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The long lasting effects of education on old age health: Evidence of gender differences

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ABSTRACT

The large and positive association between education and many health outcomes is well-documented but what drives this association is still a matter of discussion in the literature. Exploiting the time and geographical exogenous variation in compulsory schooling laws across 6 European countries this paper shows evidence of large and positive effects of the additional year of schooling induced by these policies only on men's self reported health, depression and memory in old age. Furthermore, results suggest that these effects come mainly through an improvement in men's working conditions with small or no role played by income and health related behaviors. On the other hand, since women affected by compulsory school reforms show a very low labor force attachment, they do not show similar spillovers. These policies only have mixed effects on women's health related behaviors. In particular, affected women show a lower probability of being overweight, but also a higher probability of having ever smoked.

Introduction

The positive association between schooling and health is well-documented in the literature. In addition, the benefits associated with additional schooling are rising over time together with the returns to schooling in particular in old age (e.g. Goldman & Smith, 2011). It is also well-known that this association does not imply causality despite it is reasonable to think that part of this association reflects a causal effect of education on health. Parental characteristics, socio-economic status (SES) and other unobserved factors (e.g. cognitive and non cognitive skills, preferences, and initial health endowment) might confound and bias the estimated effect of education on health. To overcome this problem, a growing body of literature (for a review, see Lochner, 2011; Oreopoulos & Salvanes, 2011) have exploited plausibly exogenous variations in schooling—like changes in compulsory schooling laws (CSL). The main intuition is that the additional schooling induced by CSL is exogenous to individual characteristics and that therefore should reflect the pure effect of education on health. Even though the evidence on positive returns to education using CSL as instrument is well-established (e.g. Acemoglu & Angrist, 2001; Brunello, Fort, & Weber, 2009; Oreopoulos, 2006), the evidence on health is still mixed. Exploiting changes in CSL in more than 30 US states, Lleras-Muney (2005) estimates a 6-percentage point reduction in ten-year mortality rates. However, Mazumder (2008) shows that the estimated effects are not robust to the inclusion of state-specific cohort trends. According to the large literature surveyed by Lochner (2011), there is evidence of very small spillovers of the additional schooling induced by these policies on selected health outcomes in many European countries. Also in the UK the evidence is mixed, despite the attention has been paid to the 1947 compulsory school reform—an extraordinary reform that affected half of the population of the 14 year-olds. On the one hand, there is robust evidence of small or no effects on many health outcomes (Jürges, Kruk, & Reinhold, 2013). On the other hand, that reform had a strong positive effect on men's cognitive abilities (Banks & Mazzonna, 2012). Similar sex heterogeneity has been found by Kemptner, Jürges, and Reinhold (2011) that explore the effect of changes in compulsory schooling on long-term illness and work-disability in Germany. Also Gathmann, Jürges, and Reinhold (2012) find evidence of a small reduction in mortality as a consequence of CSL in 19 European countries only for men. These authors argue that one reasonable explanation for the observed sex difference is that education decreases the probability of being employed in physically demanding occupation only (or mainly) for men. The main intuition is that the nature of a large part of women's occupations has not changed much, mainly because women's labor force participation was very low in Europe. However, so far nobody has convincingly tested this hypothesis.

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From a methodological point of view, it is important to remark that CSL usually affect only a very small portion of the population at the lower end of the education distribution. In some cases this implies that the exogenous variation in schooling is not sufficiently powerful to find a significant effect on health. This is particularly true with survey data given the poor finite sample property of the instrumental variable estimator (IV). Not less importantly, this estimation strategy allows to recover only the effect on those affected by the policy change – the so-called compliers (Imbens & Angrist, 1994). Therefore, if the effect of education on health is heterogeneous across the population, this estimation strategy allows to estimate only the causal effect of education for people affected by CSL (those who without the reform would have been most likely to leave the school earlier). If working conditions and labor market participation are important mediating factors in the education gradient in health, the above-mentioned problem might explain the estimated sex heterogeneity. In fact, lower educated (old) women usually had a lower labor force attachment than men.

All in all, despite an increasing number of studies that uses CSL as source of exogenous variation, the evidence provided remains fragmentary and inconclusive. The results largely vary according to the reform, the country analyzed, and the specification employed.

This study aims to provide a comprehensive analysis that sheds light on the causal effect of the additional schooling induced by CSL in Europe. Exploiting the time and geographical exogenous variation in CSL across six European countries, this paper investigates whether and how the additional schooling induced by CSL causally affects mental and physical health later in life. This is done by taking advantage of the Survey of Health, Aging, and Retirement in Europe (SHARE), a large household panel that contains data on individual life circumstances of individuals aged 50+ in several European countries. In order to investigate the mediating factors through which education affects health later in life, the paper explores the richness of information on health, cognitive abilities, behaviors, and proxies for socio-psychological resources provided by the survey and the retrospective information on respondents' employment history.

The results show consistent evidence of gender heterogeneity in the effect of education on memory, self rated health (SRH) and depression. For SRH and depression, there is evidence of positive and significant effects of education only for men. In the case of memory the effect of the additional year of schooling due to CSL is positive for both genders but for men the effect is always statistically significant and about twice as large as that for women. Consistently with the previous results, the mediation analysis displays large sex differences. For men, schooling improves men's occupational patterns by decreasing the number of years spent in blue-collar jobs. For women, on the other hand, schooling has mixed effects on some of the lifestyles and behaviors considered. In particular, schooling decreases the probability of being overweight (as in Brunello, Fabbri, & Fort, 2009), but it increases the probability of having ever smoked.

All considered, the evidence presented in this paper show that these policies provided large and long lasting benefits on men's health. These benefits seem to be largely due to an improvement in working conditions. As a consequence, since women affected by these policies displayed a very low labor force attachment, there is no evidence of comparable health benefits.

The remainder of this paper is organized as follows. In the rest of this section, I briefly review the theoretical literature; in the next section (Methods), I describe the data used for the analysis and the empirical strategy; in the final section, I present main results as well as discuss issues arising from them and illustrate some conclusions.

How does education affect health?

Health and mortality gaps by education are large and have been growing for decades (e.g. Hummer & Lariscy, 2011; Miech, Pampel, Kim, & Rogers, 2011). The economic literature has identified many reasons why education may improve health and reduce mortality. Taking Grossman's model (1972) as a reference, we can identify several potential mechanisms through which education might affect health. Firstly, education may directly increase health production by raising the marginal productivity of health inputs or behaviors (productive efficiency) and by enhancing individuals' ability to acquire and process health information (allocative efficiency). To this end, Cutler and Lleras-Muney (2007) stress the importance of cognitive abilities as a mediating factor in this relationship particularly through the fundamental role played by health behaviors. In particular, they show that over 20% of the education gradient in health behaviors is associated with general cognitive abilities. Another theoretical explanation proposed is that education might change time preferences and thereby induce individuals to invest in better health. However, it is also possible that future-oriented persons get more schooling and invest more in health (Fuchs, 1982). The effect of education on health might also work through the labor market. Education generally increases earnings, which allows individuals to have command over resources, such as costly insurance or medical treatments and the possibility of living in healthy housing conditions. Furthermore, education may affect health through the trade-off between higher lifetime earnings and shorter (and sicker) life as stressed by Case and Deaton (2005) using the modified version of the Muurinen's version of the Grossman model (1982). The main intuition is that low-educated individuals can be paid-off to accept risky occupations. At the same time education might allow individuals to have more cognitively demanding occupations, which in turn might have positive effects on cognitive abilities and on health later in life.

In sociology, education is supposed to shape key socio-psychological resources, such as a sense of personal control (Ross & Wu, 1995) and social support (Berkman, 1995), which may protect health through both psychological (e.g. reducing stress and anxiety, see also Adler et al. 1994) and behavioral mechanisms. The effect on social network and social engagement is also stressed in the cognitive enrichment hypothesis (Hertzog, Kramer, Wilson, & Lindenberger, 2008) which states that social engagement, exercise, and other behaviors have a positive impact on the level of effective cognitive functioning in old age.

Another interesting open issue – largely discussed in this paper – is that of gender differences in the education-health association. The presence of a steeper education differential among men in adult mortality is well-established in the literature (e.g. Zajacova & Hummer, 2009). However, the reason for this difference remains an open question, despite its importance to understand the channels through which education affects health. Schumacher and Vilpert (2011) argue that since older cohort women were less involved in the labor market, their material resources depend more on their husband's level of education than on their own educational attainment. For the same reason, low educated women are preserved from being employed in risky occupations or highly educated women cannot benefit from more cognitively demanding occupations.

Methods

Data

This paper uses data from the first three waves (2004, 2006 and 2008) of the Survey of Health, Aging and Retirement in Europe