	Yes	Yes		
Block FE	Yes	Yes					Yes	Yes

Notes: This table reports heterogeneous effects of parental death by school quality at the time of parental death. School quality is measured using National Test Scores (NTS), with schools classified as high quality if their average standardized test scores across subjects and years are above the median. School quality is measured using National Test Scores (NTS), which are only available from 2010 onwards, restricting our analysis to students who attended schools that remained operational and measurable in the post-2010 period. For educational outcomes (columns 1-2) and labor market performance (columns 7-8), measured at ages 20 and 35 respectively, we estimate the results by Equation (1). For student status, mental health, criminal behavior, and fertility outcomes (columns 3-6), we use Equation (3) to estimate the effects up to four years post-treatment. Data availability varies by outcome: educational data span 1995-2020; mental health prescriptions cover 1995-2021; criminal behavior records span 1995-2018; fertility and labor market data cover 1980-2020. Individuals with missing labor market records are excluded from respective analyses. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A14: Mitigating Channels (Female Teacher Ratio, by Gender)

	(1) High School	(2) College and above	(3) Student Status	(4) Any Mental health	(5) Any Charge	(6) Any Child	(7) Participation	(8) Income
Panel A: Boys								
Treatment × (Post) ×Low Ratio	-0.0136	-0.0171***	-0.0086	0.0015	0.0062*	0.0008	-0.0058	-1.4702
	(0.0083)	(0.0055)	(0.0056)	(0.0027)	(0.0032)	(0.0009)	(0.0059)	(4.1741)
Treatment × (Post) ×High Ratio	-0.0367***	-0.0099*	-0.0055	0.0012	0.0097***	-0.0002	-0.0101	-14.1275**
	(0.0090)	(0.0054)	(0.0045)	(0.0032)	(0.0032)	(0.0007)	(0.0078)	(5.6792)
Observations	25,384	25,384	49,736	143,168	143,168	299,560	25,092	25,092
P-Value	0.0600	0.357	0.661	0.941	0.441	0.334	0.665	0.0748
Low Group Mean	0.421	0.132	0.997	0.0243	0.0339	0.000298	0.857	384.3
High Group Mean	0.305	0.0811	0.999	0.0321	0.0105	0.000228	0.840	358.7
Panel B: Girls								
Treatment × (Post) ×Low Ratio	-0.0084	-0.0037	-0.0136**	0.0125***	-0.0001	0.0012	0.0021	-0.5513
	(0.0079)	(0.0061)	(0.0057)	(0.0031)	(0.0014)	(0.0013)	(0.0056)	(2.8203)
Treatment × (Post) ×High Ratio	0.0027	-0.0117*	-0.0029	0.0061*	0.0022	0.0011	0.0015	1.3566
	(0.0102)	(0.0065)	(0.0049)	(0.0036)	(0.0015)	(0.0014)	(0.0082)	(3.5896)
Observations	26,066	26,066	49,824	146,120	146,120	308,960	26,653	26,653
P-Value	0.388	0.371	0.151	0.181	0.274	0.932	0.951	0.676
Low Group Mean	0.603	0.175	0.993	0.0200	0.00747	0.000492	0.853	281.9
High Group Mean	0.439	0.123	0.994	0.0171	0.00481	0.000349	0.814	250.3
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE			Yes	Yes	Yes	Yes		
Individual FE			Yes	Yes	Yes	Yes		
Block FE	Yes	Yes					Yes	Yes

Notes: This table examines how teacher gender composition moderates the effects of parental death, with results stratified by child gender. Panel A reports effects for boys, while Panel B reports effects for girls. Teacher gender ratio data are obtained from school employee records, which are only accessible from 2008 onwards, restricting our analysis to students who attended schools that remained operational and measurable in the post-2008 period. Schools are classified as having high female teacher ratios if the proportion of female teachers is above the median across all schools. For educational outcomes (columns 1-2) and labor market performance (columns 7-8), measured at ages 20 and 35 respectively, we estimate the results by Equation (1). For student status, mental health, criminal behavior, and fertility outcomes (columns 3-6), we use Equation (3) to estimate the effects up to four years post-treatment. Data availability varies by outcome: educational data span 1995-2020; mental health prescriptions cover 1995-2021; criminal behavior records span 1995-2018; fertility and labor market data cover 1980-2020. Individuals with missing labor market records are excluded from respective analyses. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A15: Mitigating Channels (by Female Teacher Ratio)

	(1) High School	(2) College and above	(3) Student Status	(4) Any Mental health	(5) Any Charge	(6) Any Child	(7) Participation	(8) Income
Treatment × (Post) × Low Ratio	-0.0107*	-0.0101**	-0.0111***	0.0073***	0.0027	0.0011	-0.0016	-0.9788
	(0.0058)	(0.0042)	(0.0040)	(0.0021)	(0.0017)	(0.0008)	(0.0040)	(2.4732)
Treatment × (Post) × High Ratio	-0.0172**	-0.0108**	-0.0042	0.0035	0.0061***	0.0003	-0.0042	-6.3983*
	(0.0068)	(0.0042)	(0.0034)	(0.0024)	(0.0018)	(0.0008)	(0.0057)	(3.3613)
Observations	51,450	51,450	99,560	289,288	289,288	608,520	51,745	51,745
P-Value	0.465	0.908	0.182	0.227	0.180	0.513	0.708	0.196
Low Group Mean	0.515	0.154	0.995	0.0221	0.0204	0.000398	0.855	330.6
High Group Mean	0.371	0.102	0.996	0.0247	0.00769	0.000288	0.827	304.6
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE			Yes	Yes	Yes	Yes		
Individual FE			Yes	Yes	Yes	Yes		
Group FE	Yes	Yes					Yes	Yes
Block FE	Yes	Yes					Yes	Yes

Notes: This table examines how teacher gender composition moderates the effects of parental death. Teacher gender ratio data are obtained from school employee records, which are only accessible from 2008 onwards, restricting our analysis to students who attended schools that remained operational and measurable in the post-2008 period. Schools are classified as having high female teacher ratios if the proportion of female teachers is above the median across all schools. For educational outcomes (columns 1-2) and labor market performance (columns 7-8), measured at ages 20 and 35 respectively, we estimate the results by Equation (1). For student status, mental health, criminal behavior, and fertility outcomes (columns 3-6), we use Equation (3) to estimate the effects up to four years post-treatment. Data availability varies by outcome: educational data span 1995-2020; mental health prescriptions cover 1995-2021; criminal behavior records span 1995-2018; fertility and labor market data cover 1980-2020. Individuals with missing labor market records are excluded from respective analyses. For cross-sectional comparisons, baseline mean refers to the control group mean at the measurement age. For difference-in-differences specifications, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

B Robustness check with a different Δ

In this subsection, we examine the robustness of our results with respect of using $\Delta = 4$. The results are presented in Tables B1 through Tables B5, demonstrate remarkable consistency with our main findings across all outcome domains, providing strong evidence for the stability of our conclusions to alternative methodological choices.

Table B1: Effects of Parental Death on Educational Outcomes

	(1)	(2)	(3)	(4)
Panel A: Measured at age 20				
	Academic High School	College	University	College and above
Treatment	-0.0118***	-0.0030***	-0.0036***	-0.0066***
	(0.0026)	(0.0011)	(0.0013)	(0.0017)
Observations	92,108	92,108	92,108	92,108
Baseline mean	0.388	0.0451	0.0676	0.113
Year FE	Yes	Yes	Yes	Yes
Block FE	Yes	Yes	Yes	Yes
Panel B: Average Treatment Effects				
	Student Status	NEET		
Treatment	-0.0094***	0.0075***		
	(0.0030)	(0.0025)		
Observations	120,561	120,561		
Baseline mean	0.973	0.0220		
Year FE	Yes	Yes		
Age FE	Yes	Yes		
Individual FE	Yes	Yes		

Notes: This table reports robustness checks using $\Delta = 4$ years instead of the main specification's $\Delta = 5$ years. Panel A estimates the impact of parental death on educational outcomes measured at age 20 using Equation (1) Panel B reports average treatment effects for student status and NEET outcomes using Equation (3). For Panel A, baseline mean refers to the control group mean at age 20. For Panel B, baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table B2: Effects of Parental Death on Children's Health Condition

	(1) Overall	(2)	(3)	(4)	(5)	(6)
		by Category				
	Mental health	Psychosis	Anxiety	Insomnia	Depression	Psychostimulant
Panel A: Extensive Margin						
Treatment × Post	0.0060***	0.0005	0.0008**	0.0023***	0.0044***	-0.0011
	(0.0013)	(0.0006)	(0.0004)	(0.0005)	(0.0009)	(0.0007)
Observations	419,692	419,692	419,692	419,692	419,692	419,692
Baseline mean	0.0243	0.00464	0.00307	0.00262	0.00732	0.0109
Panel B: Intensive Margin						
Treatment × Post	0.0162	0.0032	0.0018	0.0041**	0.0188***	0.0162
	(0.0112)	(0.0049)	(0.0025)	(0.0019)	(0.0047)	(0.0112)
Observations	419,692	419,692	419,692	419,692	419,692	419,692
Baseline mean	0.145	0.0229	0.00890	0.00676	0.0285	0.0784
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports robustness checks using $\Delta = 4$ years instead of the main specification's $\Delta = 5$ years on the effects of parental death on adolescent mental health, measured by mental health prescription records. Panel A presents results for the extensive margin (any prescription), while Panel B examines the intensive margin (number of prescriptions). The sample is restricted to data from 1995 onward, as earlier records on mental health prescriptions are unavailable.We estimate the results from Equation (3). In Column (1), we consider prescriptions for any mental health condition. In Columns (2)–(6), we disaggregate prescriptions into specific categories: psychosis, anxiety, insomnia, depression, and psychostimulants. Baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table B3: Effects of Parental Death on Children's Criminal Behaviors

	(1)	(2)	(3)	(4)	(5)	(6)
	Extensive Margin			Intensive Margin		
	Charge	Conviction	Victims	Charge	Conviction	Victims
Treatment × Post	0.0041***	0.0035***	-0.0005	0.0143**	0.0064	0.0002
	(0.0011)	(0.0010)	(0.0008)	(0.0062)	(0.0044)	(0.0010)
Observations	419,692	419,692	419,692	419,692	419,692	419,692
Baseline mean	0.0198	0.0165	0.0110	0.0507	0.0368	0.0125
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports robustness checks using $\Delta = 4$ years instead of the main specification's $\Delta = 5$ years on the effects of parental death on adolescent criminal behaviors, measured by criminal charge, conviction, and victimization records. The sample is restricted to data from 1995 onward, as earlier records on criminal behavior are unavailable. We estimate the results from Equation (3). The extensive margin presents results for any criminal charge, conviction, or victimization are reported in the first three columns, while the intensive margin examines the number of criminal charges, convictions, or victimizations are reported in the last three columns. Baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table B4: Effects of Parental Death on Fertility Decisions

	(1)	(2)	(3)
	Becoming parent		Pregnancy (female only)
	Any Child	Number of Children	Pregnancy dummy
Treatment × Post	0.0012***	0.0010**	0.0010
	(0.0004)	(0.0005)	(0.0010)
Observations	935,977	935,977	204,267
Baseline Mean	0.00107	0.00111	0.00695
Year FE	Yes	Yes	Yes
Age FE	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes

Notes: This table reports robustness checks using $\Delta = 4$ years instead of the main specification's $\Delta = 5$ years on the effects of parental death on adolescent fertility decisions. The sample for outcomes related to becoming a parent is restricted to data from 1980 onward, as earlier records are unavailable. For the pregnancy outcome (female only), we include both pregnancies and abortions. The pregnancy sample is restricted to data from 1995 onward, as abortion records are only available from that year. We estimate the results from Equation (3). Columns (1) and (2) report the effects on becoming a parent, measured at the extensive and intensive margins, respectively. Column (3) reports the effects on female pregnancy decisions. Baseline mean refers to the control group mean in the year prior to the treatment group's parental death. Standard errors, clustered at the household level, are reported in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table B5: Effects of Parental Death on Children's Labor Market Performance

	(1) Participation	(2) Intensive participation	(3) Wage	(4) Total income
Treatment	-0.0048**	-6.5669**	-3.4668***	-4.0361***
	(0.0021)	(2.6368)	(1.1665)	(1.2638)
Observations	92,840	92,840	92,840	92,840
Baseline Mean	0.822	843	295.1	307.6
Year FE	Yes	Yes	Yes	Yes
Block FE	Yes	Yes	Yes	Yes

Notes: This table reports robustness checks using $\Delta = 4$ years instead of the main specification's $\Delta = 5$ years on the impact of parental death on labor market performance under the soon-to-be-treated design with Equation (1). Baseline mean refers to the control group mean at age 35. Standard errors, clustered at the household level, are reported in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.