

Turku Center for Welfare Research
Working Papers on Social and Economic Issues
12/2016

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university education**

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28.06.2016

The effect of early parental death on children's university education

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Abstract

The role of social background as a determinant of adult status has been widely studied over previous decades. These studies have shown that children inherit resources from their parents and the wider social background and that the positive effects of different resources accumulate over the life course. The intergenerational impact of parental death has been a relatively little-studied topic with some studies showing negative effects (e.g., Jonsson and Gähler 1997; Fronstin, Greenberg, and Robins 2001; Amato and Anthony 2014) and others showing no negative effects on children's education (e.g., Lang and Zagorsky 2001; Francesconi, Jenkins, and Siedler 2010).

In this paper, we focus on the relationship between the timing of parental death and children's university education, applying ordinary least square regression and linear sibling fixed effect models on high-quality Finnish Census Panel data, consisting of 49,202 children born between 1980 and 1988.

Parental death has a more negative effect the younger the child is. Lowered long-term family income did not explain the negative effects, and the re-partnering of the widow was not a successful compensation strategy. There are positive selection effects when those experiencing parental death come from a family background that otherwise has positive effects on children's education.

Keywords: parental death, maternal death, paternal death, social inheritance, education

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1. Introduction

The role of family background as a determinant of adult socioeconomic status of children has been widely studied during previous decades. The literature has shown that parental resources have positive effects on children's adult attainment and that the positive effects of different resources accumulate over the life course. Thus, one would expect that losing parental resources because of premature parental death, for example, should have a negative effect. Due to the accumulation of resources, this effect should vary by the child's age. However, relatively few studies have examined the consequences of parental death on the socioeconomic outcomes of children. Due to the relatively rare occurrence in developed societies and strong selection effects, the studies have drawn mixed conclusions. Some studies have shown the expected negative effects, (e.g., Prix and Erola 2016; Amato and Anthony 2014; Jonsson and Gähler 1997; Fronstin, Greenberg, and Robins 2001), while others have not (e.g., Corak 2001; Francesconi, Jenkins, and Siedler 2010; Lang and Zagorsky 2001; Acock and Kiecolt 1989).

In this study, we examine the effect of parental death on children's university education with sibling fixed effects models, applying high-quality Finnish register-based panel data. Our identification approach relies on distinguishing the effects of parental deaths according to siblings' age. As noted previously in studies on parental loss due to separations (Björklund, Ginther and Sundström 2007; Francesconi, Jenkins and Siedler 2010; Grätz 2015), the sibling approach allows us to control for the selection and unobserved heterogeneity that often biases the results. We also contrast fixed effect results to ordinary least square results. Further, unlike in many of the previous studies, our data are large enough to avoid the power problems often linked to the studies on this topic (e.g., Amato and Anthony 2014). This setup also allows us to test whether the possible effects are different for maternal and paternal deaths. Finally, we consider whether the negative effects can be explained by lost parental economic resources and whether the loss can be compensated for by the re-partnering of the widow.

The paper is organized as follows. In chapter 2, we discuss the relationship between parental resources and children's outcomes in the context of early parental death and present various possible mechanisms. In chapter 3, we review earlier studies on the relationship between early parental death and children's education. In chapter 4, we

present the data, research questions and methods. We show results in chapter 5 and the concluding remarks in chapter 6.

2. The relation between parental resources and children's outcomes in the context of early parental death

Previous studies have shown that children socially inherit resources from their parents and the wider social background and that early family resources are most decisive for adult socioeconomic outcomes (e.g., Duncan and Brooks-Gunn 2000; Heckman 2006; Erola 2012). For young children, family background has a strong influence (e.g., Mare 1980; Pfeffer 2008). When growing up, children become more and more socially and economically independent from their parents (Müller and Karle 1993). Parental influence slowly diminishes overtime and is replaced by other, extra-familial factors. Because of these reasons, parental deaths occurring early during a life-course should be expected to have more negative long-term effects than deaths occurring later; the children lose access to the different types of resources of their parents and also miss the advantages associated with the accumulation of resources over time.

The mechanisms that are involved in such a loss depend on the types of parental resources that are assumed to be decisive. One resource is economic. The previous literature suggests that parental death may lead to a heightened risk of economic vulnerability (Steele, Sigle-Rushton and Kravdal 2009). The reasoning behind this obvious: when one parent dies, the family loses the income that had been provided by the deceased parent. Additionally, the economic consequences of a more commonplace, economically restricted life course situation, such as the unemployment of a parent, are more severe than they would be for intact families due to the reliance on one person's income. Even if the unemployment is not involved, sufficient economic circumstances help provide a sense of security, which supports the stress adjustment, whereas insufficient economic circumstances are sources of chronic stress (Acock and Kiecolt 1989; Cerel et al. 2006). Stress may interfere with children's performance (Amato 2000). The remaining parent may also be more risk-averse and thereby also more reluctant to investment in a child's human capital, eventually manifested as lower education (c.f. Breen and Goldthorpe 1997; Björklund and Salvanes 2010).

However, there are also other resources linked to parental background such as social and human capital. Because of these, we should also expect that parental presence, role modelling, parenting style and gender, as well as stress related to the death of a family member, may contribute to the intergenerational effects of parental death. Parental presence, particularly the years lived with the father and mother, has positive associations with various issues such as children's cognitive skills, education, income and wealth (Lang and Zagorsky 2001). The parents contribute to their children's development by doing the parenting as such (Guo and Harris 2000; Thomsen 2015). Children whose exposure to parental role modelling is limited due to parental death may lack those skills and, as a consequence, may be less successful in school and have other issues (Steele, Sigle-Rushton and Kravdal 2009). Parents may contribute to children's education by helping with school work and providing informed advice on educational choices (Björklund and Salvanes 2010), both of which can be assumed to decline after parental death.

In developed countries, parental divorce is a more common reason for loss of parental resources than parental death. In the previous literature, the topic parental death is often compared to parental divorce (see Section 3). In the case of divorce, children of the non-resident parent may still benefit from the resources of that parent, which is not the case when the parent has died (Steele, Sigle-Rushton and Kravdal 2009). Both a non-resident living parent and a deceased parent can pass on aspirations and be a role model for a child. The key difference is that with a living parent, that parent is still actively contributing to the role modelling, whereas with a deceased parent, that parents' importance as a role model depends on the children themselves (e.g., in the form of memories) and others involved in the child's upbringing. Yet, this may be critical: an ethnographic study by Brewer and Sparkes (2011) reported that bereaved children often thought back on their deceased parents. The children thus viewed their deceased parent as a positive motivator for the choices they made in their own life.

Parental death may also have harmful consequences because of prolonged stress. Numerous studies have shown that parental death causes multiple stressors in a child's life because, in addition to losing a primary caregiver, the child has also been exposed to series of changes that may include moving to new neighbourhood, a new school and the remaining parent's new partner (e.g., Amato 2000; Fauth, Thompson and Penny 2009).

Early parental death is associated with lower levels of self-confidence in children and higher levels of depression and other psychological problems (Mack 2001; Brent et al. 2009; Cerel et al. 2004). According to a British study, children who experienced early parental death showed difficulties in trust, relationships, self-esteem and feelings of self-worth, loneliness, isolation and the ability to express feelings as an adult (Ellis, Dowrick and Lloyed-Williams 2013). Additionally, the remaining parent's caregiving can be impaired due to the stress of the loss of a partner (Amato and Anthony 2014; Steele, Sigle-Rushton and Kravdal 2009). If the surviving parent is able to offer warmth and discipline, better resilience is predicted for the children (Lin et al. 2004), which leads to better overall outcomes for them. A higher socioeconomic status for the family and a lower level of depressive symptoms for the surviving parent are also associated with better outcomes for children. When the parental death leads to economic struggle, it can be considered a significant stressor for both the surviving parent and children. (Cerel et al. 2006; Acock and Kiecolt 1989).

The negative effects expected above may also vary by birth order and gender. Several studies have found that firstborn children have better educational outcomes than later-born children (Bu 2016; Black, Devereux, and Salvanes 2005; Kristensen and Bjerkdal 2010). A recent Finnish study showed that a mother's education has the greatest effect in early childhood, whereas the father's education has effects in adolescence (Erola, Jalonen and Lehti 2016). This suggests that maternal death could have a more negative effect in early childhood and paternal death a greater effect during adolescence. In general, the father's socioeconomic status tends to matter strongly in the socioeconomic adult outcomes of the children (Beller 2009; Erola and Jalovaara 2015; however, see Korupp, Ganzeboom, and Van Der Lipper 2002), while the mother's education influences the child's own education (e.g., Beller 2009). It is assumed that paternal absence is more harmful for boys than girls because boys lose a same-sex role model (Acock and Kiecolt 1989).

If the effects of losing a father due to death are similar to those of losing a father due to divorce, it can be expected that the loss can be compensated for by a stepfather's presence (c.f. Erola and Jalovaara 2015). A stepparent can contribute to child raising and the economic needs of the household. With parental death, lost resources are likely to be highest for families with a high status, which is why the negative effect may be

particularly strong in these groups. However, the most negative effects may as well be limited to the opposite end of social stratification because the families with a low socioeconomic status may not have enough resources to buffer the negative effects of the loss (c.f. Augustine 2014; Mandemakers and Kalmijn 2014). Re-partnering also effects the amount of parental time available to children. Single parents have to take care of the household duties alone, and it may be that they simply do not have a sufficient amount of time to do that if they need to spend more time working to cover the economic loss (Amato and Anthony 2014; Steele, Sigle-Rushton and Kravdal 2009). Naturally, if there are two parents in a household, there is also twice as much time available for children, suggesting that re-partnering may help overcome the possible negative effects associated with parental death. However, the evidence on stepparents' positive effects is not consistent; some studies also found that living in a stepfamily has a negative effect for children (Jonsson and Gähler 1997; Biblarz and Gottainer 2000).

Yet, if it is the economic resources that matter, it is assumed that the loss can be relatively easily compensated for through institutional arrangements, such as special pensions or social support schemes for widows or orphans in Nordic welfare state countries (Erikson and Goldthorpe 1992; Solon 2004). Institutions and public investments may act as compensators (Solon 2004). Additionally, more universal social support systems may be important. For example, in Finland, the students do not have any tuition fees and are eligible to receive study grants, housing supplements and government guarantees for student loans to cover living costs during education. Consequently, the negative effects of parental death on children' education could be associated with factors other than economic loss in the Nordic welfare countries.

3. Previous studies: Relationship between early parental death and children's educational attainments

In the context of advanced societies, the intergenerational effects of parental death have been analysed only in contrast to the effects of parental divorce. During childhood and youth, parental death is not nearly as common as parental divorce, making it a societally less acute research question for many. However, unlike in the case of divorce, the loss of a parent due to death is always final and cancels part of the parental investments

permanently. Despite this, a number of studies (Biblarz and Gottainer 2000; Corak 2001; Francesconi, Jenkins and Siedler 2010; Lang and Zagorsky 2001; Acock and Kiecolt 1989) have failed to establish a link between parental death during childhood and negative adult socioeconomic outcomes for children. Even when the studies have found a negative effect, parental divorce has always had more adverse effects in the long run (Amato and Anthony 2014; Chen, Chen, and Liu 2009; Gimenez et al. 2013; Fronstin, Greenberg, and Robins 2001; Jonsson and Gähler 1997).

These findings are, to an extent, in contrast with the studies conducted in developing countries that tend to find negative effects of parental death on children's education (Case and Ardington 2006; Case, Paxson, and Ableidinger 2004; Gertler, Levine, and Ames 2004; Himaz 2013, 2009). The results may differ because of institutional differences but also because studying the effects of parental death in developed societies has particularly high data requirements due to its relatively low prevalence. According to extensive reviews from the 1990s (Amato and Keith 1991; Amato 1993), parental death is associated with negative outcomes, but a few studies were unable to find the negative association for parental death that they did for parental divorce, and some studies were unable to find any negative association for either (Amato and Keith 1991; Amato 1993).

More recently, there have been a number of studies on parental death and divorce applying North American data (e.g., Corak 2001; Acock and Kiecolt 1989; Biblarz and Gottainer 2000; Lang and Zagorsky 2001; Amato and Anthony 2014). Acock and Kiecolt (1989), using US data, found that when socioeconomic status during adolescence and current socioeconomic status were controlled for, there were only a few adverse effects for parental divorce and no effects for paternal death. Using American data, Biblarz and Gottainer (2000) found that children who had lost their father and lived with a single mother did not differ from intact families except for having a slightly lower probability of completing high school. Children from divorced families tended to do worse than children from bereaved families. It seemed that the children did even worse if they lived in stepfamilies after parental death or divorce (Biblarz and Gottainer 2000). In Canada, parental divorce was found to be more adverse for children's adulthood outcomes than parental death, and even parental divorce had only a small negative impact. (Corak 2001).

Lang and Zagorsky (2001) compared children living in widowed, divorced and intact families in the USA. The only significant results for parental death were that boys were

less likely to marry if their father died, and girls' future income was likely to be lower if their mother died early. Amato and Anthony (2014) compared whether marriage disruption is more adverse during childhood or adolescence using two different American datasets. Among the young children, parental divorce was negatively associated with many outcomes, but parental death was associated with only a decline in mathematical scores and an increase in internalizing problems. Among adolescents, parental divorce was associated with many negative outcomes but parental death only with a decline in math scores, a decline in internal locus of control and an increase in smoking. However, power analysis suggested that even though parental death did not have many statistically significant results, the estimates were about the same as for parental divorce and that the statistical insignificance was mainly due to a small number of children who experienced parental death. (Amato and Anthony 2014)

Likewise, parental divorce in Britain was found to have more severe consequences on educational attainment than paternal death for boys (Fronstin, Greenberg and Robins 2001). For girls, both paternal death and divorce were found to be harmful. The results also suggest that when paternal death and divorce occur before the teenage years, they have the greatest adverse effect on education. When parental death occurs after the teenage years, the greatest adverse effect is found in labour market outcomes (Fronstin, Greenberg and Robins 2001). In Germany, parental divorce has been associated with adverse outcomes of children, but paternal death has not been (Francesconi, Jenkins and Siedler 2010). In contrast, negative effects were found in Taiwanese studies, further showing that maternal death was more harmful than paternal death on children's college enrolment and even more harmful when the death occurred unexpectedly (Chen, Chen and Liu 2009; Gimenez et al. 2013). It was also found that time generally weakens the negative effect of parental death; in other words, recent death has more severe effects than death that occurred many years ago. The effect of parental death was most adverse for children from low income families, especially girls. (Gimenez et al. 2013)

There have also been some studies applying Nordic data by Jonsson and Gähler (1997), Steele, Sigle-Rushton and Kravdal (2009) and Prix and Erola (2016). In Sweden, children who had experienced family dissolutions showed lower educational attainment than children from intact families (Jonsson and Gähler 1997). However, children from bereaved families did better than children from divorced families. A new stepparent was

found to be negatively associated with children's education. Family income was not strongly associated with children's education. Researchers explained this by noting the generally low income differences in Sweden and in their data (Jonsson and Gähler 1997). In Norway, parental divorce was found to be more harmful than paternal death; however, after controlling for selection, the difference between parental divorce and paternal death narrowed substantially (Steele, Sigle-Rushton and Kravdal 2009). Steele, Sigle-Rushton and Kravdal (2009) did not find any significant effect for having a stepparent, and the child's age did not have any significant effect for parental death. In Finland, paternal death was associated with lower educational attainment, and the mother's resources were found to be able to compensate for the lost paternal resources (Prix and Erola 2016).

Outside of Western countries, most studies have been conducted with African data. In a study of ten African countries, bereaved children were found to be less likely to enrol in school; the negative effect of parental death increased with the child's age (Case, Paxson and Ableidinger 2004). In South Africa, the loss of a mother was found to have more adverse effects than the loss of a father (Case and Ardington 2006). Paternal death was related to only the family's economic well-being. In Ethiopia, maternal death was associated with a lower likelihood of school enrolment and a higher probability of illiteracy (Himaz 2009). Paternal death was associated with only the child's sense of optimism about the future. In a later Ethiopian study, it was found that maternal death had adverse effects if a child was still in the middle of childhood but not during early adolescence, whereas paternal death had adverse effects in early adolescence (Himaz 2013). In Indonesia, parental death was found to increase school dropouts in all age groups and at all school levels (Gertler, Levine and Ames 2004). The results also suggest that the parental death has more severe effects for younger children. Paternal death was found to have a slightly greater effect for elementary schooling than maternal death. The overall effect was largest close to school transitions.

We are likely to gain similar results to other studies conducted in Western countries because the prevalence of early parental death is rare and the population's educational level more similar to those countries than non-western ones, especially in Africa. Additionally, cultural differences in children's position in and responsibilities to the family are likely to play a role. In addition, there are institutional differences in Western countries with the US offering the minimum support from the state and Nordic countries

offering more extensive support. Finland is a strong egalitarian welfare state that is, with the regard to intergenerational mobility, quite open in comparison to North America (e.g., Erikson and Goldthorpe 1992; Jäntti et al. 2006), thus it is an ideal context for exploring the negative effect of parental death. In the next chapter, we will present the research questions, data and methods for our research.

4. Research questions, data & methods

4.1 Research questions and data

Our research questions are:

- 1) Are maternal and paternal death related to children's educational attainment?
- 2) Does the effect vary by the child's age?
- 3) Does family income explain the possible negative effects?
- 4) Can the re-partnering of the widow compensate for the loss?

To answer these questions, we analysed data from the Finnish Census Panel on 49,202 children born between 1980 and 1988. The original data are a 10 percent sample of all people who lived in Finland in 1980². The data allows the linking of all family members, including spouses, parents and siblings, to every child. The advantage of register-based data is that it hardly suffers from missing data and response bias, which is often the case for survey data. In the first part of our analyses, we model the full data, while in the second part, we concentrate on a subsample of 3,084 siblings who experienced early parental death.

Children who lost both of their parents before turning 22 years old were excluded from the data (204 cases). Due to our research method, we also dropped those who did not live

² The license to use the data has been given by Statistics of Finland for Professor Jani Erola's INDIRECT-project in the University of Turku. (License number Dnro: TK53-507-12)

with their parents when they were 0-16 years old, did not have any siblings or had only twin siblings (sibling fixed effects, see Section 4.2). We studied only biological siblings with biological parents because educational attainment is correlated with biological factors (e.g., Jencks and Tach 2006; Plug and Vijverber 2003) and thus we reduced genetic variance as much as possible. In our data, most of the families had more than one child: 61 percent of the intact families had two children and 28 percent had three children. The respective numbers for bereaved families were 61 percent and 26 percent, which indicates that there were slightly less children in bereaved families than in intact families. Eighteen percent of bereaved children lived in stepfamilies (Table 1). The stepparent variable was created by investigating whether there was some adult other than child's biological parent living in the child's family.

Table 1: Descriptive statistics of categorical variables.

Variable	%	N
University education enrolment/completed when child is 22 years old and parent alive	13	46 118
University education enrolment/completed when child is 22 years old and parent dead	10	3 084
Parent dead when child is 21 or under	6	49 202
Mother dead when child is 21 or under	1	49 202
Father dead when child is 21 or under	5	49 202
Daughter	51	49 202
Stepparent (bereaved)	17	3 084
Firstborn	32	49 202
Mother's education		
Basic	15	
Secondary	67	
Tertiary	18	49 202
Father's education		
Basic	23	
Secondary	56	
Tertiary	21	49 202

In our data, 5 percent of children had lost a parent, 1 percent a mother and 4 percent a father, when they were 21 or under. Our outcome is dummy coded as 1 for child has enrolled in university education or completed it by the age of 22, and 0 for not enrolled

or completed university education. In the analysed data, 13 percent of children with living parents have either completed or are enrolled in university education compared to 10 percent for bereaved children (Table 1). As control variable, we used the child's birth year, which was categorized into three groups where children born between 1980 and 82 were the reference group and compared to children born between 1983 and 85 and those born between 1986 and 88.

Family income is measured as average family income when the child is 0-18 years old and in the analysis is separated into five family income percentiles. Family income contains all taxable income, including universal child allowance, widow's and children's pension. Information for income is available in our data for 1980, 1985 and 1987-2010. Family income from 1986 is imputed as an average of the 1985 and 1987 family income. Including one year's imputed family income to the analysed data reduces a little underestimation of family income for the oldest cohorts when those children are 0-6-year-olds. Family income was 57,799 euros on average with 49,802 euros for bereaved families and 58,334 for intact families. The standard deviation for bereaved families was about double that for intact families (Table 2).

Table 2: Descriptive statistics of family income (average when child was 0-18 years old). Unfortunately, we are not allowed to present minimum and maximum figures due to privacy reasons of our informants.

Variable	Mean	Standard Deviation	N
Family income	57 799	40 048	49 202
Family income (5 percentiles)	3.4	1.3	49 202
Family income in bereaved families	49 802	78 274	3 084
Family income in intact family	58 334	36 014	46 118

4.2 Methods

Many studies (e.g., Steele, Sigle-Rushton and Kravdal 2009; Corak 2001) assume that parental death is an exogenous event and that it is assumed to be only slightly correlated with unobserved attributes of family background. Amato and Anthony (2014) noted that even though some researchers (e.g., Corak 2001; Lang and Zagorsky 2001) have argued that parental death is a natural experiment to study the effects of parental absence, it is

still important to appreciate that parents may “self-select” into death by risky behaviour. Early parental death is rare in western countries, and thus those parents who die are greatly selected and some causes of death, such as suicides and accidents, are over-represented (OSF 2015a, 2015b; Torssander and Erikson 2010; Table 1 in Appendix). Those who belong to lower social classes have a higher risk for early death than those who belong to higher social classes. In addition, there is also some evidence for a relationship between the cause of death and social class. (Erikson and Torssander 2008, 2009). Thus, any analysis on the effects of premature parental death is likely to be strongly influenced by socioeconomic selection. Only part of this can be covered through observed parental characteristics. In our data, selection is clear: 28 percent of mothers who experienced early death had a basic education compared to 15 percent of mothers that are alive, and for fathers, the differences were 38 and 23, respectively. Ten percent of mothers who experienced early death had tertiary education compared to 18 percent of mothers that are alive, and for fathers, the numbers were 12 and 21, respectively.

As Elstad and Bakken (2015) argued in their study, the OLS estimates may be misleading if important unobserved control variables are missing from the model. In our study, the data are analysed with a linear probability sibling fixed effects model that is designed to reduce this omitted variable bias. In practise, we are comparing siblings from the same family who sharing the same family environment. What are left in the fixed effects are the sibling differences when experiencing parental death – typically age and gender – in addition to the unobserved individual differences. However, sibling fixed effects models also have their limitations. Because fixed effect models estimate the change, all variables that can change over time (e.g., family income) must be included in the model or the model will be biased. (Allison 2009)

There are also other limitations. Sibling fixed effects models can estimate only families with two or more children. Therefore, we do not know if the intergenerational transmission is different in single- and multi-child families (Francesconi, Jenkins and Siedler 2010). Many sibling methods are based on the assumption that the longer the child is in an intact family the better. They also assume that parents treat their children exactly the same and that children respond similarly (Steele, Sigle-Rushton, and Kravdal 2009; Carbonneau et al. 2002; Jenkins, Rashbash, and O’Connor 2003). The age differences between siblings are usually the most important factor explaining the different treatment

of siblings in the same family (Jenkins, Rashbash and O'Connor 2003). In our study, we exploit this variation for the identification of the effect of parental death. All types of stress may lead to differential treatment of children in a family because parents have a finite amount of resources.

5. Results

5.1 The effect of maternal and paternal death on children's university education

Figure 1 shows the proportion of university-educated children by child's age when a parent died, separating maternal and paternal deaths, using the full sample. The figure provides an answer for our first research question: there is a clear negative effect for parental death and the effect of parental death is linear by child's age. The effect is stronger for deaths occurring earlier and the negative effect diminishes according to age. Maternal death seems to be slightly more adverse than paternal death for child's education, but the confidence intervals overlap to an extent that the difference is not statistically significant.

[FIGURE 1 ABOUT HERE]

Table 3 shows similar results using the ordinary least square and sibling fixed effects models. To simplify the interpretation, the age effects in these models are fitted with a dummy for mothers', fathers' or for any parent death and a linear effect for the age when experiencing death, instead of including a separate effect for each age. In the OLS models, there appears to be a difference according to whether the mother or the father has died. Only the latter seems to lead to a statistically significant – albeit very small – negative effect on children's education. However, in the FE models, controlling for the unobserved selection into deaths, there are no differences between the effects of mothers' and fathers' deaths. The estimates are much bigger than in the OLS models and almost the same for both parents (-0.11 for fathers and -0.13 for mothers).

Table 3: Child’s university education at the age of 22. OLS regression and sibling fixed effects models.

	OLS			FE		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Child’s age at death	0.002 (0.002)	0.003 (0.002)	0.002 (0.001)	0.051*** (0.007)	0.062*** (0.013)	0.053*** (0.007)
Parent dead	-0.026* (0.012)			-0.114** (0.039)		
Mother dead		0.002 (0.020)			-0.128* (0.063)	
Father dead			-0.029* (0.012)			-0.109** (0.041)
Daughter	0.022*** (0.003)	0.021*** (0.003)	0.022*** (0.003)	0.023*** (0.006)	0.024*** (0.006)	0.024*** (0.006)
Constant	0.075** (0.026)	0.042 (0.051)	0.076** (0.027)			
<i>N</i>	49 202	49 202	49 202	49 202	49 202	49 202
<i>R</i> ² /FE within	0.002	0.001	0.002	0.008	0.004	0.006

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

It is not surprising to find a substantial amount of background selection. The negative effects observed after taking this into account nonetheless suggest that the selection actually *reduces* the disadvantages according to family background; those experiencing early parental death are likely to have a family background that has a positive effect on children’s university education – otherwise we should have observed a smaller difference in the fixed effect models than in the OLS models. Interestingly, the selection effect appears to be equally strong in the case of mother’s and father’s death – in both cases, the negative effect size grows approximately 0.1 after fixing the family background. This provides a further justification to model maternal and paternal deaths together in the following analyses.

Table 3 also reports the gender differences in educational attainment. As expected, daughters were more educated than sons. The additional, unreported analyses, including interaction effects, also suggest that the negative effects do not vary by gender.

5.2 Family income and stepparents

Let us now consider the role of income as an explanation for the negative effect of parental death and the possible compensatory effect of stepparents among children who have lost their parent. The multivariate models for these analyses using the smaller subsample are reported in Table 4. The baseline models (Model 1 for OLS and FE) control for child's gender and are comparable to Models 1 in Table 3 using the full data. In the second set of models reported, we also control for income (Models 2). As expected, family income is positively associated with children's education but only in the OLS model. In neither the case of the OLS nor the fixed effects, do the estimates for parental death change once the income differences are controlled for. This suggests that the increased economic strain experienced by the families does not explain the negative effect of parental death. A similar conclusion applies to the effect of stepparents (Models 3). In OLS models, we find a statistically significant *negative* effect for stepparents. However, this is no longer statistically significant once we control for the unobserved family background variation that is already in the fixed effects models. The effects for parental death remain unaltered in both cases. Thus, we cannot find any evidence for the compensatory effects for the stepparents.

[TABLE 4 ABOUT HERE]

In the following models reported in Table 4, we also control for whether a child is firstborn. The further, unreported analyses also suggest that the estimate for the firstborn is the only birth order effect that is statistically significantly associated with children's university education³. While we do find a small, statistically significant effect in the OLS model, this is not the case with the fixed effects model. When firstborn is controlled, the statistical significance of parental death disappears in the fixed effects models but the estimate still remains similar to previous models (cf. FE Models 3 and 4). We can thereby conclude that the firstborns are not advantaged compared to later born siblings in the case

³ We also tested for the effect of being the youngest of the siblings and birth order as a continuous variable.

of parental death when unobserved family characteristics are controlled. This is in contrast with the findings of some of the previous literature (e.g., Bu 2016).

Figure 2: Child's probability to achieve university education by dead parent's educational level. OLS regression (N= 3 084).

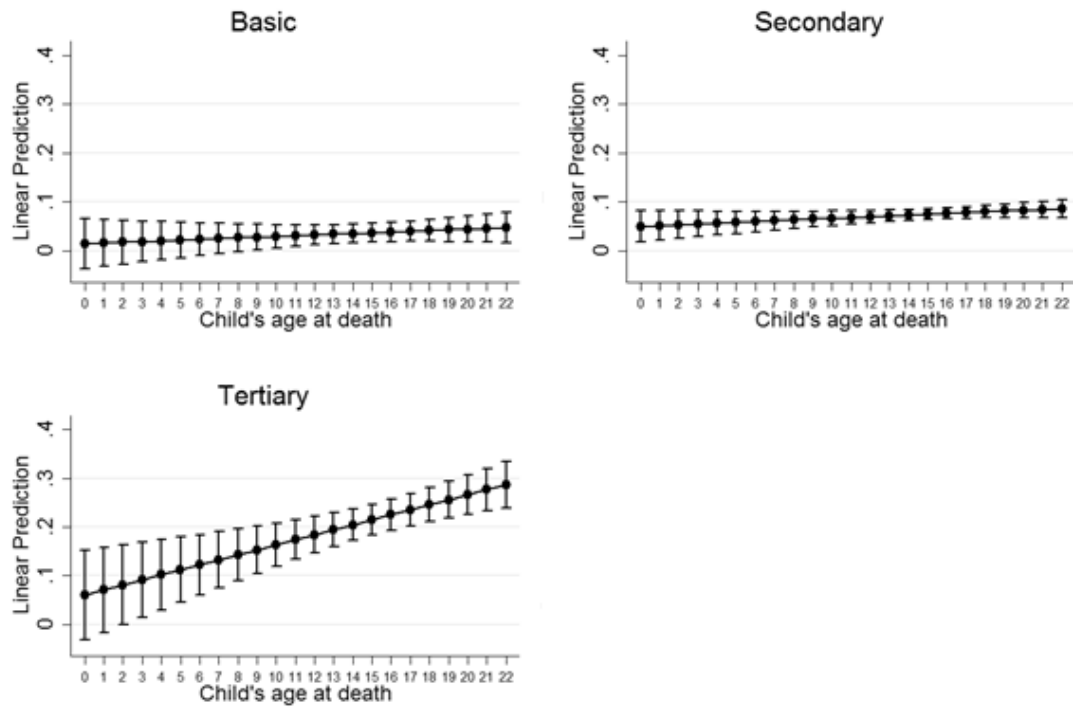
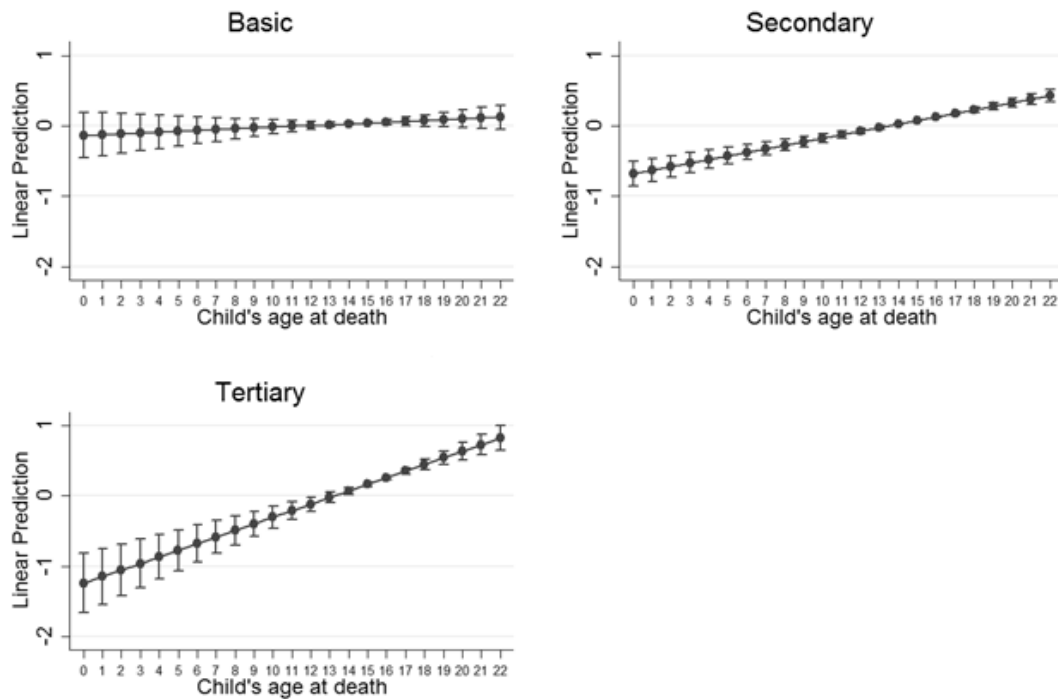


Figure 3: Child's probability to achieve university education by dead parent's educational level. Sibling fixed effects (N= 3 084).



Usually, the estimates of the sibling fixed effect models are smaller than those acquired from the OLS models. We find the opposite. This suggests that the effects may be strongly heterogeneous according to background characteristics. Figures 2 and 3 distinguish the effects according to the level of parental education. If the positive selection were to be entirely related to the observed educational family background, there should not be differences within the educational level. This is not the case in the figures: the importance of the child's age for the negative effect increases by parents' education. Bereaved children of basic-educated parents are not likely to be university educated independent of the age of experiencing death.

6. Conclusion

The intergenerational impact of parental death has been a relatively little analysed topic. Studies conducted in non-western countries generally tend to find a negative effect for parental death. Some of the previous Western studies found a negative effect on children's education (e.g., Jonsson and Gähler 1997; Fronstin, Greenberg, and Robins 2001; Amato and Anthony 2014), while others could not (e.g., Lang and Zagorsky 2001; Steele, Sigler-Rushton, and Kravdal 2009; Corak 2001).

We studied the effect of early parental death on children's university education using high-quality Finnish register-based data with ordinary least square regression and linear sibling fixed effects models. The limitation of the OLS regression in these types of analyses is that it takes into account only the observed family characteristics. This is often problematic because many such characteristics (such as parenting style) are hard to measure objectively and without considerable bias. Sibling fixed effects models take into account the unobserved constant (time-invariant) parental and environmental characteristics that all siblings share. Because of this, these models should show less biased estimates for parental death than the OLS models.

Our results clearly show that the children who had experienced parental death during childhood and youth had weaker educational attainment at the age of 22. The negative effect is particularly clear once the family background selection into the deaths is accounted for with sibling fixed effects. The difference between the models suggests that there is in fact *positive* selection for experiencing early parental deaths – those

experiencing parental deaths come from a family background that otherwise has positive effects on education, thereby masking the negative effect of the event itself. However, this positive selection is not solely based on educational background; the higher the parents' education is, the more there are other, age-related and currently unobserved factors that contribute to the negative effect.

Parental death had more adverse effects the younger the child was. Only a few previous studies (e.g., Fronstin, Greenberg and Robin 2004; Steele, Sigle-Rushton and Kravdal 2009) have considered how the effect of parental death varies by the child's age. The previous studies considered only whether parental death had more adverse effects during childhood or adolescence and had very mixed findings. We found that parental death is more adverse the younger the child is. The linearity of the effect is unaffected by sensitive periods, such as transitions to either primary or secondary school at the ages of 7 and 15, respectively. This suggests that the negative effect is not due to temporary shock but long-term, accumulated consequences. Our results support the theory that early childhood is a good predictor of adulthood outcomes and that disturbance during early childhood has long-lasting negative effects (Erola 2012; Duncan and Brooks-Gunn 2000; Heckman 2006). Our results are also in line with the findings that years spent with two parents are positively related to children's attainments (Lang and Zagorsky 2001). However, our findings suggest this mostly applies to the children of the highly educated parents.

There were no statistically significant differences between experiencing mother's or father's death. Additionally, the background selection appeared to play a similar role independent of whether the mother or the father had died. This finding is in line with our result that reduced family income due to parental death did not contribute to the negative effect. This is in contrast to the previous finding by Jonsson and Gähler (1997) in Sweden. All this points to the conclusion that although the negative effect of parental death is related to some long-term accumulated consequences associated with the event, it is mostly related to the non-economic factors. One of the reasons for this may be that in the Finnish institutional context with free-of-charge education, parental income has a particularly limited role in the production of human capital. Additionally, other institutional arrangements, such as special pensions for both to the widow and bereaved children, may reduce the importance of the lost economic resources.

We found similar results to Steele, Sigle-Rushton and Robin (2009), finding that there is no significant effect for having a stepparent. Therefore, we can conclude that re-partnering of the widow is not a successful compensation strategy for the negative effects of parental death. Thus, unlike the previous results suggest in the case of divorce in Finland (Erola and Jalovaara 2015), neither of the parents are replaceable when the loss occurs by death. Many earlier studies have found that having a stepparent has a negative effect on children's education (Biblarz and Gottainer 2000; Jonsson and Gähler 1997). We also have a negative main effect on the OLS model but not in the sibling fixed effect models. Thus, stepparenthood simply does not matter in this case. Similarly, we did not find any support for firstborns being more advantaged than later born children even though that has been suggested in the previous literature (e.g., Bu 2016).

Altogether, our study demonstrates that parents' time spent with a child is important for the child's educational attainment and that parents' presence cannot be compensated for by family income or the re-partnering of the widow. The negative effect of parental death is mostly due to the reduced amount of accumulation of human and social capital, not economic capital. Parents' presence is the best present for a child, and it cannot be successfully compensated for by other presents or other's presence – at least for those having an advantaged family background.

Acknowledgements

The study was funded by the European Research Council (ERC-2013-CoG, project number 617965). We want to thank Irene Prix, Elina Kilpi-Jakonen and participants of TWCR seminar and RC28 working group 4.1 for useful comments.

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Tables and figures in the text

Table 4: Estimates of child's university education at the age of 22. OLS regression and linear sibling fixed effects model.

	OLS					FE			
	Model 1	Model 2	Model 3	Model 4	Model 5 ²	Model 1	Model 2	Model 3	Model 4
Child's age at death	0.003** (0.001)	0.002* (0.001)	0.002 (0.001)	0.001 (0.001)	0.001 (0.001)	0.027* (0.011)	0.025* (0.011)	0.025* (0.011)	0.019 (0.011)
Daughter	0.020 (0.010)	0.023* (0.010)	0.022* (0.010)	0.022* (0.010)	0.026* (0.010)	0.054** (0.020)	0.054** (0.020)	0.054** (0.022)	0.054** (0.020)
Family income		0.029*** (0.004)	0.030*** (0.004)	0.031*** (0.004)	0.013** (0.004)		-0.043 (0.033)	-0.048 (0.034)	-0.043 (0.034)
Stepparent			-0.033* (0.014)	-0.037** (0.014)	-0.026 (0.014)			0.038 (0.049)	0.033 (0.049)
Firstborn				0.038*** (0.012)	0.028* (0.012)				0.036 (0.025)
Mother's education ¹									
secondary					0.023 (0.013)				
tertiary					0.126*** (0.020)				
Father's education ¹									
secondary					0.018 (0.012)				
tertiary					0.080*** (0.018)				
Constant	0.244*** (0.022)	0.163*** (0.024)	0.173*** (0.024)	0.166*** (0.024)	0.166*** (0.025)				
<i>N</i>	3 084	3 084	3 084	3 084	3 084	3 084	3 084	3 084	3 084
<i>R</i> ² / FE within <i>R</i> ²	0.105	0.123	0.125	0.128	0.153	0.162	0.164	0.164	0.167

Standard errors in parentheses

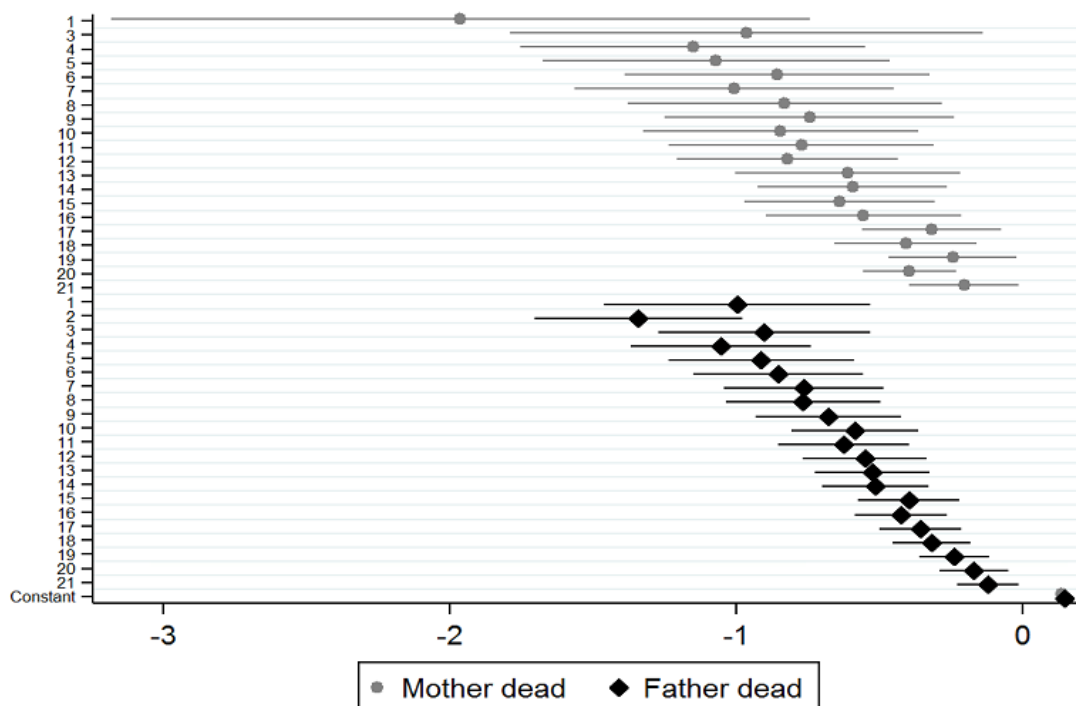
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

¹ Reference: basic education

Controls: Child's birth year categorized 1980-82 (ref), 1983-85 and 1986-88.

²Note: Parent's education is controlled in FE design (cf. Model 5)

Figure 1: The proportion of university-educated children by child's age when parent died. Estimates from linear sibling fixed effects models with confidence intervals (N= 49,202).



APPENDIX

Table 1: Cause of death in our data.

Cause of death	Parent died before child was 22	Parent died
Tumours	29	32
Cardiovascular or circulatory	22	23
Alcohol-related	13	13
Accidents	14	12
Other	22	20
%	100%	100%
N	2 358	8 432