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# Education and health knowledge: Evidence from UK compulsory schooling reform

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ABSTRACT

We investigate if there is a causal link between education and health knowledge using data from the 1984/85 and 1991/92 waves of the UK Health and Lifestyle Survey (HALS). Uniquely, the survey asks respondents what they think are the main causes of ten common health conditions, and we compare these answers to those given by medical professionals to form an index of health knowledge. For causal identification we use increases in the UK minimum school leaving age in 1947 (from 14 to 15) and 1972 (from 15 to 16) to provide exogenous variation in education. These reforms predominantly induced adolescents who would have left school to stay for one additionally mandated year. OLS estimates suggest that education significantly increases health knowledge, with a one-year increase in schooling increasing the health knowledge index by 15% of a standard deviation. In contrast, estimates from instrumental-variable models show that increased schooling due to the education reforms did not significantly affect health knowledge. This main result is robust to numerous specification tests and alternative formulations of the health knowledge index. Further research is required to determine whether there is also no causal link between higher levels of education – such as post-school qualifications – and health knowledge.



## 1. Introduction

There is an extensive interdisciplinary literature that has shown that education is significantly correlated with better health-related behaviours and outcomes (often called the 'education-health gradient'). This arises as more educated people tend to have better diets, are less likely to smoke, are more likely to undertake regular exercise, are less likely to be obese, report fewer chronic health conditions, and live longer (Ross and Wu, 1995; Lleras-Muney, 2005; Cutler and Lleras-Muney, 2010; Brown et al., 2012; Clark and Royer, 2013). Higher parental education is also strongly associated with better child health (Case et al., 2002). However, in this literature a causal relationship remains difficult to establish.

There are many proposed pathways linking education to health. The most direct pathway is the effect of education on health-related knowledge accumulation (Grossman, 1972, 2000, 2005; Kenkel, 1991). Health knowledge makes individuals more efficient in health production, that is, they can obtain better health with the same amount of inputs (Grossman, 2005). For example, more knowledgeable individuals may accrue greater benefits from a doctor visit, because they are better able to understand doctor's instructions. Individuals with better health knowledge can also make better decisions about the choice of inputs in health production (Grossman, 2005). For example, people who know more about health are less likely to smoke than people who have less knowledge about it, as we show in this paper.

The central aim of this paper is to establish whether additional schooling has a causal impact on health related knowledge. There are two main pathways through which this relationship could operate. First, it may increase health knowledge directly if the school curriculum includes material on how the human body functions and the health effects of lifestyle choices. Second, additional schooling may give an individual the skills they require to access required health information. Education improves an individual's cognitive skills, including reading and information processing (Cascio and Lewis, 2006). Consequently, the higher educated are more likely to use health information resources, including books, television, radio programs, and Internet websites (Wagner et al., 2001; Bundorf et al., 2006). In addition, the more educated react more quickly and make better choices when new knowledge becomes available, for example, in response to new

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medical treatments or a public health campaign (Kenkel, 1991; Glied and Lleras-Muney, 2008; Vikram et al., 2012).

Despite the importance of health knowledge for the education-health gradient, there has been no attempt to establish a causal link between schooling and health-related knowledge. In contrast, a large number of papers have sought to causally estimate the education-health gradient. This is a difficult task given it is not possible to directly assess the counter-factual; that is, what would have been the health outcomes of individuals who selected into further education if they had not undertaken that education. In particular, estimated effects are likely to be too large if the same individual characteristics that determine educational attainment (e.g. parental background, cognitive ability, risk preferences), also directly affect health outcomes. A second concern arises if education is measured with error. Survey measures of educational attainment are often afflicted by high misclassification rates (Black et al., 2003), and in addition we do not often observe the quality of education or the topic-matter covered in the curriculum. If these issues induce classical measurement error, then estimated effects are likely to be too small.

These empirical difficulties have led to some recent papers using policy-changes that have exogenously affected some individuals' years of schooling but not others, to better identify the causal effect of additional schooling on health. A valid source of exogenous variation (an instrument) allows researchers to overcome both the endogeneity and measurement error issues. Examples in the international literature are Adams (2002), Lleras-Muney (2005), Mazumder (2008), Arendt (2005, 2008), Albouy and Lequien (2009), Brunello et al. (2011), Kempter et al. (2011), and Mazzonna, 2014. The results from these studies are mixed, with some finding a significant causal effect of education on health outcomes, while others finding no significant effect (Braakmann, 2011).

Mixed results are also found in studies that have utilised the exogenous educational reforms in the UK that incrementally increased the minimum school leaving age in 1947 (from 14 to 15) and 1972 (from 15 to 16). For example, Clark and Royer (2013) use these reforms as an instrument to establish a causal relationship between schooling and a variety of health outcomes. Overall, while they find strong education-health correlations for all of their considered outcomes (mortality, having a long term illness, health behaviours and self reported physical health) they find that the reforms causal effect on health is either not significant or very small. In contrast, using the same reforms and pooled cross sections of the General Household survey from 1980 to 2004, Silles (2009) documents that an additional year of education increases the probability of self-reporting being in good health by about 5 percentage points. A conclusion that schooling augments self-reported physical health is also drawn by Oreopoulos (2006). In addition, Powdthavee (2010) draws the conclusion that schooling lowers the risk of hypertension using the 1991 to 2007 Health Survey for England (HSE). In contrast, Jürges et al. (2013), also using the HSE (from 1993 to 2006), consider the risk of cardiovascular ill health alongside self-reported health. The only significant effect they find pertains to females and self-reported health. In a related paper using the 1947 reform to test for the effect of parental education on child health outcomes, Lindeboom et al. (2009) found that the 1-year increase in parental education had little effect on the health of their children, although increased schooling did improve the household financial situation.

Interestingly, while these previous studies of the education-health gradient emphasise that a likely pathway between additional schooling and their respective health outcomes is an increased level of health knowledge, few of these studies cite evidence for or discuss the importance of this pathway. To the best of our knowledge, there was no statutory health education in British school's curriculum during the period of the UK education reforms. Additionally, some evidence suggests that health education is ineffective with respect to altering health and behavioural outcomes in the short term (Coleman et al., 2011). Therefore, the pathway through which these reforms may impact on health outcomes is less clear, and a rigorous testing of the potential health knowledge route is a valuable contribution to this literature.

To identify the causal effect of education on health-related knowledge we follow the aforementioned education-health gradient literature, and utilise the exogenous variation in minimum compulsory years of schooling generated by the 1947 and 1972 UK education reforms, together with data from the UK Health and Lifestyle Survey (HALS). This data uniquely captures a respondents' level of health-related knowledge at two points in time. In particular, respondents are asked what they think are the main causes of ten common health conditions, and we compare these answers to those given by medical professionals to form an index of health knowledge.

## 2. Data and descriptive analysis

### 2.1. Health and lifestyle survey

We use the UK Health and Lifestyle Survey (HALS) whose purpose was to collect data on health behaviours of the British population (England, Wales and Scotland), including smoking, alcohol consumption, diet, and exercise as well as factors that may affect these behaviours. The HALS sample is broadly representative of the British population (Cambridge University School of Clinical Medicine (1985)). The first wave of HALS was conducted in 1984/85, with a response rate of 73 percent. In total, 9003 individuals (18–99 years old) were interviewed. Seven years later (in 1991/92), a follow up survey was carried out resulting in 5352 completed interviews. To increase the sample size, we use observations from both waves. Individuals born before 1923 were excluded from the sample for identification purposes. After also excluding observations with missing values, the analysis sample size is 10,085 observations.

As a measure of schooling, we use the age at which a respondent left high school, which ranges from 14 to 19 years old. Since some respondents continued their education after completing high school, this variable does not measure total years of education. However, school-leaving age is an appropriate measure of education in our analysis, because our identification strategy involves utilising education reforms that increased the legal school leaving age in Britain from 14 to 15, and then later from 15 to 16. It has been shown that these reforms had little effect on post-school qualifications (Clark and Royer, 2013). The average school leaving age in the sample is 15.5 years (with a standard deviation of 1.3) and the median is equal to 15 years.

### 2.2. Measuring health knowledge

A unique feature of HALS is that it includes questions that directly measure a respondent's health knowledge. Specifically, respondents were asked what causes ten common health conditions which have very different pathologies: stomach ulcers, chronic bronchitis, high blood pressure, migraine, liver trouble, stroke, lung cancer, heart trouble, severe depression, and piles and haemorrhoids. The respondents were not prompted with possible answers and all mentioned answers were recorded. To determine whether a respondent's answers signified a high level of health knowledge, we compared them to the answers supplied by respondents who reported they were medical doctors. Therefore, a 'correct' answer is defined by the knowledge held by medical