

## Abstract

The aim of this paper is to analyze the effects of early life shocks on later-in-life outcomes. A major shock being parental loss very early on and up to age 28. For doing this, we use the universe of the Danish population from 1980 to 2013 and focus on a cohort composed by those individuals born between 1980 and 1983 and detailed information on causes of deaths. This is important as we can probe the robustness of our results using accidental deaths only.

We find that the death of a parent (either mother or father) has a substantial negative effect on income of the offspring at the age of 30-33 (typically considered a good proxy for permanent income) and we find that such effects are larger if parental death happened in the very early stages of life, suggesting a lower income of about 7,200 US\$ (13.4% of the mean income). The effects are then decreasing for later deaths.

We point out that such negative effects arise, and can on average be almost fully accounted for, by the loss of schooling. Furthermore, a deterioration in mental health seems to be extremely relevant for those who lost a parent early in life, with an increase in the probability of being admitted to hospital for mental health treatment being double that of the general population.

## Introduction

Early life events have the potential to divert individual life trajectories with irreversible consequences on child development. The death of a parent early in life is one of the most disruptive event for a child has major consequences, such as

- 1) the emotional strain caused by a prolonged grief;
- 2) direct income losses due to missing parent's income;
- 3) adult productivity and well-being.

However, much of the previous literature on parents' absence or household structure and composition (e.g., *Lundberg et al. (2016)*) relies on potentially **endogenous sources of variations**, albeit following cleaner designs than for paternal absence due to divorce.

In this paper we exploit **high quality registered data**, covering the entire population of Denmark, coupled with **detailed information on the causes of deaths** we can probe the robustness of our results using accidental deaths as in *Andersen and Nielsen (2011)* and other conditional designs. Furthermore, and more substantively, we are able to explore many of the mechanisms through which the loss of a parent can affect offspring's outcomes in the long-run.

## Data

We address these issues using Danish administrative data from 1970 to 2016, which offers an exceptional opportunity for studying the impact of parent's death on a different set of outcome, such as offspring's

- 1) Income
- 2) College Education
- 3) Mental Health

In addition, using the registry of deaths for the entire Danish population from 1970 to 2016 and the **causes of deaths**, we can identify the year when a parent dies and in 79% of our estimating sample the cause of death. Alternatively, we follow *Walter et al. (2019)* and classify from the the Register of Causes of Death (*Dødsårsagsregistret*) an **accidental death** if the individual's case has been registered with the World Health Organization International Classification of Disease (ICD).

We focus on a **cohort composed by those individuals born between 1980 and 1983** for whom we can identify parents in the data. *Chetty et al. (2014)* use a similar cohort approach for the study on inter-generational mobility in the US. We measure **average income of parents around the birth time of their offspring and the income of the children around age 30**, as a proxy for permanent income. Besides the necessary restriction of data availability described above, the specific cohort means that those individuals are likely to be subjected to the same economy-wide shocks and underlying structural conditions at the same time in their life cycle.

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## Estimation strategy

Our estimation strategy is based on the following equation:

$$y_{ic} = \alpha_0 + \sum_{a=1}^A \alpha_a 1\{\text{death at age } a=1\}_{ifc} + \gamma X_{ico} + \epsilon_{ic}$$

where, for each individual  $i$ ,  $y$  is a generic outcome, e.g., permanent income,  $\alpha_a$  captures the effect of parental deaths at different ages compared to death at age larger than  $A$ . Importantly in each table presenting the results we have a last column using only accidental deaths versus still alive parents by 2013. In our analysis we cluster the standard errors at the household level.

Child's Age at Death	Dependent variable: Offspring's income						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
[0, 2]	-5759.53***	-5743.48***	-5245.39***	-5598.19***	-5569.31***	-5597.83***	-7208.50***
(2, 6]	(1071.07)	(1081.88)	(1103.41)	(1211.10)	(1209.13)	(1209.07)	(1432.50)
[6, 14]	-4428.59***	-4179.27***	-3075.15***	-3095.79***	-3112.37***	-3128.26***	-3001.21*
	(821.95)	(815.99)	(849.59)	(993.22)	(992.47)	(993.07)	(1555.66)
(14, 20]	-4598.31***	-4566.32***	-4232.31***	-4365.01***	-4494.28***	-4504.70***	-5081.23***
	(430.47)	(426.49)	(431.65)	(470.97)	(473.48)	(473.47)	(715.40)
(21, 28]	-3287.69***	-3273.54***	-2970.87***	-3126.35***	-3274.47***	-3288.19***	-3815.15***
	(437.26)	(423.41)	(443.20)	(431.20)	(433.95)	(433.95)	(775.65)
	-2515.79***	-2580.49***	-2381.04***	-1758.20*	-1882.17*	-1889.70*	-2355.28
	(756.64)	59.69	67.37***	(988.07)	(997.85)	(995.72)	(1472.20)
Income Father		(37.03)	(14.91)				
Income Father squared		476.99***	315.79				
		(4.94)	(257.52)				
Income Mother		204.41***	(19.79)				
Income Mother squared		-500.51	(823.62)				
Household Income		0.29***	0.29***	0.29***	0.29***	0.28***	
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
Household Income squared		0.00	0.00	0.00	0.00	0.00	
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Year of birth Father				69.02***	67.62***		
				(16.74)	(16.75)		
Year of birth Mother				-290.51***	-295.04***		
				(20.07)	(20.55)		
Year of birth Offspring					223.45***		
					(108.47)		
Only accidental deaths	No	No	No	No	No	No	Yes
Average of the dep. variable	53595.76	53595.76	53824.11	539476.63	53947.30	539476.63	53868.94
Adjusted R <sup>2</sup>	0.00	0.43	0.01	0.01	0.01	0.01	0.01
Number of clusters	187,023	187,023	187,709	147,721	147,716	147,721	133,452
Number of observations	208,220	208,220	197,709	156,914	156,198	156,198	141,373

We find that father's death in the first **1,000 days** has major impact on sons' income the size of the effect is over **7,200 US\$ or 13.4% of the mean income for the population in 2013** (the average income in 2013 for Denmark is 53,596 US\$). As we read along the rows of the table, we see how father's death at later ages is linked to lower incomes for the adult sons with a monotonically decreasing effect. In column (2) we control for father's income and its square and find qualitatively the same results as in column (1). As we progress left to right, we add additional controls, and we find no changes in the effects. Column (7) only uses accidental deaths, and it is our preferred specification, and find even larger effects at younger ages, up to 13% of average income, while parental deaths at age 21-28 becomes insignificant and economically small.

**Similar pattern can be found when college education and mental health are considered as dependent variables.** Additional results shows that negative effects arise, and can on average be almost fully account for, by the loss of schooling.

Overall, the effect are statistically the same for sons and daughters and mothers or fathers' deaths. For children in the lowest quarter of household income at the time of birth the loss of income is enormous at about 9,800 US\$ or 18.2% of the mean.

## Conclusions

We find that death of a parent (either mother or father) has a substantial negative effect on incomes of the offspring at the age of 30-33, which typically is considered a good proxy for permanent income, and we find that such effects are larger if parental death happened in the very early stages of life. The effect is very large with our preferred specification based on accidental deaths suggesting a lower income of about 7,200 US\$ or about 13.4% of the mean income if the parental death occurs in the first 1,000 days of life. The effects are then decreasing for later deaths, to about 4,000 US\$ for deaths in the 14-20 age range and smaller and insignificant for later deaths. These effects can be largely attributed to the loss of schooling.

## References

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