A Critical Assessment of Janke, Johnston, Propper and Shields (2020)

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Introduction

This paper critically assesses the claims made and evidence of Janke et al's (2020) statistical analysis of the relationship between education and a set of prevalent chronic health conditions. Following this assessment, I have recommended additional tests intended to build upon their results.

Overall, their statistical technique is comparably strong to the cited examples. Evidence that they provide is both relevant and where intended supports their argument and provides justification for the preceding empirical analysis. The results of the majority of their tests are weak and provide little support for their claim that education affects the onset of chronic health. Other than in the category containing diabetes diagnoses, in which an extra year of schooling was associated with a 3.6%-point reduction (from a population mean of 4%) in the highest instance.

Description of author's argument and assumptions

Janke et al (2020) aimed to build upon a large body of social science research, which shows a positive correlation between education and health outcomes. They recognise that a positive association between the two is not indicative of anything significant, since there are a multitude of other factors that determine both educational attainment and health at birth, such as parental socioeconomic status, genetic influences, time and risk preferences (Fuchs, 1980). Nevertheless, they aim to establish causality between increases in both educational attainment and years of schooling, with the onset of chronic illnesses. The argument hinges on their assumption that many chronic illnesses are the result of poor lifestyle choices, which are correlated to both educational attainment and length.

They apply a consistent modelling approach to information on a selection of chronic health conditions, exploiting two education reforms in the UK. The first is the raising of the school leaving age from 15 to 16 years old, which occurred in 1972 affected around 25% of the population, who would have otherwise left school at 15. The second is the widespread rise in British educational attainment which occurred in the 1990s. This was caused by a series of educational policy reforms which led to a 1.5-year increase in the average years of schooling within a decade. This second measure is less precise but allows the authors to examine the effects of education on health across a broader group than just those who leave once completing compulsory education (Janke et al., 2020).

These events are investigated using the Quarterly Labour Force Survey. Authors use a short time window around the events to isolate the causal effect from any time-varying influence. This gave them roughly 360,000 observations for the first reform and 425,000 for the second. This sample size is much larger than the median in the literature, which is 28,310 (Janke et al., 2020). Since this study is much larger, it should be much broader and more representative of the society being studied.

The prevalence of any chronic condition does appear to shift in Figure 1a presented by Janke et al (2020). However, the rest of the linear predictions in the set give little indication of discontinuity around the reform date, which indicates no change in the rate of specific chronic illnesses after the educational reform. The only chronic illness to show a considerable reduction at the time of the reforms was the *CVD & diabetes cluster score*. This could mean that the cardiovascular and diabetes reporting skewed the general proportion of the population reporting a health problem, which would explain the discontinuity visible in the general health problem analysis. Alternatively, there could be other types of illness which the authors did not investigate independently, which were recorded generally as a health problem.

This depends on how the authors identified the total observations with health problems. If they summed the total number of people experiencing one of the chronic illnesses, they tested from then it is diabetes and CVD that is skewing the total chronic illnesses group. If the measurement was calculated independently of the other chronic illnesses recorded, I believe this is evidence of other chronic illnesses being prevalent in society, which the authors could investigate, as these might show a causal link with education. Generally though, their statistical results provide very little evidence of a causality between education and the prevalence of chronic illnesses in the populations they measured against in the UK

Assessment of assumptions and claims

The authors begin by offering both sides of the argument, referencing Lleras-Muney (2005) as evidence that educational reforms are a strong driving force of improvements in health care. After presenting a comprehensive literature review of the sociological research into the relationship between education and health, Lleras-Muney establishes causality between education and mortality by using a regression discontinuity design. While this is a robust nonexperimental approach, it requires that all potentially relevant variable besides the treatment variable (education) and outcome (mortality) be continuous through the point of discontinuity. Lleras-Muney cannot fully control for this, as with many other regression analyses. This could be a factor which is influenced by being in school, which would explain the strong congruence between leaving school, and the increased chance of mortality. This effect could also be present in Janke et al (2020). For example, it might be the social aspect of being in school, which reduces pupils' indulgence in adverse health behaviours, like smoking and binge drinking. Her results suggest that an additional year of schooling is linked with a 3-6% reduction in the chance of dying within the next ten years, so is fairly strong evidence of a correlation between education and positive health effects.

Davies et al (2018) undertook a similar regression discontinuity analysis, which investigates the effect of the same 1972 education reforms on a cluster of health and economic measures. They find little evidence that the reforms effects rates of exercise, blood pressure and depression amongst the

cohort, but they too find that diabetes rates are correlated. Further evidence supporting their assumption that education is linked to health outcomes is provided by a meta-analysis which aimed to systemically review the quasi-experimental literature observing compulsory school laws (CSLs). The authors identified 89 articles in 25 countries, examining 25 health outcomes. A qualitative analysis of the findings shows that educational attainment is more often than not, a positive influencing factor on the majority of health outcomes tested (Hamad et al, 2018).

A further assumption of the 2020 study is that unhealthy habits associated with chronic illnesses (diabetes caused by sedentary-ism, or cardiovascular difficulties caused by smoking), are influenced by education. Huisman et al (2005) conducted a robust 100,000-participant study across 11 European countries. They determine that a person's education is a strong predictor of smoking, throughout Europe. It is observed that smoking is often started during adolescence, something which Janke et al also acknowledge. It is influenced by stress factors such as school performance and peer pressure, which will be stronger pressures in lower economic areas, where educational attainment and years of schooling are often lower.

The authors also assume that chronic conditions were not present at birth of throughout schooling. There is no mention in the paper (Janke et al, 2020) of removing observations from the sample, if the individual had a chronic illness form birth. A nationally representative US study found that Childhood chronic illness is associated with lower odds of graduating college and lower mean incomes (Halpern et al, 2011). If chronic illnesses were present during childhood in the UK study, then this segment of the sample (those already dealing with chronic illness) would have attained lower grades due to the simultaneous management of their illness. This would have discouraged them from education and the effect would present in the findings as visibly less years of schooling amongst those with a chronic illness.

Their empirical results offer little evidence to support their initial claims that education policy reforms in 1972 and the 1990s, and the subsequent increase in years spent in formal education, increased the health outcomes of the population. The only statistically significant finding is that an extra year of schooling was associated with a 3.6% reduction in the probability of having diabetes in the older sample and a 0.9% reduction in the younger sample. Compared to their respective means of the sample groups of 4% and 1.8%, this is a significant reduction. The reason given by the authors for the higher prevalence in the older group is that diabetes tends to develop later in life, and so the results would naturally be more pronounced in this sample than the second, younger group. This is a safe assumption to make and is supported by evidence from Diabetes UK, who estimate the average prevalence in the UK to be 4% amongst the general population. This figure rises steadily after birth and reaches its highest in the 65-74 age group (a segment the older 1972 age group are entering now). The second, younger group that the authors studied should be roughly 47 years old. This age group is reported as having considerably lower prevalence of diabetes, with only 3.6% of the 45-54 year-olds estimated to have the illness in England and a much lower proportion of the population exhibiting the illness across the rest of the UK (Diabetes UK, 2010).

They conclude from their results that the causal link is direct and school classes educating and encouraging pupils to live healthier lifestyles impacts their future health decisions. In this instance, they believe that the downward shift in the instances of diabetes amongst the survey respondents was result of diabetes awareness classes. For this to be the case, they must also have to assume that these classes were taught in the later years of education, once those who leave the education system have already done so. Personally, I find it difficult to believe that crucial health education is given out in the final years of schooling and raises the awareness of chronic illnesses (like diabetes), reducing individuals risk toward them. It seems more plausible to me that there is a confounding

third factor, which effects both education and health outcomes. It could also be the case that the level of education impacts the future level of income (as is well documented in the literature), which in turn can affect susceptibility to chronic illnesses. Another perspective which could be considered is that of Robert Fogle. He believed that early life nutritional quality had a large part to play in both education outcomes and later life health outcomes. However, historical data from the US indicates foetal programming provides a negligible effect on outcomes in later life (Cutler et al., 2007).

Recommendations

One additional test that could be completed is a study of the disparities in health outcomes between twins with different levels of education. Studying biological twins who are raised together, ensures that participants in the study were exposed to homogenous environmental conditions during early childhood, have the same genetic predisposition to illnesses and experienced the same foetal conditioning. Researchers could identify pairs of twins who had the same years of formal education and those who went to school for different amounts of time. Their rates of chronic illness could then be compared later in life to evaluate the protective effects of education. It would be difficult and highly unethical to design a study from scratch that allocates twins different levels of education in order to observe later health outcomes. Conducting a natural experiment, as Janke et al (2020) did, would be an ethical way of observing conducting analysis on twins to measure the education effects on chronic illness.

It would also be beneficial to see analyse their risk and time preferences, as Fuchs (1980) believed that the largest factor in both educational attainment, health outcomes and even future income, is one's ability to delay gratification. If this is observed to be different amongst twins, who then obtain different levels of education and then have different health outcomes, it could be concluded that the ability to delay gratification is the prime mover. Classes to hone this skill should be the focus of educational reforms, as this would impact health, income, and educational outcomes. Research has been conducted following a similar reasoning using data from roughly 3,000 German twins. Hubler (2018) found that the difference in genetics account for 23 percent of the variation in self assessed patience across individuals in his sample. There is little research establishing a link between time preference and chronic health outcomes. Studying twins would not be able to isolate the pathway through which less years of education leads to worse health outcomes, but it would be able to confirm that the correlation is in-fact statistically significant.

Another simple additional test that could be undertaken is to retest the younger age group tested by Janke et al (2020) after some time has passed. Since diabetes illness presents and is often diagnosed later in life, we could expect to see that this group experience an increase in the rate of diabetes as they age. With more cases of diabetes identified, it will then be easier to observe any effects that education has on the population. We would expect to see a more pronounced difference between the rate of diabetes in the groups with lower and higher educational attainment. If investigators wait until the younger age group is the same age as the older group were during their first test the results will be comparable, and authors could make some conclusion about the protective effects of educational duration (the first group) versus educational attainment (tested in the second group), against diabetes.

Conclusion

The quasi-experimental study examined throughout this paper (Janke et al, 2020), makes a series of fair assumptions while analysing the effect that education has on the rates of chronic health conditions on two samples of the UK population. Their findings are a useful addition to the growing body of literature that investigates the relationship between education and health indicators. The results mostly show very little relationship between an additional year of schooling and the rate of chronic illness. However, the finding that the incidence of diabetes was considerably lower across the two groups should encourage researchers to investigate the cause of this decrease. It should also lead academics to ponder whether the same factors that lead education to impact diabetes, could be applied to other chronic illnesses or health stressors. If a pathway between the increased year of schooling and lower diabetes cases can be identified, then it could theoretically be applied early during pupils' education, so that health gains from education are equitable and not dependent on length of enrolment.

I have recommended a twin study, which would isolate the effect of early life confounding variables. This could be used as another test to identify any effect that education might have on chronic illness later in life, while also being able to test Fuchs hypothesis of delayed gratification. Furthermore, I suggest that Janke et al could retest their younger cohort once they are the same age as the older sample were during their initial study (Janke et al., 2020). This would highlight the impact of educational attainment versus educational length on diabetes.

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