Production of Health.

Education

Education and Health Hurley, Chapter 6

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A production function for health

- Recall our framework modeling a person (or a population's) health as a function of the causes of health
- A stylized health production function

$$HS = f(HC, L, E, G) \tag{1}$$

where HS is health status, L is lifestyle, E is environment, and G is genetics.

In this lecture we focus on education as a determinant of health, which we could consider a part, or cause of L, lifestyle. Production of Health.

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Education and health (Hurley, chap 5, pp142-146.

- Very well-established that there is a positive correlation between health and education.
- We have already discussed education in the context of Grossman's model of health capital.
- Recall: In that model, education makes us more better producers of health, or changes our preferences, or allows us to choose better combinations of inputs.

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Figure 1: The relationship between education and life expectancy across countries °0 ૾ૢૢૢૢૢૢૢૢૢૢૢૢ 0

Average Years of Education Preston Education Curves for 138 Countries, 1960-1985

Note: Circle size proportional to country population. Authors' calculation using the Barro-Lee international data.

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Life Expectancy at Birth

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Table 5.2: Education-Health Gradient, Canada, 2005

	Less than High School Degree	High School Graduate	University Graduate
Self Assessed Health Status			
Excellent	16.8%	21.5%	29.8%
Very Good	33.4%	39.5%	42.2%
Good	32.2%	29.0%	22.5%
Fair	13.2%	7.6%	4.3%
Poor	4.4%	2.4%	1.2%
Total	100%	100%	100%
Number of Chronic Conditions			
0	30.7%	30.3%	34.1%
1	23.7%	26.1%	28.7%
2-3	27.8%	28.3%	26.7%
More than 3	17.8%	15.2%	10.5%
Total	100%	100%	100%

Source: Author's calculation, Canadian Community Health Survey, 3.1 (Statistics Canada 2009)

Table 5.2. The average health status of individuals, in this case measured by their self-assessed health status and their number of chronic health conditions, increases the greater is their level of education.

Correlation and causation, again

- More educated people tend to be healthier people. Any or all of the following could then be true:
 - 1. education causes health
 - 2. health causes education
 - "third variables" (e.g., income) cause health and education

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Example.

Suppose for Bill, health (H) is determined by schooling
(S) and family income (F) by,

$$H = (0)(S) + F = F$$
 (2)

(so there is no effect of schooling on health for Bill, holding F fixed.

- Suppose for every person, there is no effect of schooling on health, but both health and schooling are affected by family income.
- What would we see in data on health and education outcomes in this world?

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Plausible that education causes health.

- Education increases income and income increases health (indirect effect).
- More educated have "better" jobs with safer work environments.
- Education allows more efficient production of health through increased information. e.g., more educated more likely to be aware of, and demand, new treatments.
- Education increases intelligence and more intelligent people are better at producing health (critical thinking, more open to science).
- Education leads to healthier behaviors because: different social environments, change in time preference, different social networks.

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Reverse causation and third variables.

- That more educated people tend to be healthier is not good evidence that our theory that education causes health is true.
- Could also be the case that: healthier people tend to get more education, or other variables lead to both more education and more health.

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Example of third variable: subjective discount factor

- How much is \$100 one year from you worth today?
- Suppose you say \$80. Then your *discount factor* is β=0.8.
- β = 0 means you "live for the day" and ignore the future.
- $\beta = 1$ means you do not discount the future at all.
- ► The market discounts at (1/(1 + r)), but your subjective factor may differ.

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Subjective discount rates.

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- Suppose you "live for the day": you set β = 0. \$100 in one year is worth nothing to you today.
- You will not do things which have costs today and lead to benefits in the future, because you don't care about the future.
- Investing in health and education involve current costs and future benefits.

Subjective discount rates cont.

- So, even if people were alike in all respects except discount rates, and even if health does not cause education nor vice versa, we would see a correlation between health and education.
- There may be many other personality, background, genetic, and contextual variables which lead to both education and health.

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Reverse causation from health to education.

- There is good evidence that poor health causes lower education.
- e.g. kids who randomly received effective health treatments in Kenya went on to get more schooling.
- ▶ We have good evidence that this is part of the reason health and education are correlated.

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Econometric evidence on effect of education on health.

- How can we tell if education causes health?
- There are a number of different econometric techniques we can try.
- Most common method seeks "natural experiments" on educational outcomes.
- A "natural experiment" mimics controlled experiments in the sense that they attempt to use variation which is essentially random.
- Here, we want to find factors which cause different people to have different amounts of education, but which are unrelated to health holding education constant.

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Econometric evidence cont.

- Compulsory schooling laws are one example: Say the government increases the age at which one can drop out of schooling from 14 to 15.
- We compare two people who are identical except that one is subject to the new minimum and one is not.
- If we find that the people forced to get one more year of education are healthier, we have evidence that education causes health.

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Evidence cont.

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- Result: additional year of education reduces probability of death by 3.6% in U.S.
- Smaller (or no) effect from the U.K. and other parts of Europe (puzzle).
- Evidence from these studies suggests the effect of schooling on health is positive but much lower than the correlational evidence would suggest.

Examples of other empirical evidence.

- Men who faced a higher probability of being drafted to fight in the Vietnam War and hence were more likely to attend college (to avoid the draft) took up smoking at lower rates.
- Within a household, siblings who get more education tend to be in better health and exhibit better health behaviors.
- Germans who became more likely to get more schooling in the 1950s when fees were eliminated were *not* in better health than equivalent counterparts.

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Examples of other evidence cont.

- Information tends to affect the behavior of educated people moreso than less educated people, e.g., probability of vaginal birth after casearean (VBAC) fell much more among educated women after a study demonstrated this procedure is dangerous was published.
- Other evidence, e.g., from randomizing some kids to receive training on the benefits of schooling in lesser-developed countries, suggests education causes health (mostly peer group effects).

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Policy implications.

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- ► Labor market return to a year of education: about 10% \approx \$80k.
- ► Health return to a year of education: about \$30k.
- To the extent people do not demand enough education, better case for educational subsidies.
- Possible health returns to subsidizing education are comparable to returns from health care system.

The effect of health on education.

- Causality may run "in reverse" from health to education: poor health in childhood, or anticipated poor health in adulthood, may reduce educational achievement.
- Evidence examples: each additional ounce of birthweight is associated with 5% greater schooling within identical twin pairs (holds genetic/family influences constant.
- Children in the former USSR exposed to fallout from Chernobyl had worse educational outcomes than unexposed statistically identical children.
- Students with genetic markers that predispose to ADHD, depression, and obesity had roughly one standard deviation lower GPA than counterparts without these markers.

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Summary.

- Health and education are robustly positively correlated.
- That correlation could be because health causes education, education causes health, or any of a number of other factors affect both.
- Disentangling the causal effect of education on health is a matter of ongoing research. Existing studies suggest that all three paths are important: education does cause health, health does cause education, and many other variables cause both.

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