Health after mid-life: the role of adult children's education for older parents' frailty in Europe

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Abstract

In ageing societies, intergenerational transmission of (dis-)advantages is a two-way process, since parental investment in children may be reciprocated later in life. While extensive research has explored the impact of family background on children's life chances, little is known about the importance of children's socioeconomic resources on older parents' health and health inequality – what has been called the effect of "social foreground" on later-life health. We use data on parents aged 50 or over living in 29 European countries from the 2004-2020 Survey of Health, Ageing and Retirement in Europe (SHARE) to examine whether adult offspring's educational attainments are associated with parents' Frailty Index (FI). Frailty is conceptualized as a state of vulnerability that reflects an accumulation of deficits in various health domains. Preliminary results from random intercept linear regression models, based on a total of 89,752 parents and 210,999 parent-child dyads, indicate that children's higher education is associated with a lower FI, particularly among mothers. We find a positive moderating effect of the educational levels of parents and children, suggesting that a child's higher education tends to compensate for the frailty disadvantage of lower-educated parents (especially mothers). These findings suggest that children's upper intergenerational mobility in the educational ladder reduces health inequalities in later life. Furthermore, the study highlights the societal implications of investing in younger generations, as these investments yield benefits not only for the individuals but also for the health and well-being of older generations.

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1. Introduction

An unforeseen outcome of population ageing is the two-way transmission of social (dis-) advantages, from parents to children and from adult children to older parents (Torssander, 2013, 2014). On the one hand, as families become smaller, the allocation of family resources is less diluted among the offspring, with children sharing a larger part of inheritance, inter-vivo transfers, and other types of parental investment. On the other hand, increases in life expectancy lead adult children (and their social and economic resources) to play a crucial role in their older parents' health and well-being for an extended period of their lives. The consequences of the "family background" on children's life chances could mirror the effect of "social foreground", indicating that children's socioeconomic status is an important factor in understanding social inequalities in later-life health. However, while many studies have explored how family background affects children's life chances, there is little research on the effects of social foreground on parents' health in later life (De Neve & Kawachi, 2017; Madia, Präg, & Monden, 2022; Potente, Präg, & Monden, 2023).

Recent scholarly attention focused on the "upward" influence of children's socioeconomic status on parents' health, indicating an association between the educational attainment of adult children and improved health outcomes for older parents, including reduced mortality (Friedman & Mare, 2014; Zimmer, Martin, Ofstedal, & Chuang, 2007) and physical and mental health (De Neve & Kawachi, 2017; Lee, 2018; Lundborg & Majlesi, 2018; Torres, Yahirun, Sheehan, Ma, & Sáenz, 2021; Torres, Yang, Rudolph, & Courtin, 2022; Torres, Yang, Rudolph, Meza, et al., 2022; Torssander, 2013, 2014). Therefore, investing in their children's education could have substantial long-term benefits for parents in later life. According to the norm of reciprocity, family obligations instilled by parents early in life may translate into the normative expectation that "any gift should be repaid" in the long run. Besides reciprocity, children with higher levels of education may be more likely to engage in altruistic behaviours towards their parents in need, given their higher availability of socioeconomic resources. Highly educated children not only have more financial resources to assist their ageing parents, but they are also better equipped to provide health-related advice, navigate the welfare system and (health) care services, or influence their parents' health behaviours (Torres, Yang, Rudolph, & Courtin, 2022).

Although theoretical considerations suggest an "upward" influence of children's education on older parents' health, recent findings based on quasi-experimental designs provide mixed evidence on whether an increase in schooling age has a causal effect on parental longevity (Lundborg & Majlesi, 2018; Potente et al., 2023) and cognitive functioning (Ma, Yahirun, Saenz, & Sheehan, 2021; Torres, Yang, Rudolph, Meza, et al., 2022). These inconclusive findings suggest that implications of education for parental health may depend on whether increasing school-leaving age is salient for offspring's socioeconomic position, as well as on whether the institutional context provides universal and comprehensive access to health care.

The contribution of our study is twofold. First, while most previous have been focused on the United States (e.g., Friedman & Mare, 2014), United Kingdom (e.g., Potente et al., 2023), and low-income countries (Torres et al., 2021, 2021 [Mexico]; Zimmer et al., 2007 [Taiwan]), we investigate the links between children's educational attainment and older parents' health in Europe, a context in which access to healthcare is universal. Offspring's

support may be still important in preventing severe health issues and represents a latent web of support that is activated in times of need. Given its latency, the characteristics of kin network may directly influence ageing parents' frailty, as a state of vulnerability to external stressors characterised by a reduction of functional reserves that protects against health deterioration (Romero-Ortuno & Kenny, 2012). We expect that children's higher education is associated with lower levels of frailty among older parents (**Hypothesis 1**).

Second, our study aims at investigating whether the effect of children's education on parents' health varies according to parental socioeconomic resources and gender. In line with the resource substitution theory (Ross & Mirowsky, 2006, 2011), high levels of education among the offspring may overcome the health disadvantages of low educated parents, while health disadvantages associated with lower education may be amplified among parents with lower-educated children. Therefore, we hypothesize that adult children's education may be especially important for parents who are disadvantaged in terms of socioeconomic status (**Hypothesis 2**).

2. Data and methods

Sample: This paper uses data from all the available panel waves of the Survey of Health, Ageing and Retirement in Europe (SHARE) (*i.e.*, from 2004 to 2020). A total of 89,752 parents (210,999 parent-child dyads, 250,605 observations) were included in the analysis. The sample is composed by individuals aged 50 or older from 29 different countries.

Variables: The study uses a 40-item Frailty Index (FI) as the outcome variable (Romero-Ortuno & Kenny, 2012), which reflects the accumulation of deficits in various health domains and has been shown to be a strong predictor of negative health outcomes, including mortality (Ryan et al., 2022). Following Romero-Ortuno and Kenny (2012), we constructed the FI based on a variety of health deficits (*e.g.*, grip strength, comorbidities, low mood, deficits in cognition, etc.). The FI ranges from 0 (no deficits present) to 100 (all deficits present) (Cronbach's alpha = 0.863).

The main independent variable is the children's level of education. The educational attainment of each child is reported by the parent at each SHARE wave. This measure is based on the International Standard Classification of Education 1997 (ISCED-97) and refers to the highest level of education attained by the respondent's child. In addition to the education level of the children, we also consider that of their parents (*i.e.*, the SHARE respondents). For both parents and children, we classified the level of education as low (ISCED 0, 1, and 2), medium (ISCED 3 and 4), and high (ISCED 5 and 6).

All regression models account for the following parent-level confounders: age, gender, presence of the partner in the household, household wealth quartiles, current job situation, and country of residence. We also control for children's characteristics (*i.e.*, age and gender) and intergenerational relationships (*i.e.*, geographical distance and frequency of contact between parent and children).

Analytic strategy: We used random intercept models to estimate changes in the FI. The data included up to four observations per parent-child dyad, nested within 89,752 parents. We analysed the data in three steps. First, we estimated the association between children's

education and parental health (controlling for parental education and all other control variables). Second, we tested whether the effect of children's level of education varied with parental education (interacting the education of the parent and that of the child). Third, we included a three-way interaction between the gender of the parent, the individual's level of education, and that of the children to test for possible gender differences.

3. Preliminary results

Table 1 shows the results from the random intercept models on fathers' and mothers' FI. Findings indicate the FI score is lower for mothers and fathers of highly educated children than for those of lower educated children (*Fathers*: Table 1, Model 1; b = -1.661; 95% CIs: -1.904, -1.418; p<0.001; *Mothers*: Table 1, Model 3; b = -2.711; 95% CIs: -2.957, -2.465; p<0.001). These results support hypothesis 1 that adult children's educational attainments are positively associated with better health. In Models 2 and 4 we add interaction terms between parental education and children's education. The main effect of child education indicates that among lower educated parents those with highly educated children have on average, a lower FI score compared to those with lower educated children (*Fathers*: Table 1, Model 2; b = -1.90; 95% CIs: -2.29, -1.52; p<0.01; *Mothers*: Table 1, Model 4; b = -2.91; 95% CIs: -3.26, -2.55; p<0.01). Interaction terms show that the effect of child education becomes smaller according to the educational levels of parents (in line with Hypothesis 2). Figure 1 reports the estimated average differences in the FI for fathers and mothers with children having a medium and high level of education, compared to having children with a low level of education, across the three parental educational levels. In line with the results from Table 1 (Models 2 and 4), results indicated that on average, fathers and mothers with children who had a medium or high level of education had a lower FI than those with children who had a low level of education. This was especially true for lower-educated mothers with children with a higher level of education.

4. Concluding remarks and next steps

This study provides some preliminary evidence that children's education could influence parents' health across European countries. These findings may have important implications for policy and practice, and suggest that efforts to reduce frailty among older adults should also take children's education into account. As a consequence, public investments in the education of younger generations produce benefits also for older generations.

In further developing our future analyses, we plan to examine potential moderating and mediating factors that could influence the links between children's education and parental health, such as the frequency of contact between parents and children and their geographical proximity. These analyses will provide a more nuanced understanding of the complex mechanisms linking children's education and parental health, and will inform policy interventions aimed at reducing health inequalities at older ages.

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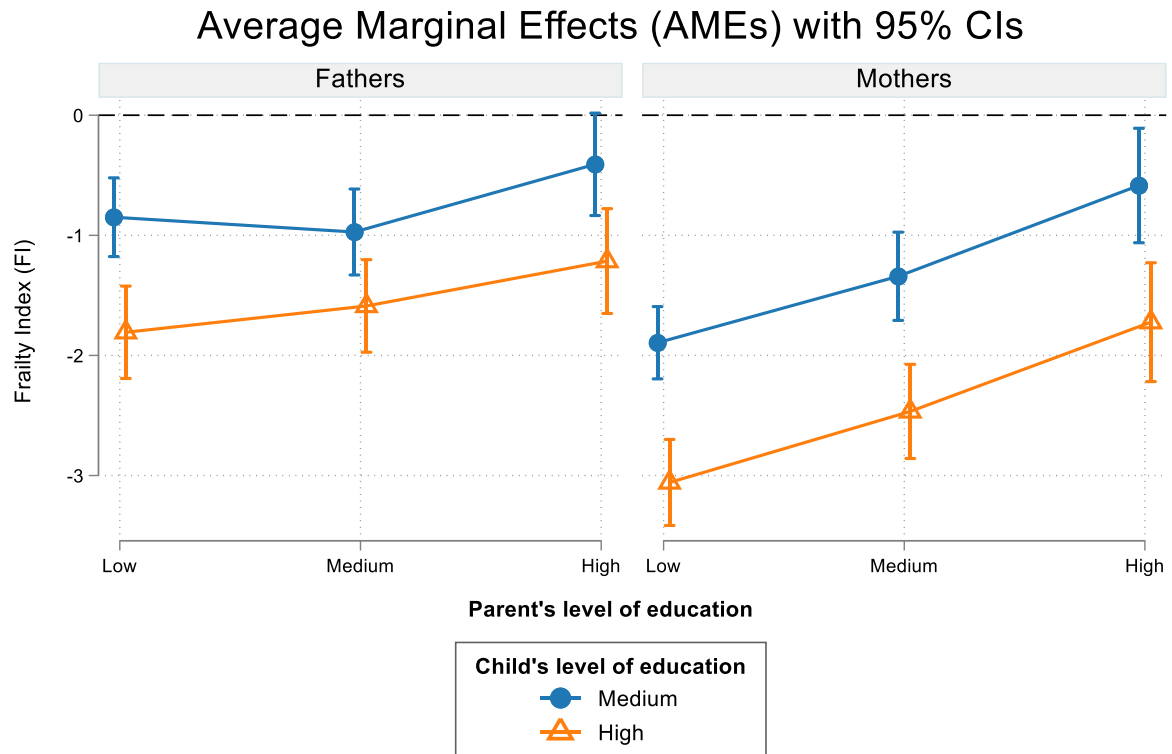
Appendix

Table 1. Random intercept linear regression models on Frailty Index.

	Fathers				Mothers			
	Model 1		Model 2		Model 3		Model 4	
	Coef.	CIs	Coef.	CIs	Coef.	CIs	Coef.	CIs
Child's level of education (ref.: Low)								
Medium	-0.90***	-1.13 - -0.68	-0.93***	-1.26 - -0.61	-1.59***	-1.81 - -1.36	-1.78***	-2.08 - -1.48
High	-1.66***	-1.90 - -1.42	-1.91***	-2.29 - -1.52	-2.71***	-2.96 - -2.46	-2.91***	-3.26 - -2.56
Parent's level of education (ref.: Low)								
Medium	-1.24***	-1.51 - -0.97	-1.30***	-1.79 - -0.80	-1.79***	-2.04 - -1.55	-2.17***	-2.66 - -1.68
High	-2.06***	-2.34 - -1.78	-2.63***	-3.17 - -2.08	-2.61***	-2.89 - -2.33	-3.63***	-4.23 - -3.04
*Child's education * parent's education*								
Medium * Medium			-0.04	-0.52 - 0.44			0.44	-0.04 - 0.91
Medium * High			0.57*	0.03 - 1.10			1.17***	0.60 - 1.73
High * Medium			0.32	-0.22 - 0.86			0.45	-0.08 - 0.98
High * High			0.76**	0.18 - 1.34			1.11***	0.50 - 1.72
Constant	-6.45***	-7.63 - -5.26	-6.36***	-7.56 - -5.15	-4.51***	-5.65 - -3.37	-4.35***	-5.50 - -3.19
N. of parents	40,727		40,727		49,025		49,025	
N. of parent-child dyads	96,887		96,887		114,112		114,112	
N. of observations	115,487		115,487		135,118		135,118	
R-squared (within)	0.196		0.196		0.238		0.239	
R-squared (between)	0.202		0.202		0.246		0.246	
R-squared (overall)	0.0346		0.0345		0.0269		0.0268	

Source: Survey of Health, Ageing and Retirement in Europe (SHARE), wave 1, wave 2, wave 4, wave 5, wave 6, and wave 8 (own estimates). Unweighted dataset (N=250,605).

Note: Models include all the control variables. "Ref." = reference category, $p<0.10$, * $p<0.05$, ** $p<0.01$, *** $p<0.001$. Control variables are: "parent-child geographical distance"; "parent-child contact frequency"; "child's age"; "child's gender"; "parental age", "wealth quartiles", "marital status (i.e., living with a partner or not)", "employment status (employed, retired, or not employed)".

Figure 1. Random intercept linear regression models on Frailty Index. Statistical interaction between child's education, parent's education, and parent's gender. Average Marginal Effects (AMEs) with 95% confidence intervals.

Source: Survey of Health, Ageing and Retirement in Europe (SHARE), wave 1, wave 2, wave 4, wave 5, wave 6, and wave 8 (own estimates). Unweighted dataset (N=250,605).