



Education and Health:  
A Review of Evidence and Public Policy Implications

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# How is good health obtained?

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- Health cannot be bought—there is no market for health
- Health is inherited and altered by people through investments in health
- Inherited Health - people are born with a biological endowment
  - consequences of this endowment may differ because of environment differences (gene-environment interaction)
- Investments in Health—made using market inputs and time
  - obtaining and processing health information
  - purchasing medical care
  - diet and nutrition
  - exercise

# How does education lead to better health?

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- Education may change environments that will alter effects of biological endowment
    - may be purposeful change—in response to a biological endowment
    - may be incidental change that works through residential location, type of dwelling, stress, marriage, or other factors associated with education
  - Education makes it easier (cheaper) for people to obtain and process information about the causes and consequences of health
    - better health behaviors
    - higher quality medical providers
    - more efficient interactions with medical providers
  - Education will affect other factors that will cause greater investments in health
    - more income
    - access to cheap employer-sponsored health insurance and thus cheaper medical care
    - reduced stress—better coping mechanisms

## Education also changes incentives to invest in health

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- Education raises wages and lifetime wealth and therefore raises spending on investments in health
- The longer life associated with greater education provides an incentive to become more forward looking because more of life's benefits will occur in later years—more forward looking people invest more in health

## Are there alternative explanations of the positive association between education to health?

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- Yes
- Intergenerational transmission—wealthier and healthier parents have children who are healthy and educated
- Ability—more able people will obtain more education and be better at producing health
- Time preference—those who are more forward looking will invest more in education and health
- Reverse causality—healthier people have greater incentive to invest in education because (future) benefits of education will be extended
- All of these alternatives are possible and may be valid, but none is likely to overturn the mountain of evidence that shows that education is a consistent and numerically important determinant of health

# Some evidence of positive association between education and health from NLSY79

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- Examine association between education and health at age 40 for recent cohort (age 40 in 2004)
- Longitudinal data and extensive information about family can be used to adjust for several variables linked to alternative explanations of association between education and health
- Adjust for family background—reduces likelihood that explanation of association between education and health is intergenerational transmission
  - family structure at age 14 (e.g., two biological parents)
  - mother's education
  - nativity of child and mother, and language spoken in home
  - presence of educational materials in household while growing up (e.g., newspapers, library card, magazines)

# Some Evidence from NLSY79

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- Adjust for non-cognitive attributes measured at age 15—addresses concerns that forward looking behavior is explanation of association between education and health
    - self esteem
    - locus of control (external v. internal)
  
  - Adjust for health endowment—attempt to reduce bias from unmeasured biological factors
    - Health limitation at age 15
    - height
    - father is dead
  
  - Adjust for cognitive ability at age 15 (net of grade in school at age 15)
    - Armed Forces Qualifications Test
    - control for intellectual capacity that is unrelated to amount of schooling and that may explain better health and more education

Variable	Short Form 12-Physical Score			
High School (12 Yrs. Educ.)	2.86**	2.67**	2.63**	2.69**
Some College (13-15 Yrs. Educ.)	3.68**	3.26**	3.12**	3.24**
Bachelors Plus (16+ Yrs. of Educ.)	4.79**	4.19**	3.90**	3.74**
Third Quartile AFQT			0.39	0.28
Highest Quartile AFQT			0.70	0.52
Family Background Variables	No	Yes	Yes	Yes
Health Behaviors	No	No	No	Yes

Adding family background measures, health at age 15, ability at age 15, and adult health behaviors decreases effects of education marginally: by between 5 and 20 percent.

Education still has large effects:

High School raises physical health by  $\frac{1}{4}$  of a standard deviation  
 Bachelors raises physical health by  $\frac{1}{2}$  of a standard deviation

Variable	Respondent Reported Fair or Poor Health			
High School (12 Yrs. Educ.)	-0.18**	-0.16**	-0.16**	-0.14**
Some College (13-15 Yrs. Educ.)	-0.23**	-0.20**	-0.20**	-0.17**
Bachelors Plus (16+ Yrs. of Educ.)	-0.27**	-0.24**	-0.23**	-0.20**
Third Quartile AFQT			-0.01	-0.01
Highest Quartile AFQT			-0.02	-0.01
Family Background Variables	No	Yes	Yes	Yes
Health Behaviors	No	No	No	Yes

Adding family background measures, health at age 15, ability at age 15, and adult health behaviors decreases effects of education by between 20 and 25 percent.

Education still has large effects:

High School reduces probability of poor health by 35 percent  
 Bachelors reduces probability of poor health by 55 percent

Variable	Annual Earnings (Wages)			
High School (12 Yrs. Educ.)	6320**	-500	-722	-1741
Some College (13-15 Yrs. Educ.)	17885**	7454	6717	5244
Bachelors Plus (16+ Yrs. of Educ.)	42603**	30240**	27950**	26037**
Third Quartile AFQT			671	585
Highest Quartile AFQT			4879	4461
Family Background Variables	No	Yes	Yes	Yes
Health Behaviors	No	No	No	Yes

Adding family background measures, health at age 15, ability at age 15, and adult health behaviors decreases effects of education by between 40 and 100 percent.

Only very high levels of education matter

Variable	Current Daily Smoker Age 34			Binge Drinker Age 38		
	No	Yes	Yes	No	Yes	Yes
High School	-0.20**	-0.21**	-0.20**	-0.60**	-0.59**	-0.59**
Some College	-0.35**	-0.36**	-0.34**	-0.74**	-0.74**	-0.71**
Bachelors Plus	-0.49**	-0.49**	-0.45**	-0.92**	-0.86**	-0.80**
AFQT-3 <sup>rd</sup> Quartile			-0.02			-0.02
AFQT-4 <sup>th</sup> Quartile			-0.09**			-0.14
Other Covariates	No	Yes	Yes	No	Yes	Yes

Education is strongly associated with health behaviors and adding many other variables has little effect on effects of education

Bachelors is associated with nearly 100 percent reductions in smoking and binge drinking

# Summary of Evidence

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- Education is a large and statistically significant predictor of health and health behaviors
  - High School v LTHS—increases SF-physical score by 25% of a standard deviation and decreases probability of being in poor health by 35%
  - Bachelors v LTHS—increases SF-physical score by 50% of a standard deviation and decreases probability of being in poor health by 55%
- While there may be some diminishing returns, additional years of education still matter even at relatively high levels of education
- Education improves health even for those with low cognitive ability—so getting low achievers through high school will likely improve health
- The significant and large association between education and health remains after adjusting for:
  - family background, health endowments, non-cognitive attributes, and cognitive ability (intelligence)

# Conclusions

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- It is unlikely that alternative explanations of association between education and health would eliminate or even substantially reduce the magnitude and significance of the effect of education on health
- Adjusting for health behaviors (smoking, drinking, obesity, exercise) has relatively little influence on the effect of education on health even though these behaviors are significant predictors of health and are correlated with educational attainment
- Effects of education on health (at age 40 but also at other ages) are mainly through other mechanisms; but not income as adjusting for income has little effect
- Evidence consistent with many other studies that provide descriptive evidence consistent with a causal effect of education on health

# More Sophisticated Evidence

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- Studies based on compulsory schooling laws (Lleras-Muney (2005) in US, Oreopolous (2003), Arendt (2005) and Spasojevic (2003)
    - policies that change the quantity of schooling obtained by people generate plausibly exogenous variation in education
    - studies that use such variation to obtain estimates of the association of education and health still find a strong positive effect
  - Chen and Lange (2008)—study the mechanism
    - objective, clinical measure of risk of breast cancer: Gail index
    - subjective measure of risk of breast cancer—survey responses
    - information on breast cancer screenings
    - positive association between objective measure of risk and subjective measure of risk is significantly larger for those with more education
    - positive association between the objective measure of risk and whether woman obtains cancer screening is significantly larger for those with more education

# Conclusions—More Sophisticated Evidence

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- Evidence from studies using plausibly exogenous variation in education still find rather large effects of education on health; indeed effects are often as large as those from observational studies
- Chen and Lange (2008) provide evidence about the mechanism—better recognition of health benefits and better use of information
- More work needs to be done to identify mechanisms—see Cutler and Lleras-Muney (2006)
- Lack of evidence on mechanisms should not be used to discount importance of effect of education on health
  - there is a widespread consensus that increases in schooling cause higher earnings even though there are few studies that identify the mechanisms underlying this association
  - perhaps mechanisms are many and difficult to measure

# Policy Implications

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- Education is a powerful determinant of health, and many other social and economic outcomes
- Unfortunately, high school graduation rates in many large cities are around 50%-evidence suggests that getting more persons to graduate high school, even low ability persons, will improve health
- Health policy is not focused on education, but instead focused on expanding health insurance and increasing spending on health care services
- Little evidence that the large sums of money we are spending on health care are getting us much:
  - RAND Health Insurance Experiment
  - Dartmouth Atlas and spending on Medicare
  - While estimates from prominent health economists indicate that benefits of health care spending in terms of longevity and improved health are greater than costs, these calculations miss the boat—we do not evaluate the efficiency of any other market using this criterion
  - There are no proven solutions to make spending more efficient

# Policy Implications

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- Good education policy is good health policy
  - Increasing rates of high school graduation and the quality of schools will likely lead to large improvements in population health
  - Improvements in population health will reduce spending on health care—more educated are healthier and spend less on care than less educated
- Solve problem of the uninsured—the large proportion of population that is uninsured keeps health policy focused on insurance and health care
  - Significantly decreasing the number of uninsured would allow health policy to move beyond insurance
  - Tradeoff expanded coverage for greater efficiency in health insurance markets—reduce regulation, eliminate tax advantage of employer-sponsored insurance; and encourage high-deductible insurance plans