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A note on the causal link between education and health – Evidence from the German short school years

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A note on the causal link between education and health – Evidence from the German short school years

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Abstract:

I exploit exogenous changes in school year length in Germany in 1966 and 1967 to study the causal effect of education on health. Controlling for cohort, school track and Federal states fixed effects, which fully control for the assignment into treatment, reveals no differences in body weight, mental or physical health between affected and non-affected individuals. Additional robustness checks suggest that selection effects of individuals into non-affected Federal states play no role.

Keywords: education gradient, school year length, health

JEL Classification: I12, I20

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The data from the German Socio-Economic Panel (SOEP) used in this paper are provided by the DIW Berlin. See http://www.diw.de for details. All analyses used Stata 11. Do-Files are available from the author on request. There are no conflicting interests that need to be disclosed.

1 Introduction

The social determinants of health have been a major focus of interest in recent years (see, e.g., Adams et al., 2003; Commission on Social Determinants of Health, 2008). A robust correlation has been found between individual education and individual health (see, e.g., Grossman, 2006, for a survey). Possible channels that may be responsible for this so-called education gradient are higher income, a better social background, differences in personality as well as a causal impact of education on healthy behaviour related to, e.g., a greater knowledge of the importance of health (see Cutler and Lleras-Muney, 2010, for recent evidence).

Several recent studies have provided evidence for the conjectured causal link between education and health (see the review in Grossman, 2006, for details). These often exploit changes in compulsory schooling laws to look at possible effects of education on mortality. To name two prominent examples, Lleras-Muney (2005) exploits state-level changes in compulsory schooling policies and child labor laws across the United States and find large effects on mortality. Albouy and Lequien (2009) use similar changes in France in a regression discontinuity design and find no evidence for a causal link between education and mortality.

In this paper, I exploit a change in the length of two school years in Germany that affected certain cohorts attending certain school tracks in most Federal states during 1966 and 1967 using data from the German Socio-Economic Panel for 2004 (see Wagner et al., 2007). These changes were caused by the decisions of the German states to move to a common school start date with school years beginning after the summer holidays. For the affected individuals the duration of education was reduced by as much as 8 months, i.e. about two thirds of a school year. Note that the experiment did neither change the curricula nor the formal duration of education, i.e. someone graduating from lower secondary schooling would have a formally

completed 9 years of schooling, but would have received between 8 years and 4 months and 9 years of education depending on state of residence and entry cohort/birth year. Evidence by Pischke (2007) using the same quasi-experiment suggests that these short school years affected grade repetition and higher secondary school attendance (and consequently the total duration of education as the completion of higher secondary school is a prerequisite for university attendance in Germany), but had no effects on earnings and employment later in life. In other words, we can think of this experiment as isolating one direct channel from length of education to health while crossing out influences running through income and work related channels or through (unobserved) family or personal determinants of higher education.

My design closely follows Pischke (2007) in comparing individuals who were affected by the short school years with individuals entering school shortly before or after the respective years. The analysis also exploits the fact that individuals from the same entry cohort in certain school tracks or in certain Federal states, specifically Bavaria, Berlin, Hamburg and - for some tracks - also Lower-Saxony, were also not affected by the short school years to form other comparison groups. Effectively, this strategy amounts to using cohort*school track*Federal state interactions to form the treatment group and using a full set of cohort, school track and Federal state fixed effects to control for possible confounders that also affect assignment into treatment.

As outcomes, I look a three direct measures of health; two summary scales of physical and mental health based on the SF-12v2^{TM} health survey (see Ware Jr. et al., 1996) as implemented in the German Socio-Economic Panel (see Andersen et al., 2007, for details) and the body mass index defined as weight in kg divided by body height in meters squared. Given that the individuals in my sample entered school between 1949 and 1971 and are

consequently between 45 and 67 years of age in 2004, these measures may arguably be better suited to capture health effects among a relatively young population than mortality.

The results indicate no effects of the shortened school years on any health related outcome. Robustness checks using variables that cannot be influenced by the treatment indicate no evidence for selection effects that might bias the results.

2 Data

I use data from the German Socio-Economic Panel for the year 2004. The sample is restricted to West-German born individuals with a birthday between 1943 and 1964. The resulting sample encompasses 1,362 individuals with 88 individuals having experienced one short school year and 465 having experienced two. These cohorts entered school between 1949 and 1970. Individuals entering school between 1954 and 1966 faced either none, one or two short school years, depending on the Federal state they lived in[1] and the school track they were in. Individuals from earlier cohorts are only affected if they are in the higher tracks of the German school system with a corresponding longer duration of education. A full description of the institutional details and the corresponding treatment assignment can be found in Pischke (2007, pp. 1218-23). The important part is that the treatment assignment varies mechanically with school entry cohort, Federal state and school track. The resulting design can be seen as a regression discontinuity with several forcing variables or as a difference-in-difference-type analysis.

[1] Again following Pischke (2007), the Federal state an individual lived in during that period is approximated using current place of living. Pischke (2007, p. 1229) provides evidence that this procedure is relatively innocuous given the low mobility of these cohorts, i.e. more than 80% of all individuals born in the relevant period lived in the same state in 1965 and now.

In the econometric analysis, I regress the respective health indicator on a full set of cohort, school track and Federal state dummies as well as on the treatment dummy. The former capture any possible confounders related to the assignment mechanism that might be responsible for health differences later in life. A possible concern with that design is that individuals might try select to select into the states without shorter school years. While this is a priori unlikely as the final decisions for the short school years were taken at the beginning of 1966, which would have left parents with almost no time to react to these changes (see Pischke, 2007, p. 1223), I test the validity of the research design using variables that possibly cannot be influenced by the treatment, i.e. parental education and social status.

Descriptive statistics for the estimation sample can be found in table 1. Note that higher values for the health scales imply better conditions.

[Table 1 around here.]

3 Results

Table 2 presents the results from the main regression. Note that there is no clear pattern in favour of a relationship between education and health. While individuals with one short school year fare somewhat better on the mental scale, they appear to be disadvantaged physically, having both a higher BMI and a lower score on the physical scale.

[Table 2 around here.]

For individuals with two short school years the pattern of point estimates is similar. However, the effects are smaller and consequently always insignificant. Taken together, these effects do

not suggest any clear cut relation between the duration of education and health outcomes later in life.

A major concern with the research design could be that certain individuals, e.g., those with a preference for education, might select out of the affected Federal states. Table 3 presents evidence against that conjecture. Here, variables which are unlikely to be affected by the treatment, specifically parental education and social status, have been used as outcomes. Statistically significant effects would point towards selection effects. However, all estimated effects are small and insignificant, which suggests that the research design is valid.

[Table 3 around here.]

4 Conclusion

Using an exogenous change in the length of up to two school years in Germany in 1966 and 1967 that affected individuals depending on their state of residence, their secondary school track and the year they entered school. Comparisons of a mental and a physical health scale and of body mass index between affected and non-affected individuals, while controlling for a full set of fixed effects for cohorts, school track and Federal states, reveal no clear pattern of effects. Additional robustness checks suggest that selection effects of individuals into certain states seem to play no role. Overall, there is little evidence for a direct causal relationship between the duration of education and health, at least for this particular intervention.

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Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.
One short school year	.065	.246
Two short school years	.330	.471
Mental component summary scale	52.5	8.5
Physical component summary scale	52.8	8.0
Body mass index	24.9	3.8
At least one parent with higher secondary schooling	.211	.408
At least one parent is university graduate	.157	.364
Father's occupational prestige (ISEI scale)	47.5	17.8

Number of observations is 1362, except for father's ISEI status where it is 943.

Table 2: Effect of short school years on health outcomes

Outcome:	Mental scale	Physical scale	Body mass index
One short school year	1.7687*	-2.2656**	0.8769*
	(1.0159)	(0.9905)	(0.5224)
Two short school years	0.7416	-1.0038	0.0994
	(0.8147)	(0.7918)	(0.3829)
N	1,362	1,362	1,362
R^2	0.0430	0.0709	0.0553

Coefficients, robust standard errors in parentheses. All estimates contain fixed effects for school entry cohort, school track and Federal states.

Table 3: Robustness checks

Outcome:	At least one parent secondary schooling	At least one parent university graduate	Father's occupational prestige (ISEI)
One short school year	-0.0049	-0.0014	0.4142
	(0.0486)	(0.0456)	(2.2791)
Two short school years	0.0020	-0.0103	-2.8907
	(0.0379)	(0.0344)	(2.0021)
N	1,362	1,362	943
R^2	0.0788	0.0709	0.1313

Coefficients, robust standard errors in parentheses. All estimates contain fixed effects for school entry cohort, school track and Federal states.

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