Adult Children's Education and Parent Mortality: Exploring Mechanisms

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Abstract

A series of recent studies find a robust association between adult children's education and parent health. Three mechanisms are thought to underlie the observed associations: the provision of direct care, the transfer of financial resources, and the influence on health behaviors, in particular smoking, of parents. This research draws on data from the National Longitudinal Surveys of Older Men and Mature Women and causal mediation models to test the three mechanisms.

Objectives

A substantial body of work documents associations between both parents' and individual's educational attainment and health(Antonovsky 1967; Elo and Preston 1996; Elo 2009; Kitagawa and Hauser 1973; Ross and Wu 1995), but more recently attention has turned to whether adult children's educational attainment also contributes to an individual's health—an inversion of the more commonly studied intergenerational transmission from parents to offspring (see Figure 1). Studies have identified relationships between adult children's educational attainment and a range of health outcomes

Figure 1. Multigenerational effects of education on mortality.

including functional limitations, self-rated health, and mortality using samples from a number of different countries including China, Finland, Mexico, Sweden, Taiwan, and the United States.(Friedman and Mare 2014; Torssander 2013, 2014; Yahirun, Sheehan, and Hayward 2016; Yang, Martikainen, and Silventoinen 2016; Zimmer et al. 2007; Zimmer, Hanson, and Smith 2016; Zimmer, Hermalin, and Lin 2002)
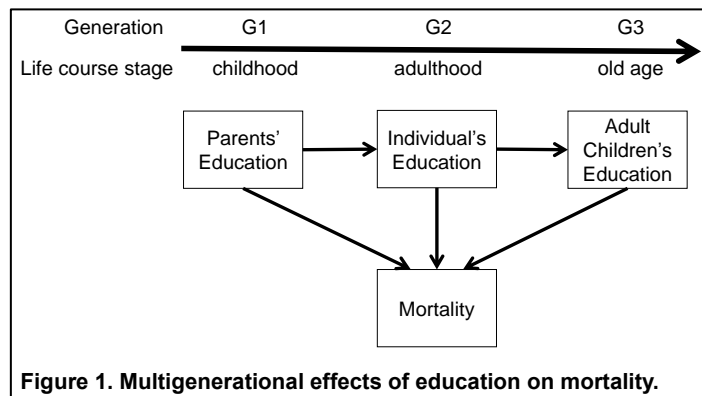
Three mechanisms are thought to link adult children's education to their aging parents' health: 1) direct care, 2) financial resources, and 3) health lifestyle and behavioral spillover.(Friedman and Mare 2014; Torssander 2013, 2014, Zimmer et al. 2007, 2002) The first proposed mechanism, direct care, refers to the provision of physical assistance. When the elderly are in need of assistance, family members—and in particular their adult children—often provide it.(McGarry 1998; Silverstein et al. 2002; Spitze and Logan 1990) In these cases, adult children with higher levels of educational attainment tend to have more flexible work schedules and, in turn, are better positioned to provide more care for their aging parents, though research on this claim is mixed.(McGarry and Schoeni 1995)

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Adult children with higher levels of education might also provide higher quality care by attaining a greater knowledge of health care and the health care system, which is especially beneficial for elderly parents experiencing cognitive decline.(Friedman and Mare 2014; Torssander 2013)

The second proposed mechanism involves adult children's financial resources. Higher levels of education typically increase earnings, which could help support aging parents' health following retirement.(Couch, Daly, and Wolf 1999; Hout 2012; McGarry and Schoeni 1995) On the other hand, adult children with lower levels of education may depend more heavily on parents' financial resources and thus divert funds from parents that would otherwise be used to support their own health.

The third proposed mechanism, health lifestyle and behavioral spillover, concerns the health behaviors of parents and children and the potential for adult children's lifestyle to 'spillover' to their parents.(Friedman and Mare 2014) A growing body of evidence documents the influence of social networks on health behavior.(Christakis and Fowler 2007, 2008; Rajan et al. 2003; Seeman et al. 2001) Adult children may exert a similar network-based impact on their parents. The relationship between education and smoking, for example, has shifted over time from a positive association in earlier cohorts to a negative association in more recent cohorts.(Pampel 2002; Pampel et al. 2015) This shift during the lives of the National Longitudinal Surveys of Older Men (NLS-OM) and Mature Women (NLS-MW) cohorts provides a unique opportunity to study whether more educated children directly improve their parents' health behaviors.

Methods

Our key dependent variable for all analyses is the age of death. A small percentage of NLS-OM respondents (11 percent) and a larger proportion of NLS-MW respondents (55 percent) were alive as of the last period when data was collected on age of death. Our key independent variable is adult children's education, which we measure as the highest year of education completed among all adult children over the age of 25. For direct care and financial resources, the NLS-MW has a broad array of questions about adult child transfers to NLS-MW respondents. These questions include respondent reports of whether adult children have helped with personal care, household chores, running errands, and financial assistance. NLS-OM respondents, however, were only asked to whom they could turn for financial or physical assistance. For health behaviors, we focus on smoking, which was asked at in multiple waves of the NLS-OM and NLS-MW. With this data we are able to determine the timing of smoking cessation (for those who ever smoked) relative to the timing of their adult children's education.

As a guide to the analysis, we use a directed acyclic graph (DAG) to represent the presumed causal relationships among the key variables and the potential threats to causal inference (see Figure 2). In Figure 2 we
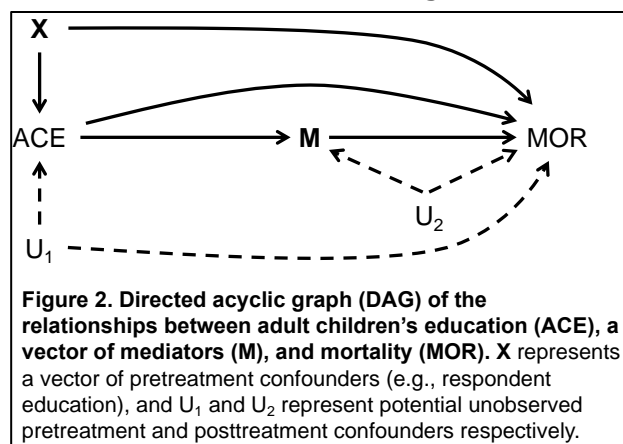

Figure 2. Directed acyclic graph (DAG) of the relationships between adult children's education (ACE), a vector of mediators (M), and mortality (MOR). X represents a vector of pretreatment confounders (e.g., respondent education), and U_1 and U_2 represent potential unobserved pretreatment and posttreatment confounders respectively.

see adult children's educational attainment (ACE) having a direct effect and indirect effects via a vector of mediators (M)—direct care, financial resources, and smoking—on their parents' mortality (MOR). In addition, we see a vector of observed variables (X) that shape both adult children's educational attainment and mortality that we might think of as "pretreatment confounders." This vector includes respondent's education as well as other sociodemographic characteristics such as race/ethnicity, region, household structure, and income and wealth (prior to when the adult children completed their education). Finally, U_1 and U_2 represent unmeasured pretreatment and posttreatment confounders, respectively.

For our analysis we specify accelerated failure time models for our primary outcome, mortality at a given age, and appropriate regression models for our mediators (i.e., either standard regression models or ordered logit models for direct care and financial resources and logit models for smoking). The models are given by

$$\log(T) = \beta_0 + \beta_1 ACE + \beta_2' M + \beta_3' ACExM + \beta_4' X + \epsilon_1 \quad (1)$$
$$f(M^{(i)}) = \gamma_0^{(i)} + \gamma_1^{(i)} ACE + \epsilon_2^{(i)} \quad\quad\quad (2)$$

where T is the age of death, ACE is adult children's educational attainment, M is a vector of mediators, ACExM is a vector of interactions between adult children's education and each mediator, ϵ_1 is an error term scaled to follow a Weibull distribution, f(.) is an appropriate function for the given mediator (e.g., the logit function for smoking), (i) indexes mediators 1 to 3, and ϵ_2 is an appropriate error term for the function chosen for the given mediator (e.g., a logistic distribution with variance $\pi^2/3$ for the logit model). The parameter estimates from these models permit us to calculate the controlled direct effect (CDE), the natural direct effect (NDE), and the natural indirect effect (NIE). In general, the CDE is identified under less restrictive assumptions than the NDE, though the NDE is often more often the desired estimand when analyzing mediation. Finally, the NIE provides an estimate of the effect of changing adult children's education from ace to ace* on mortality that operates through the mediators. In addition, we conduct a robustness analysis to assess the plausibility of the assumptions underlying the interpretation of the mediation analysis.

Preliminary Findings

We have completed a preliminary analysis for both the NLS-OM and NLS-MW cohorts that documents the associations between adult children's education and parent mortality. Our results support a three-generation model in which parent occupation, personal wealth, and adult child education and occupation are independently associated with men and women's mortality in later life. We also find that men with high-attaining adult children have an especially low risk of mortality in later life when compared to fathers with low-attaining children and men who remain childless. Furthermore, we find evidence of racial differences in the associations between parental, personal, and spousal education and mortality risk, but the education of adult children was a robust predictor of survival for both black and white women. We have not yet completed the mediation component of the analysis.