Healthy, Wealthy, and Wise: Is there a Causal Relationship Between Child Health and Human Capital Development?

Janet Currie

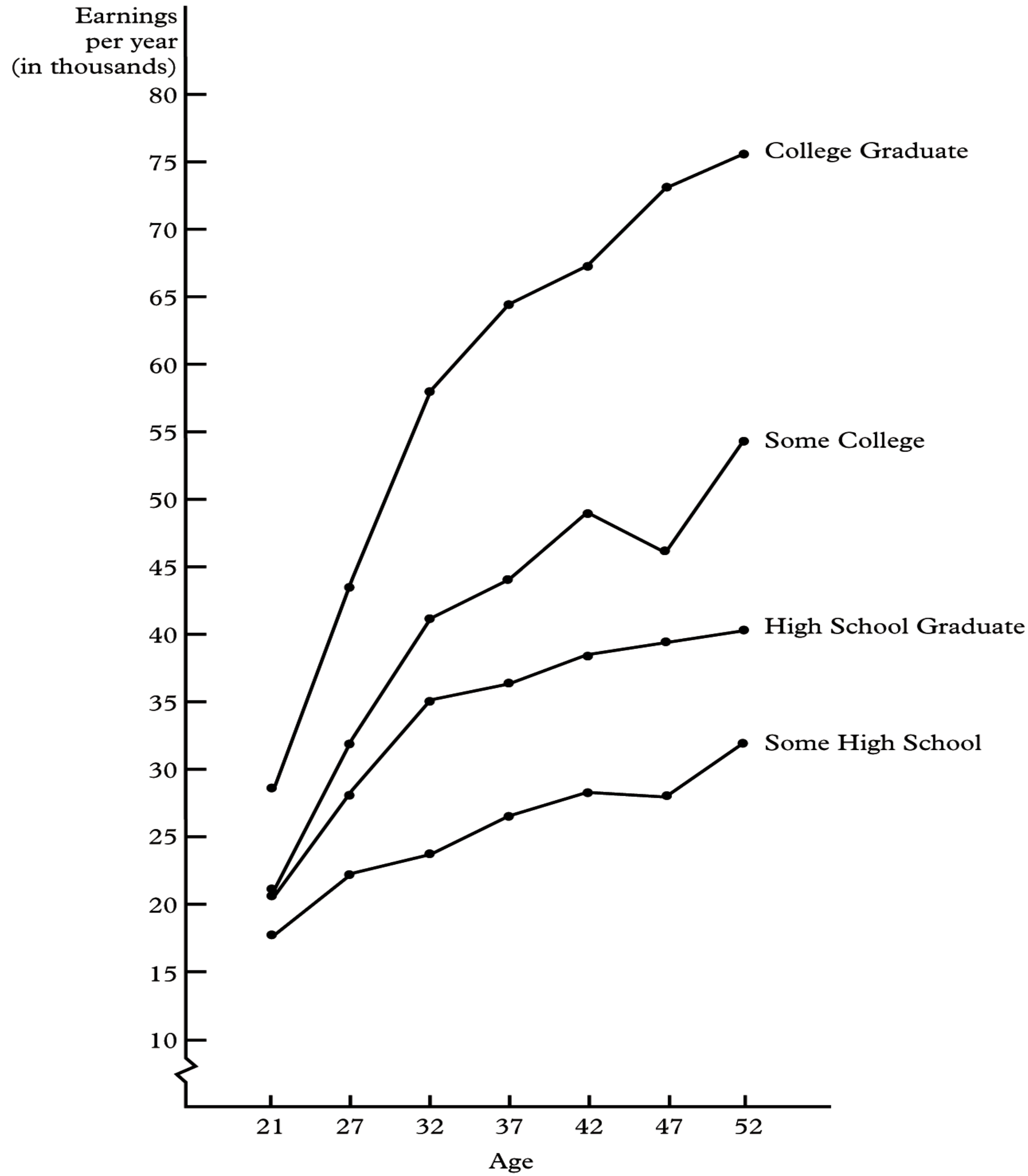
The phrase “human capital” often means “education.”

- Following Becker and Mincer, education is viewed as a form of capital because investments in education lead to increases in productivity and in wages.

- Empirically, the relationship between education and wages is one of the most robust and stable findings in all of economics.

Earnings, Full-Time, Year-Round Male Workers, 1999

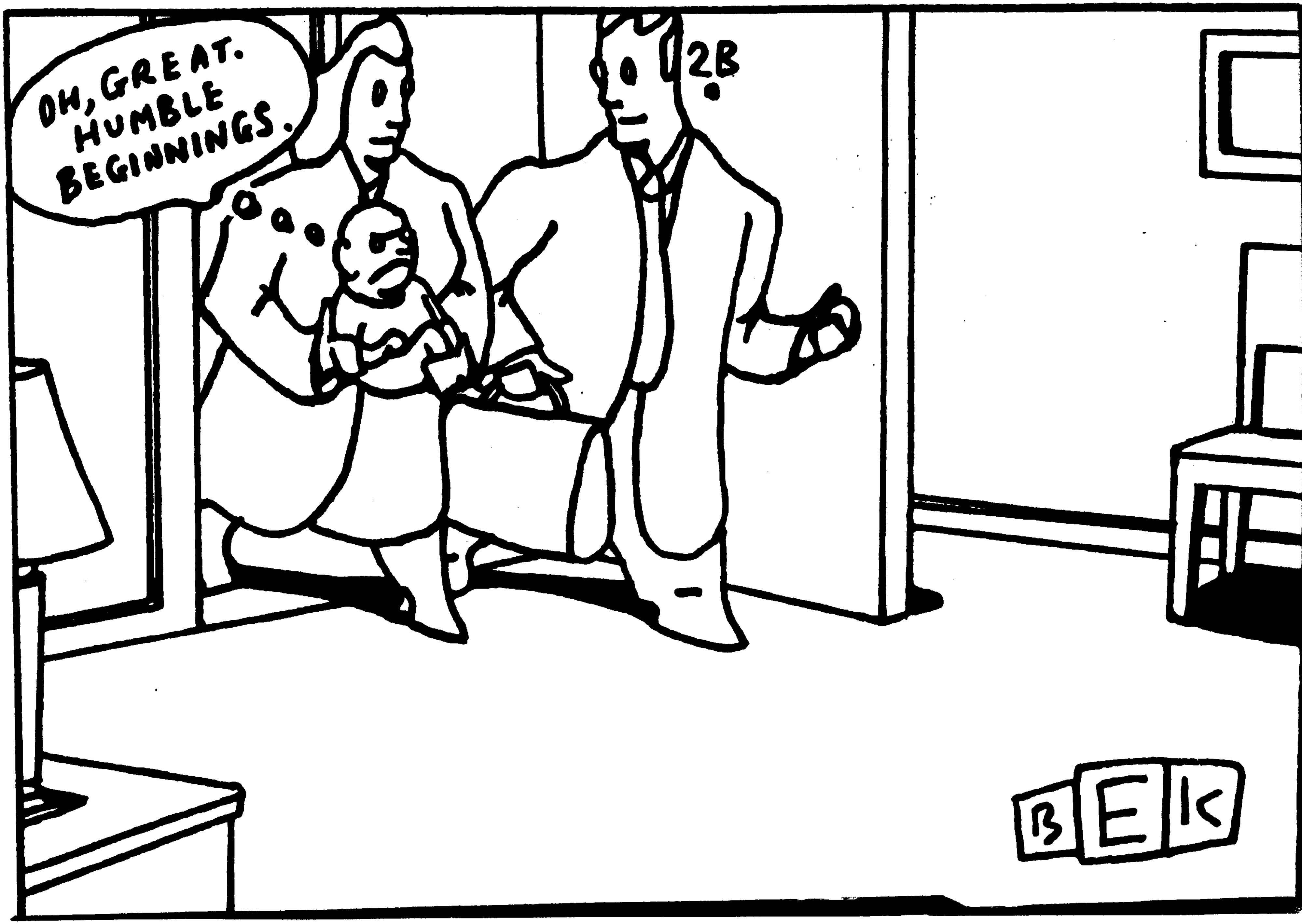
Source: Ehrenberg and Smith



But what determines Human Capital?

Family background!

And human capital of parents is one of the most important determinants of family background.


OH, GREAT. HUMBLE BEGINNINGS.
2B
BEK

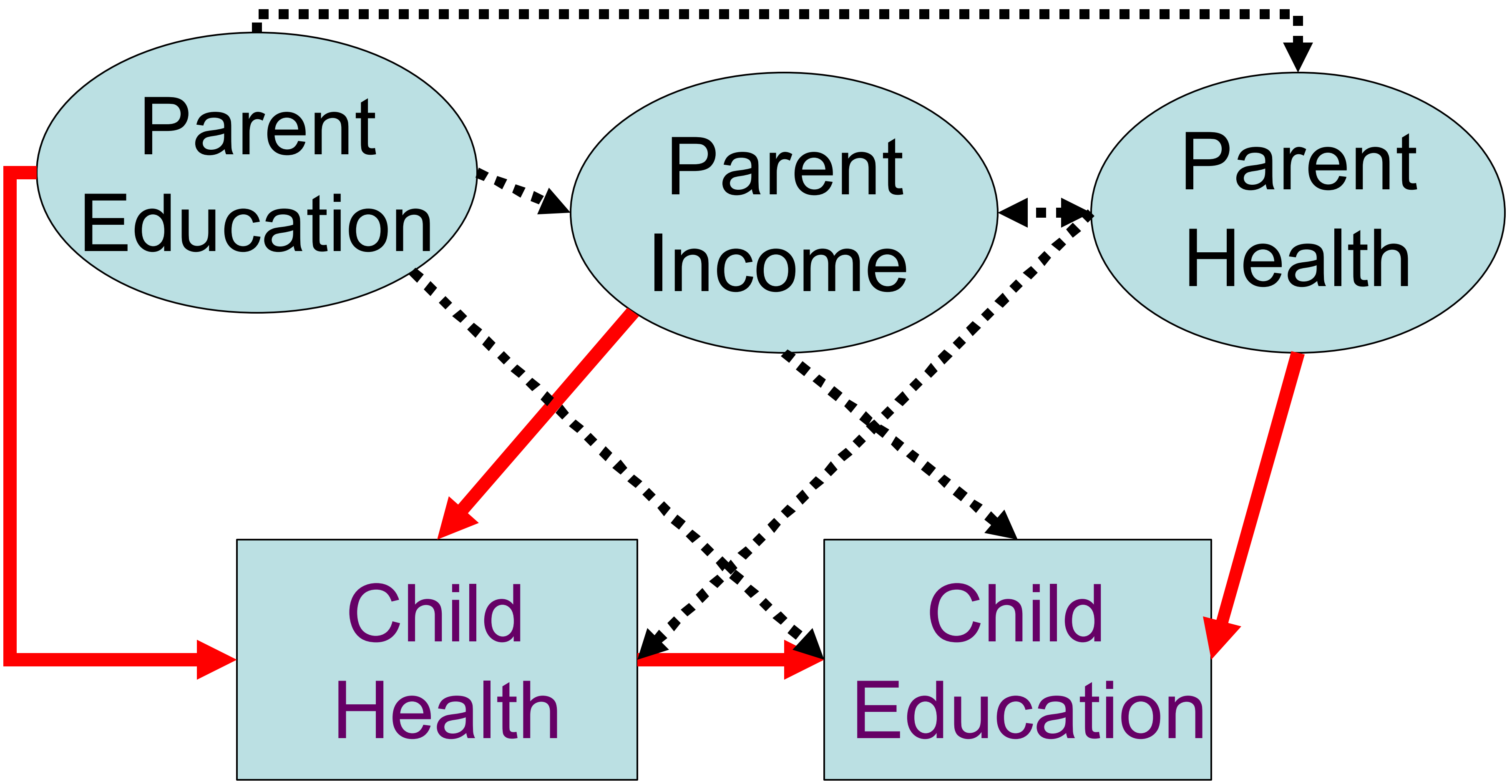
Everyone knows that children from “humble beginnings” are less likely to be successful in life.

But what are the mechanisms? Is it possible that health is a factor, even in rich countries like the United States?

It is not possible to answer this question definitively yet, but this essay examines two related questions:

- Does parental socioeconomic status have a causal effect on child health?
- What is the link between child health and future educational and labor market outcomes?

Links Between Family Background and Child Health and Education



Parent Education and Income and Child Health

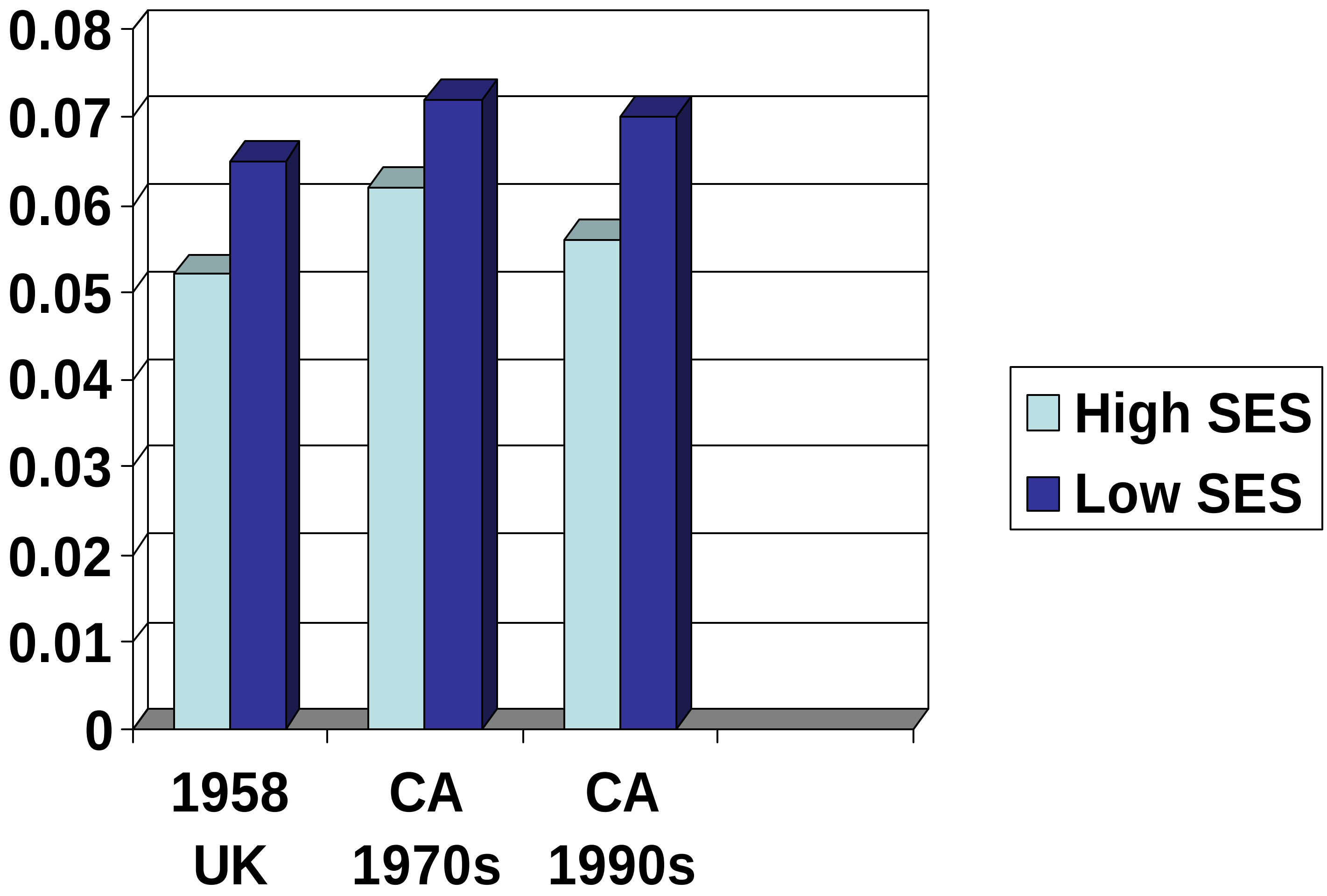
- Differences in child health are apparent at birth.

- e.g. in rate of low birth weight (birth weight less than 2500 grams).

- And initial differences in health grow over time.

SES Difference in Low Birth Weight

Note: In CA SES=zip income at birth, in UK SES defined using Father occupation.



Health of Poor vs. Non-Poor Children, 2001-2005 NHIS

	Poor	Non-Poor
Maternal Assessment of Child Health		
health is excellent/very good	0.700	0.869
AGE 2~3	0.746	0.901
AGE 4~8	0.725	0.873
AGE 9~12	0.682	0.870
AGE 13~17	0.661	0.853
Health at Birth		
Birth weight (grams)	3221	3348
Birth weight < 2500 grams	0.112	0.078
Ever Chronic Conditions		
Ever told Asthma	0.159	0.131
Ever mental problem[a]	0.119	0.079
Ever told ADHD, 2-17	0.071	0.060
Trouble hearing or seeing	0.076	0.053
Stuttering or stammering-past 12 mo.	0.026	0.012
Ever told heart problems	0.018	0.014
Ever told diabetes	0.002	0.002
Ever told had arthritis	0.002	0.001
Any of the above	0.324	0.265

Activity Limitations	**Poor**	**Non Poor**
Limit b/c of chronic conditions	0.114	0.070
AGE 2~3	0.061	0.037
AGE 4~8	0.097	0.062
AGE 9~12	0.139	0.087
AGE 13~17	0.141	0.078
Asthma/resp. prob causes limit	0.019	0.006
Mental problem causes limit[b]	0.062	0.035
ADHD causes limits	0.023	0.014
Hearing/vision causes limit	0.008	0.005
Speech problem causes limit	0.019	0.015
Illness and Medically Attended Injury		
Days missed illness/injury past 12 mo.	4.471	3.531
injured/poisoned requiring med.attention last 3 mo.	0.024	0.031
asthma attack past 12 m	0.073	0.057
ER due to asthma last 12 m	0.032	0.016
resp. allergy last 12 m	0.115	0.135
frequent diarrhea last 12 m	0.018	0.012
3+ ear infection last 12 m	0.072	0.056
# Obs.	7,363	36,858
# Obs. Representing	8,339,503	44,476,130

SOURCE: NHIS 2001-2005 Sample Children Files, Children 2-17

Child health on family income
1=excellent, 5=poor
U.S. National Health Interview Survey
Source=Case, Lubotsky, Paxson (2003)

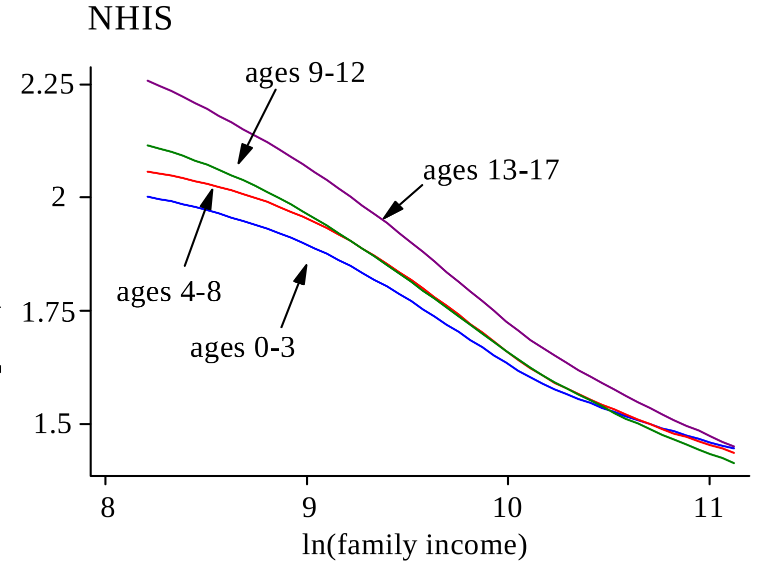


Table 1: The Steepening of the Health-Income Gradient with Child Age
A Comparison of the U.S., Canada, and the U.K.
Ordered Probits (1=excellent, 5=poor health)

Age:	**0 to 3**	**4 to 8**	**9 to 12**	**13 to 17 (15)**
U.S.: Case, Lubotsky, Paxson, NHIS				
Ln(Income)	-0.183	-0.244	-0.268	-0.323
	[.008]	[.008]	[.008]	[.008]
Canada: Currie and Stabile, NLSCY				
Ln(Income)	-0.151	0.216	-0.259	-0.272
	[.026]	[.019]	[.024]	[.040]
U.K.: Case, Lee, Paxson, HSE				
Ln(Income)	-0.143	-0.212	-0.203	-0.194
	[.036]	[.026]	[.030]	[.034]

Notes: Standard errors in brackets. Regressions control for year effects, family size, sex, mother age tat birth, father present, etc.

The similarities between Canada and the U.S. suggest that access to health insurance is NOT the driver for the steepening gradient.

In Canada, rich and poor children recover from any given diagnosis to about the same extent after four years.

The problem is that poor children are subject to more negative health events.

The data on insults to health are poor, and often not recorded in the same surveys that track measures of SES and/or child outcomes.

Possible measures include:

- injuries
- hospitalizations
- chronic conditions

Injuries (intentional and unintentional) are the leading cause of death among children 1-14 in developed countries.

But there is little information about injuries that do not lead to death, about gradients by SES (parent information is often not included on death certificates), or about effects of injuries on the outcomes of surviving children.

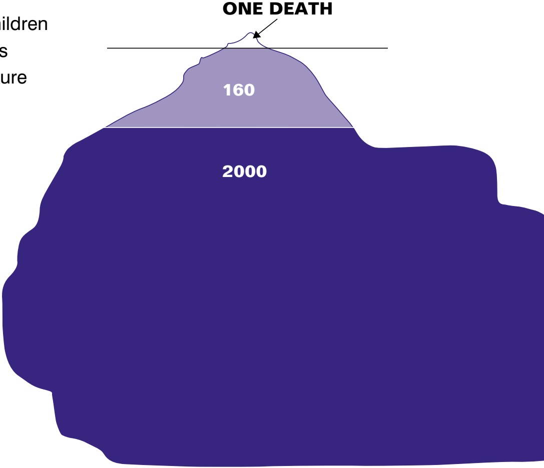
Deaths per 100,000 Due to Injuries
Children 1-14, 1991-1995

	Total Death Rate	Accidents as Share of Deaths (%)	Traffic Deaths	Boys Rate	Girls Rate
Sweden	5.2	33	2.5	5.9	4.4
UK	6.1	29	2.9	7.7	4.3
Italy	6.1	28	3.3	8.1	4.1
Netherlands	6.6	30	3.4	8.3	4.8
France	9.1	41	3.8	11	7
Canada	9.7	44	4.3	11.9	7.4
U.S.	14.1	49	5.8	17.5	10.4

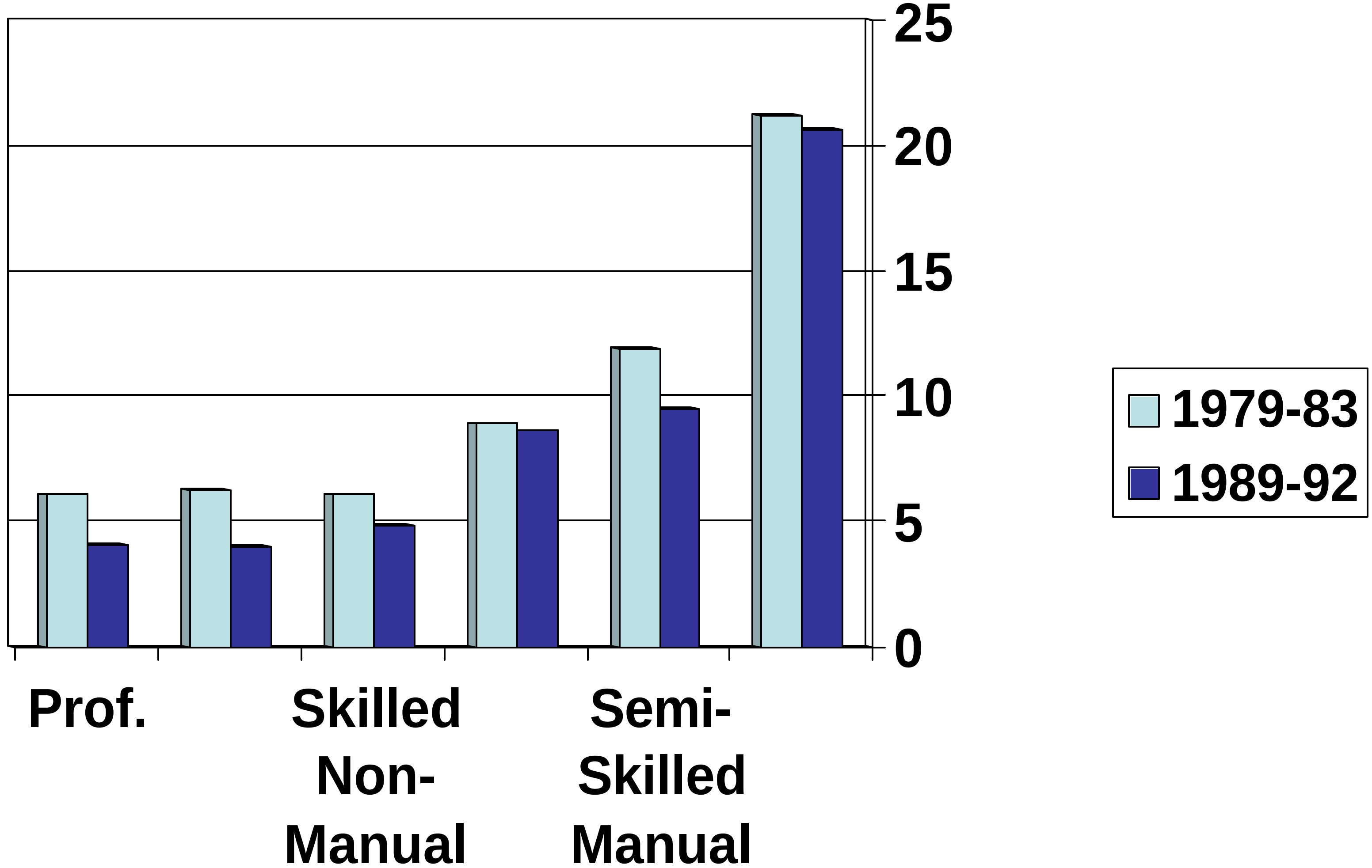
Source: Unicef, 2000.

For every one death among children aged 0 to 14 in the Netherlands during 1991-95 (home and leisure accidents) there were:

- 160 hospital admissions
- 2,000 accident and emergency department visits



Parental Occupation and Child Injury Deaths per 100,000 Children 0-15, England and Wales



Source: Unicef, 2000

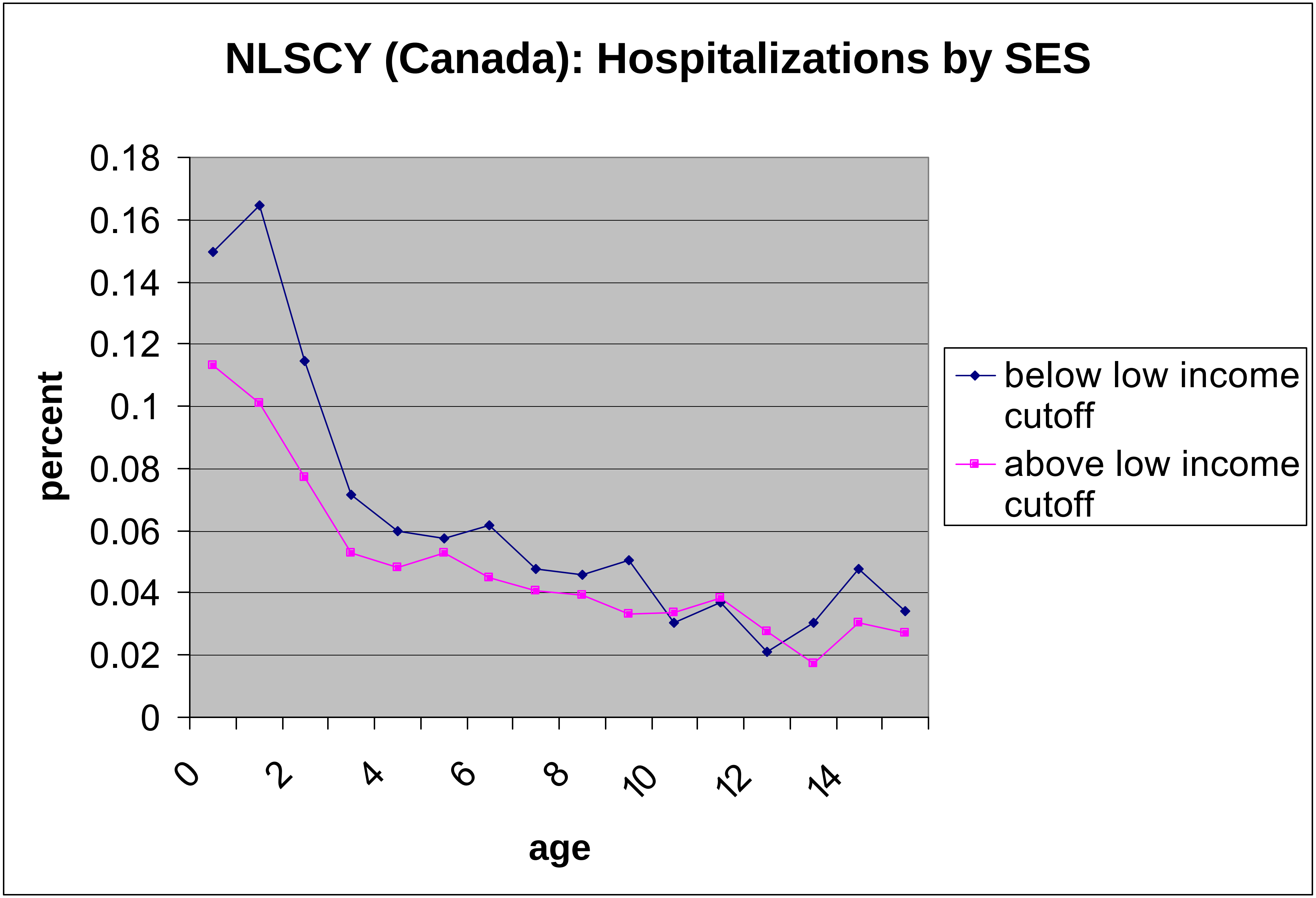
Hospitalizations and chronic conditions are subject to reporting biases.

- e.g. in the U.S., children with better insurance or more likely to be hospitalized other things being equal. In countries with universal health care, more educated parents are still more likely to seek care for given conditions.

- one important exception may be mental illness, where higher SES parents may be more able to avoid the stigma of diagnoses by finding alternative ways to deal with their child.

- if parents do not seek care for child conditions, then chronic conditions may not be diagnosed.

- age patterns may be particularly sensitive to reporting biases if many conditions are diagnosed at school entry.


NLSCY (Canada): Hospitalizations by SES
percent
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
2
4
6
8
10
12
14
age
below low income cutoff
above low income cutoff

Why Might Parental SES Affect Child Health?

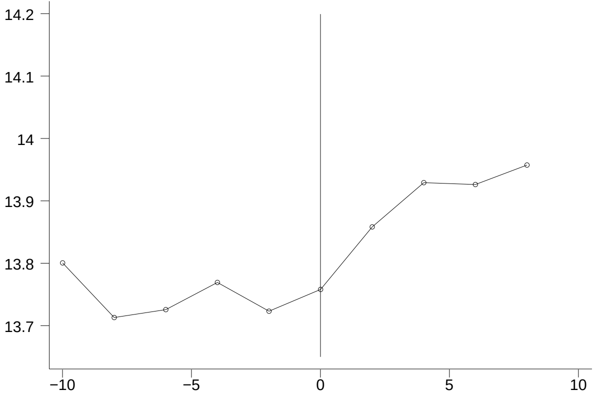
The standard "Grossman" model of parental investment in child health suggests two reasons:

1. Budget constraints are less binding in wealthy families, so they can purchase better health "inputs".
2. Parents of lower SES may be less able to "produce" child health given the same inputs.
3. Children of lower SES parents may have lower health endowments (note, this may be true even among children with identical genetic enowments).

Do Correlations Imply Causality?

- third factors may be important. E.g. poor children may have parents who are in poor health and who therefore have low earnings (or poor child health may cause low earnings, though evidence for this is weak).
- relatively few papers attempt to get at causality. Many shocks to parental SES could have direct effects on children's health.

Currie and Moretti (2003) document a large increase in the number of colleges between 1960 and 1980, which increased college going among white women. This increase improved birth outcomes, through many channels, including a reduction in smoking.



Avg. years education 1st time mothers 24+
Before & after opening of 4-year college
Source: Currie and Moretti, 2003

The Effects of Mother's Education on Infant Health
Data=U.S. Vital Statistics, IV Estimates Using College Openings as IV. Mother's 24-45 years old at time of birth.

	Coeff. Estimate	Mean of Dep. Var.
1. Low Birth Weight	-0.0098	0.049
	[.0038]	
2. Preterm Birth	-0.01	0.069
	[.0044]	
3. Prenatal Care 1st	0.0234	0.921
trimester	[.0055]	
4. Smoked During	-0.0583	0.078
Pregnancy	[.0118]	

Notes: Std. errors in brackets. Models include mother age, cohort, county*year-of-child's birth. Each row is from a separate regression.

Source: Currie and Moretti, 2003.

Effects of maternal income on child health

Berger, Paxson, and Waldfogel (2006) use Fragile Families data. Show that parenting skills and physical aspects of home environment are strongly related to income. However, effects are small enough that bringing a family up to the poverty line would have little impact, even if effects were causal.

Berger, Propper, and Riggs (2006) use the Avon birth cohort study and a reach similar conclusions. The mother's own health appears to matter more for child health.

Conley and Bennett (several studies), Johnson and Schoeni (2007) use PSID & sibling design. Find positive effect of income on birth weight when mother was low birth weight.

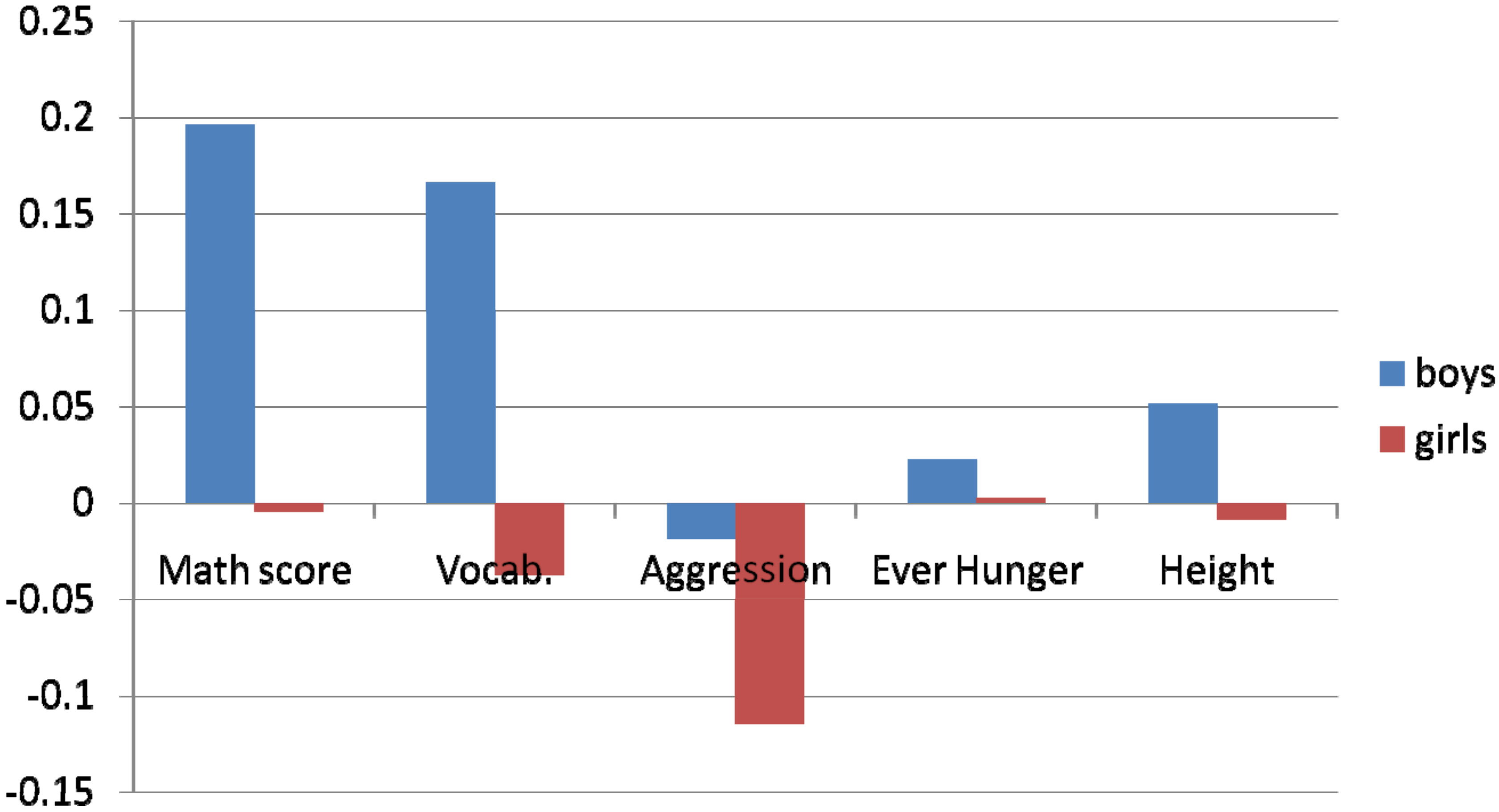
Dahl and Lochner

- Data from NLSY 1988-2000
- EITC expansion in 1987-1003 and 1993-1997 increased benefits for low income households.
- IV is predicted change in EITC income due only to change in EITC (e.g. holding HH characteristics constant).
- A $1000 increase in income raises math and reading scores .06 SD.

Milligan and Stabile

- Canadian NLSCY 1994-2005
- Use variation in child benefits over time and province as IV
- An increase of $1000 in benefits leads to 1.5% reduction in learning disability (mom<HS); 3.6% decline conduct disorders; 4.3% decline in maternal depression (11.6% if mom<HS).
- Larger effects on education for boys, larger impacts on mental health for girls.

Milligan and Stabile show significant effects of child benefits on outcomes if mothers <=HS



Currie and Moretti (2007) show that mothers born in poor areas are more likely to be low birth weight, and more likely to later give birth to low birth weight babies than their own sisters who were not born in poor areas.

Effect of Mother's Low Birth Weight and Income at Time of Own Birth on Mother's Education at Time of her Child's Birth - California

	All OLS	All - Fixed Effects	White OLS	White FE	Black OLS	Black FE
Outcome=Mother's education at time of child's birth in years.						
Mom's Birth SES	0.017	0.007	0.02	0.008	0.011	0.009
(1000's $)	[.001]	[.001]	[.001]	[.001]	[.001]	[.002]
Mother LBW	-0.214	-0.097	-0.229	-0.092	-0.207	-0.114
	[.007]	[.008]	[.008]	[.009]	[.013]	[.016]

Notes:
Mom SES @ birth = median family income in zipcode of hospital of birth.
Mean (std.) are $10,096 (3,254) in $1970.
All regressions include race, year of child's birth, mother's age, and parity of the child.
Standard errors in brackets.
Source: Currie and Moretti, 2005

MTO (Orr et al., 2003) shows positive effects of moving away from a poor area on the mental health of girls (but not on any measure of the health of boys).

Van Den Berg, Lindeboom and Portrait (2007) use administrative data from the Netherlands and show that children born just after a recession were 7 percent more likely to die before one year than children born just prior to a recession.

Effects of Child Health on Future Outcomes – Why Might Child Health Affect Future Outcomes?

1. Poor health in childhood often leads to poor health in adulthood. E.g. Bozzoli, Deaton, and Quintana-Domeque (2007) find that in rich countries, cohorts with high disease burdens in childhood have higher death rates in adulthood. (In poor countries, selection causes the relationship to be reversed).

Also, fetal origins hypothesis.

2. Poor health in childhood may impede the acquisition of skills.

Bozzoli, Deaton, and Quintana-Domeque (2007) examine the relationship between post-neonatal mortality and adult height, which is associated with higher education, income and better adult health. They use PNM because it reflects the disease environment in early childhood and it is less likely to be affected by improvements in medical care surrounding child birth than infant mortality.

High death rates among children have two possible effects: They may SELECT out the healthiest children, leading to an increase in adult heights. Or they may SCAR surviving children, leading to a decrease in adult heights. In developed countries with low mortality rates, the scarring effect is likely to dominate, whereas in developing countries, the reverse is likely true. They investigate the relationship between PNM and adult height in the U.S., U.K., and 11 European countries.

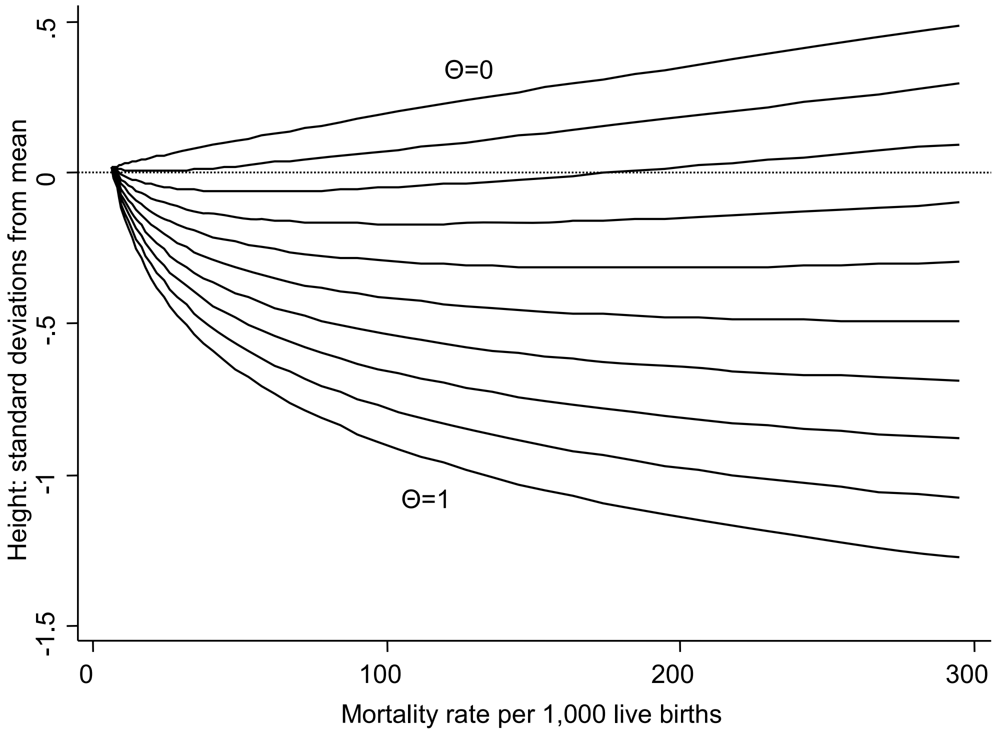


Figure 1: Theoretical deviation of height in standard deviations from mean of parent distribution in relation to mortality rate

Table 4: Regressions of height on postneonatal mortality by cause and other variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PNM								
Pneumonia	–0.531	–0.228	–0.126	–0.137	–0.408	–0.099	–0.101	–0.105
	(0.053)	(0.041)	(0.042)	(0.046)	(0.066)	(0.046)	(0.048)	(0.053)
Intestinal	–0.082	0.004	–0.014	–0.008	–0.099	–0.021	–0.021	–0.014
	(0.037)	(0.028)	(0.026)	(0.027)	(0.038)	(0.027)	(0.027)	(0.027)
Congenital	–0.110	–0.406	–0.165	–0.168	0.097	–0.248	–0.242	–0.207
	(0.161)	(0.176)	(0.090)	(0.098)	(0.150)	(0.099)	(0.099)	(0.106)
Other	–0.034	–0.125	–0.083	–0.083	0.014	–0.082	–0.084	–0.063
	(0.046)	(0.034)	(0.032)	(0.034)	(0.049)	(0.040)	(0.041)	(0.043)
NNM	--	--	--	--	–0.028	–0.089	–0.085	–0.063
					(0.030)	(0.027)	(0.031)	(0.036)
Ln(GDP)	--	--	--	--	0.832	0.006	–0.102	0.585
					(0.347)	(0.574)	(0.752)	(0.916)
Year of Birth	--	--	0.042	--	--	--	0.005	--
			(0.009)				(0.020)	
Country dummies?	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Year dummies?	No	No	No	Yes	No	No	No	Yes
R^2	0.651	0.907	0.913	0.922	0.658	0.915	0.915	0.923
F-test	16.78	12.26	2.95	3.03	11.67	2.48	2.46	1.87
Sample size	297	297	297	297	297	297	297	297

Notes: Heteroskedasticity robust standard errors are reported in parentheses. The *F*-tests in the last panel are tests of the hypothesis that the coefficients on the four categories of PNM are identical; those in columns 1, 2, and 5 are significant at better than one percent, those in columns three and four at better than five percent, and those in the last three columns are insignificant.

Using data from the 1999 PSID, James Smith shows that a retrospective question about health during childhood is remarkably predictive of future outcomes.

(What was your general health status when you were <=16 years old? 1=excellent, 5=poor)

Predicting Adult Education and Earnings Using Child Health.
PSID 1999, 25-47 Year Old Children of Original Respondents

	OLS Education	Sib-FE Education	OLS Ln(Earnings)	Sib-FE Ln(Earnings)
Health in Childhood	0.356	0.111	0.138	0.251
Excellent/Very Good	[4.40]	[1.12]	[3.07]	[3.69]
Parent's Income 1-16	0.01	…	0.002	…
	[10.7]		[4.29]	

Source: Smith (2005). Models also control for mother and father education, race/ethnicity, age, age squared.
Age 1999 squared. T-statistics in brackets. Income in $10,000.

So child health may have a significant effect on future outcomes.

But can we identify specific health conditions that have negative effects on future outcomes?

Many studies examine the long term effects of low birth weight.

Currie and Hyson (1999), Currie and Thomas (2001), Case, Fertig, and Paxson (2005) use data from the 1958 British Birth Cohort Study

- all children born in one week in March 1958
- followups at 7, 11, 16, 23, 33, 44
- detailed measures of family background, school quality.

Effects of Low Birth Weight on Math Scores at Age 7 (z-scores) in the 1958 British Birth Cohort Data

	Males	Females
LBW	-0.21	-0.21
	[.081]	[.075]
High SES	0.078	0.14
	[.033]	[.034]
Low SES	-0.016	-0.078
	[.033]	[.034]

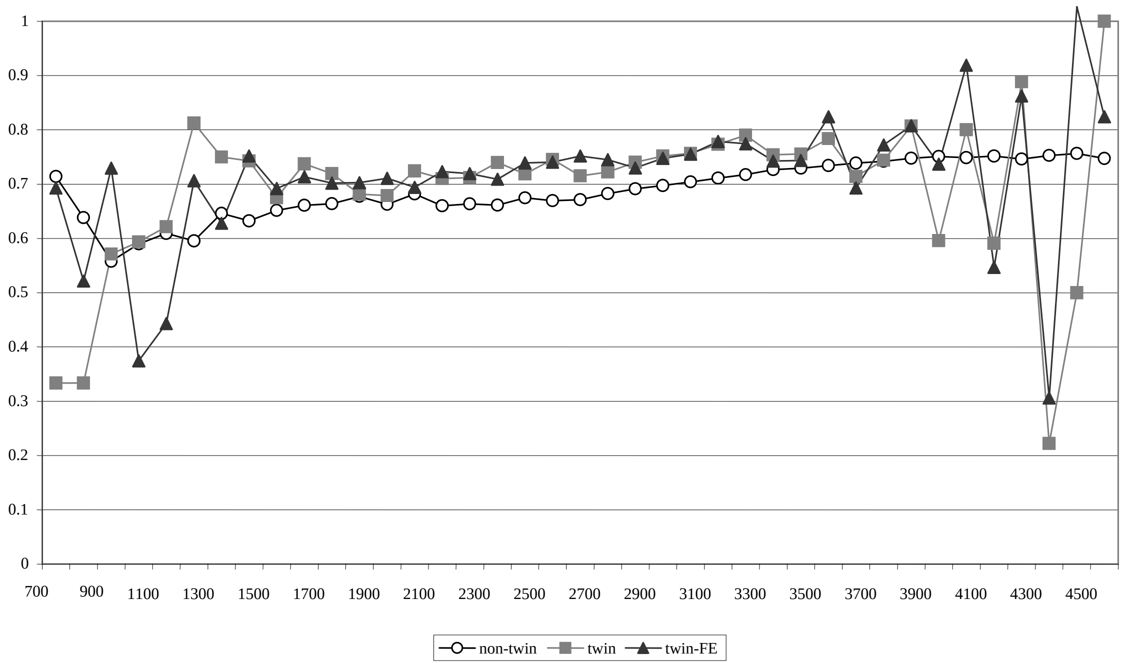
Notes:
High SES is defined as before. Low SES is semi-skilled manual or low-skilled father.
Source: Currie and Hyson (1999)

Several more recent studies use large “registry” data sets to try to get at the causal effects of birth weight by comparing twins or siblings (following an earlier twins study by Behrman and Rosenzweig, 2004).

Black, Devereux, and Salvanes, 2005 examine Norwegian twins. Find that twin FE models are similar to OLS: A 10% increase in birth weight leads to a 1 percentage point increase in the probability of graduating high school and a 1 percent increase in earnings.

Effects are surprisingly linear.

Figure 11
High School Graduation by Birth Weight



Oreopolous, Stabile, and Wald (2006) use similar data from the Canadian province of Manitoba. Find that sibs 1500-2500 grams are 8% less likely to reach grade 12 by age 17 than sibs who weighted over 3500 grams.

Royer (2005) examines birth certificate data for California. We know mother's education at the time she gave birth. If the mother was born in CA, we can locate her own birth certificate to find out her birth weight. Royer examines mothers who were twins. She finds that for each 1000 grams of birth weight there is a gain of .16 years of education.

Oreopoulos, Stabile, Wald, and Roos examine health at birth and long term outcomes in Manitoba

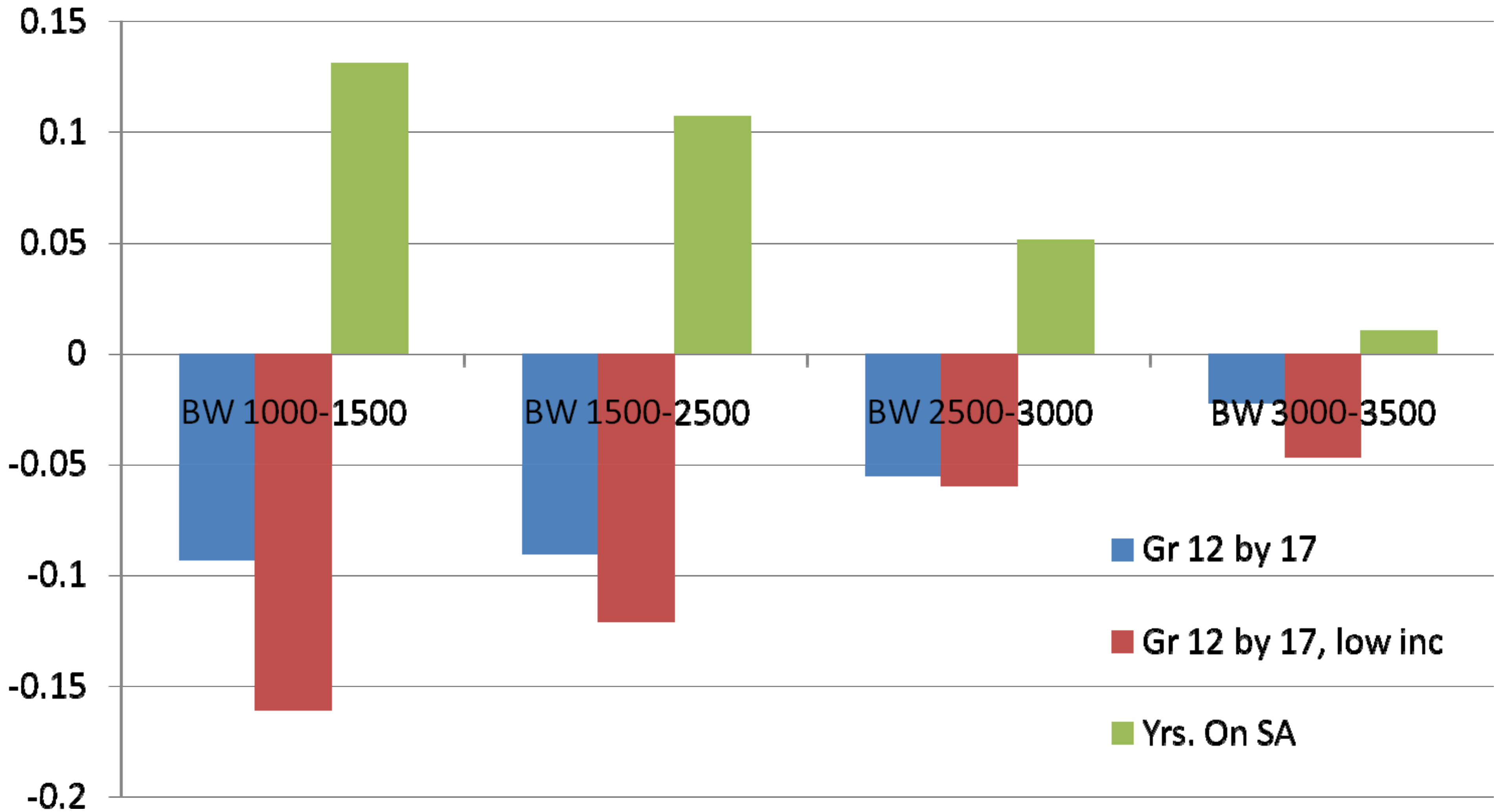
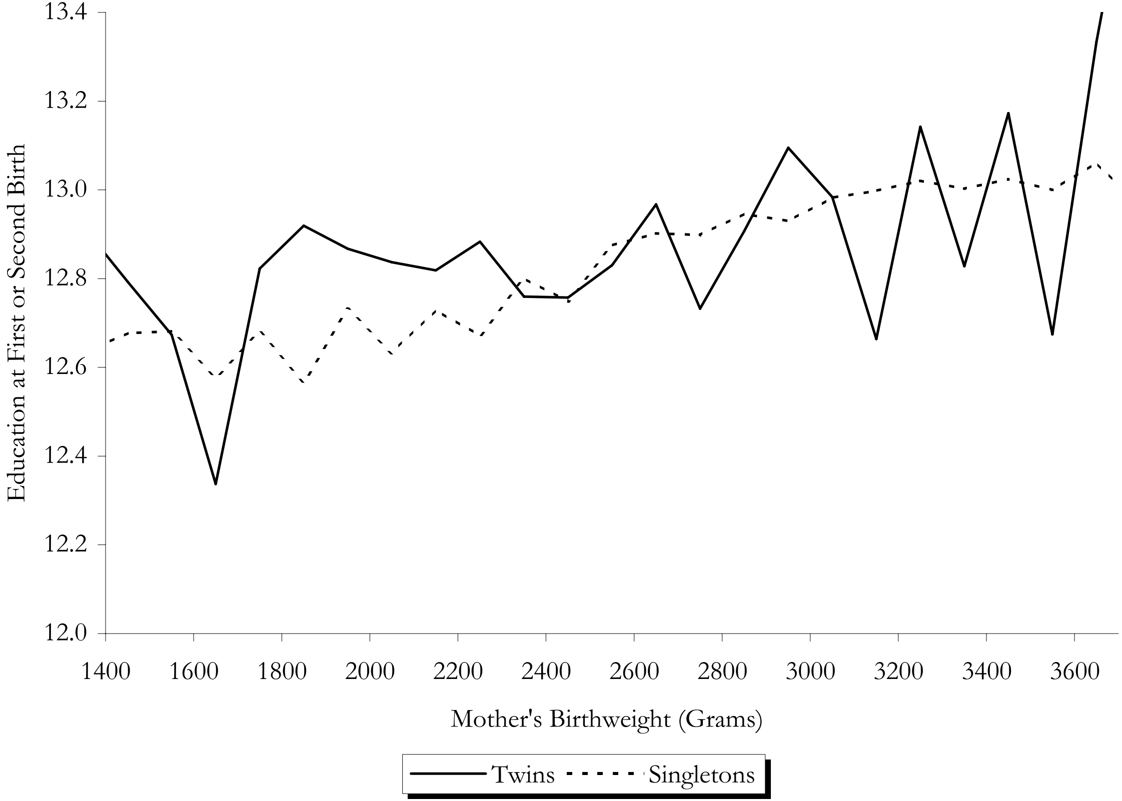


Figure 3 - Cross-Sectional Relationship Between Birthweight and Education



Johnson & Schoeni (2007) find using the PSID that low birth weight is strongly related to poorer adult health and lowers adult annual earnings by 17.5%.

Consistent with Smith, a relatively small part of the reduction in earnings occurs through lower educational attainment.

Completed education is lower by 1/10 of one year, consistent with both Royer, and Currie and Moretti.

Some of the effect may be mediated through effects on cognition – they find for e.g. that poassage comprehension is reduced by about 12% of the average test score at 3.3 pounds.

Birth weight is one indicator of health conditions before birth.

Another approach is to identify sharp systemic shocks to fetal health and then examine the long term effects by following cohorts. E.g. Dutch hunger winter has been linked to disorders of the central nervous system, heart disease, and anti-social personality disorders among affected cohorts.

Almond and Mazumdar (2005) use SIPP data to show that children of mothers infected by the influenza epidemic of 1918 were more likely to suffer schizophrenia, diabetes, and stroke as adults.

Almond (2006) examines educational outcomes, showing that these cohorts were 15% less likely to graduate from high school, and that wages of affected men were reduced by 5-9%.

These are large effects!

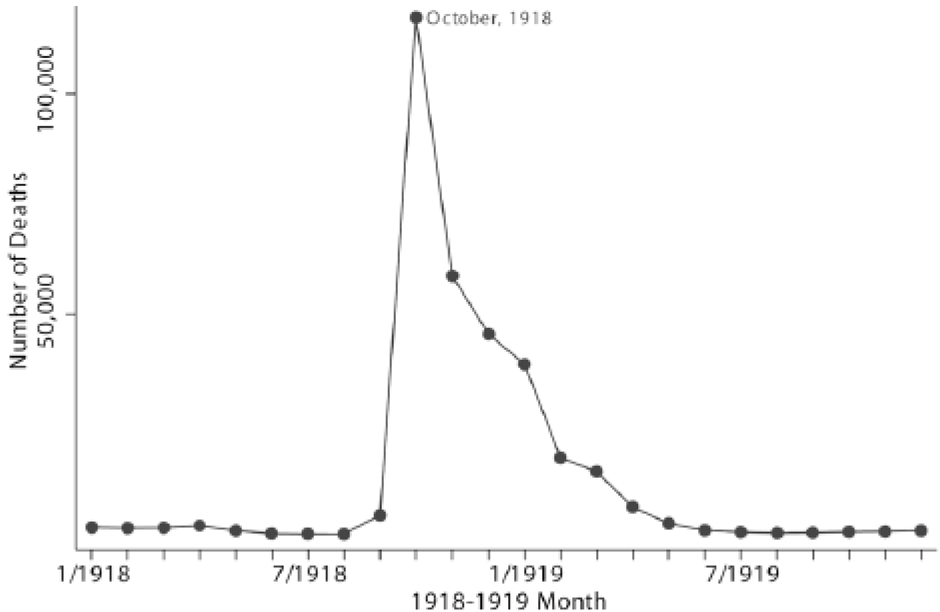


FIG. 1.—U.S. influenza deaths: *a*, by year; *b*, by month

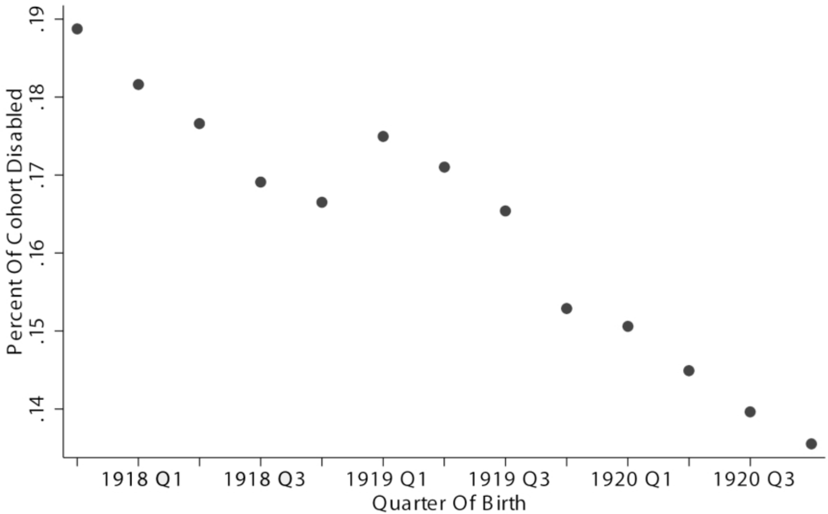


FIG. 2.—1980 male disability rates by quarter of birth: prevented from work by a physical disability.

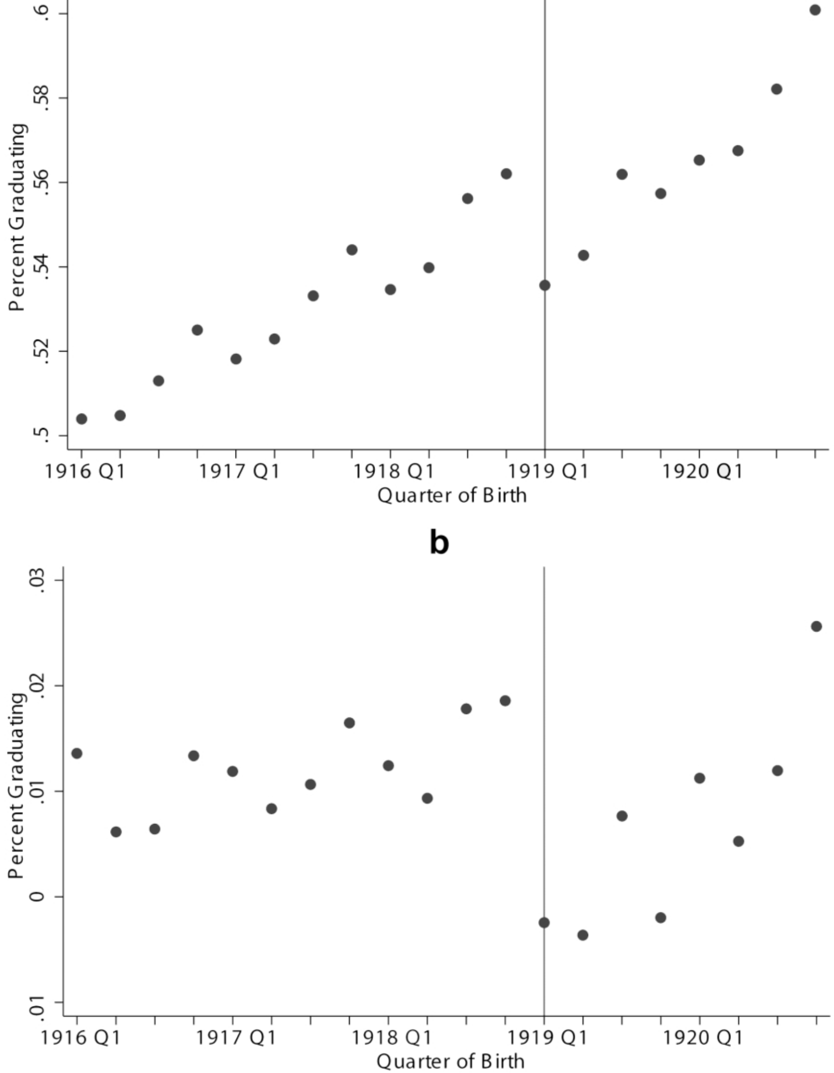


FIG. 5.—*a*, 1980 high school graduation rate by quarter of birth. *b*, Regression-adjusted 1980 high school graduation rate by quarter of birth.

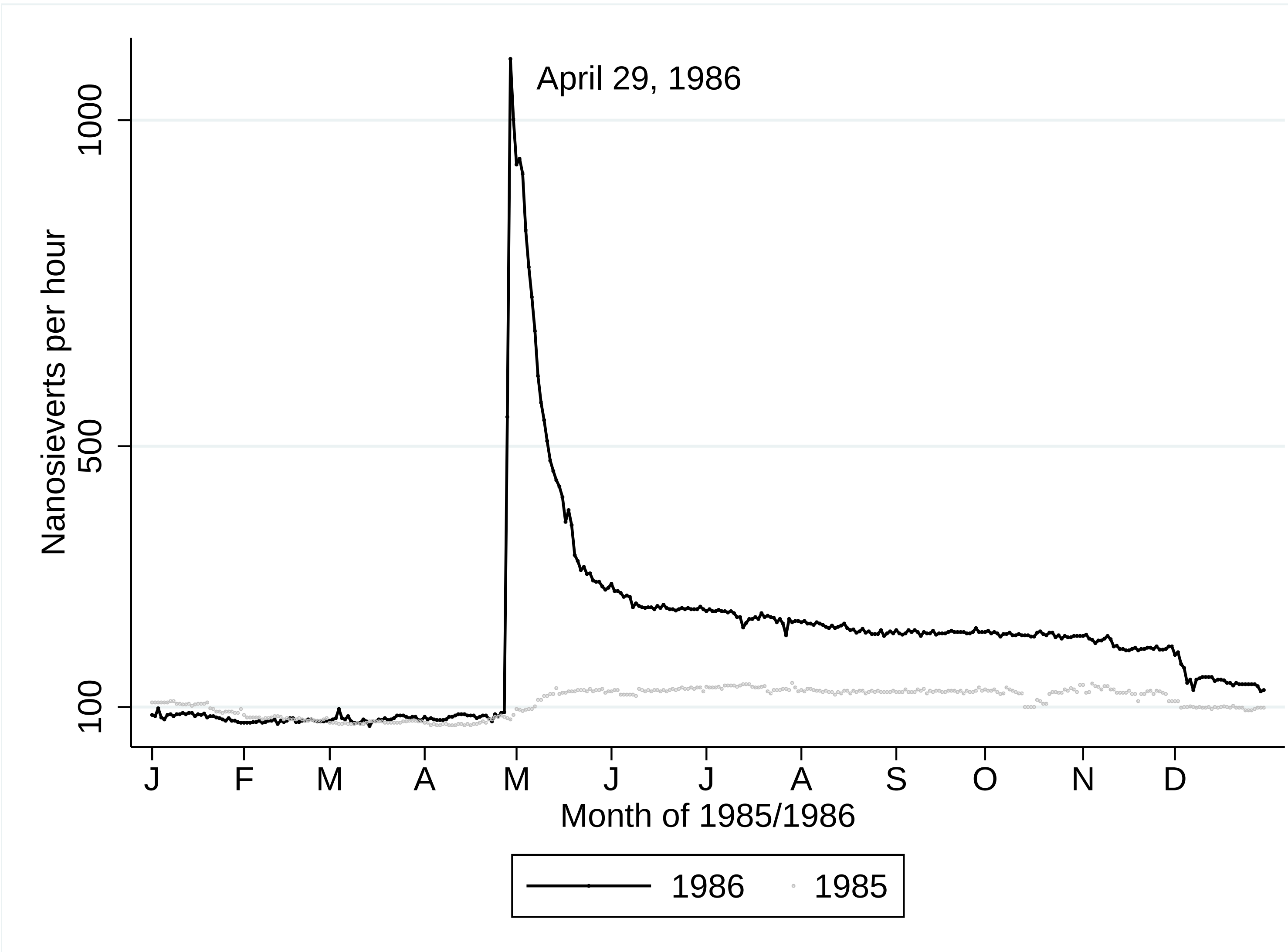


Figure I: Daily Gamma Radiation in Njurunda, Sweden

Source: Kjelle (1987).

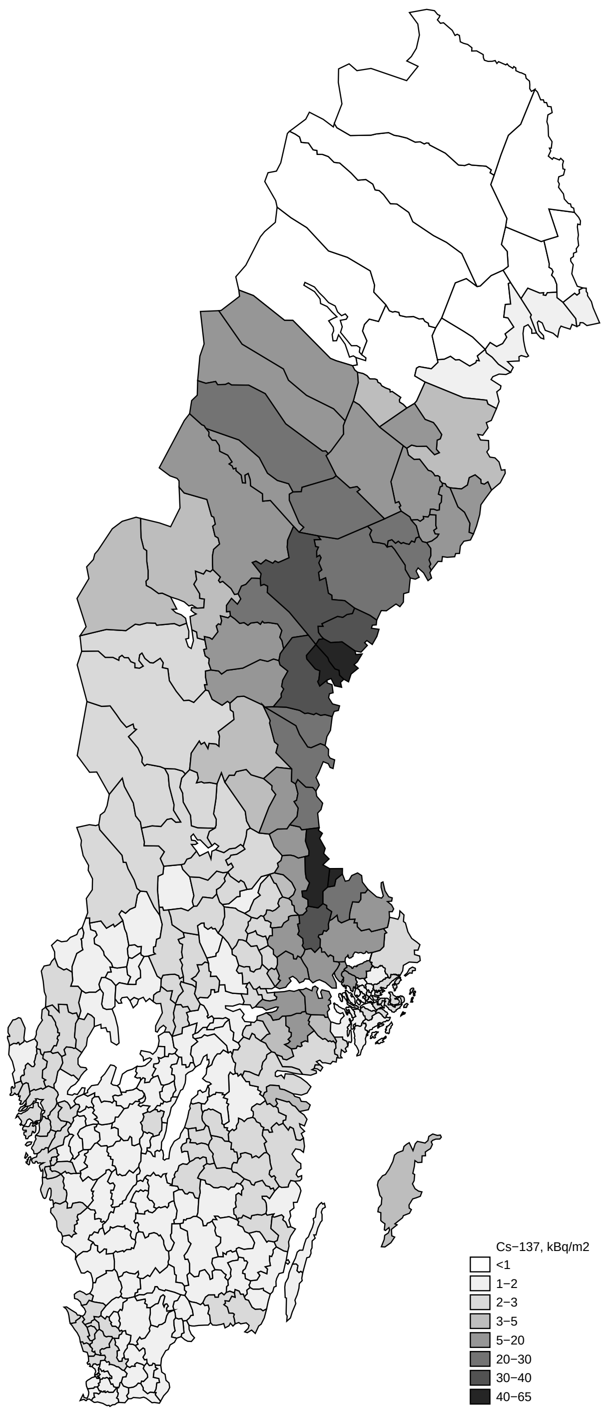


Figure II: Caesium-137 ground deposition in kBq/m^2 by Municipality.

Source: From the Swedish Radiation Protection Authority. Aerial measurements are corrected according to Edvarson (1991b) and are population weighted.

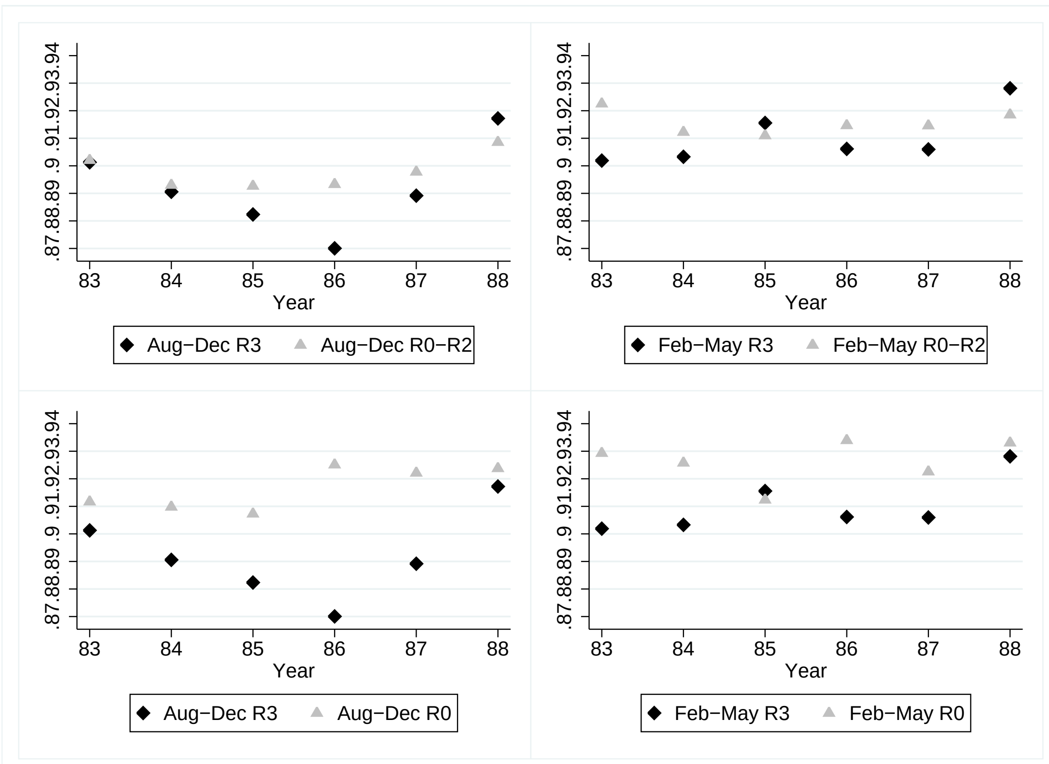


Figure IV: Fraction qualified to high school by year and season of birth. Treatment group: R3 (eight most exposed municipalities). Control groups: R0-R2 (rest of Sweden; top panels); R0 (Norbotten; bottom panels).

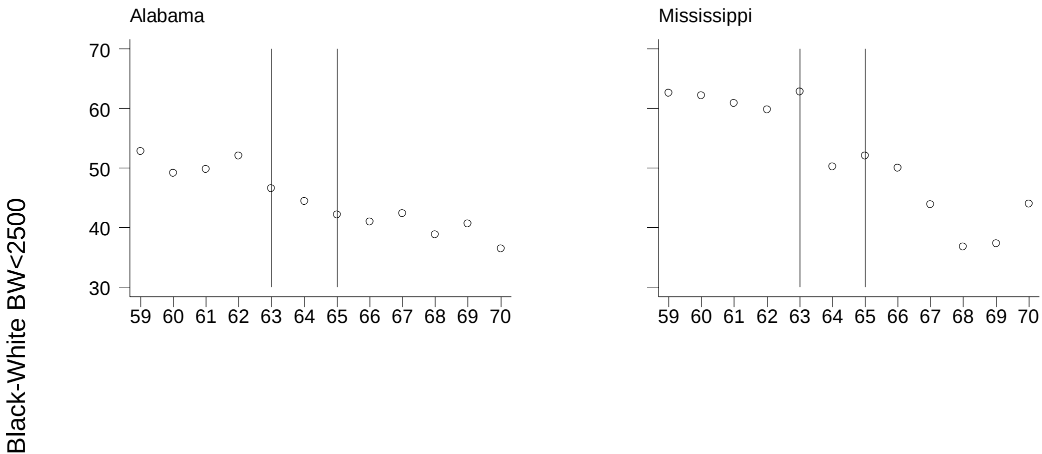
Cohort studies of birth records also represent an interesting way to look for effects of changes in parental SES on birth weight.

e.g. Almond and Chay examine intergenerational effects of the the Civil Rights era. They previously documented that Civil Rights changes led to large improvements in the health of black infants, especially in Mississippi.

They then examine the outcomes of infants born to affected cohorts of mothers who were born in Mississippi. (Birth records record the mother's state of birth)

Year
Graphs by State

B. Black-White Differences in Incidence < 2500 grams, by Mother's Year of Birth



Aside from low birth weight, there has been little study of the long term consequences of other specific health conditions.

Longitudinal data suggests that they could be important.

E.g. Case, Fertig, and Paxson use data from the 1958 British Birth Cohort to examine associations between various health problems in childhood and future educational attainments.

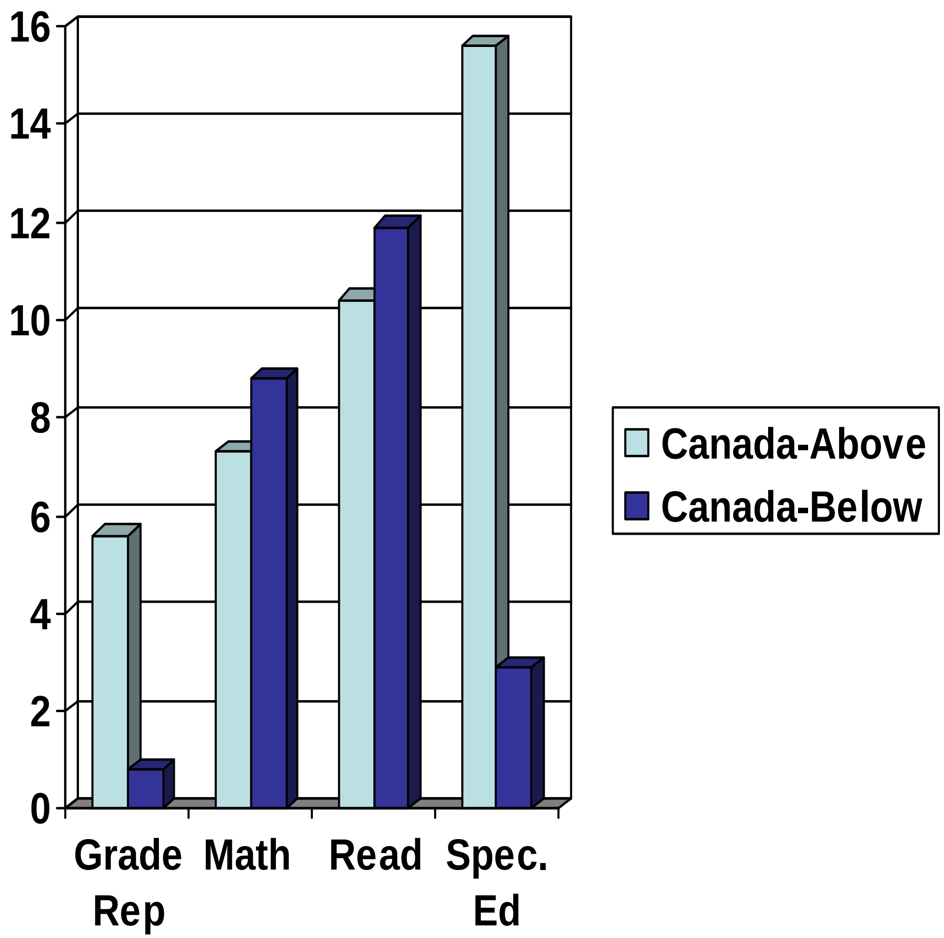
Table 2. Education and Childhood Characteristics, Men and Women

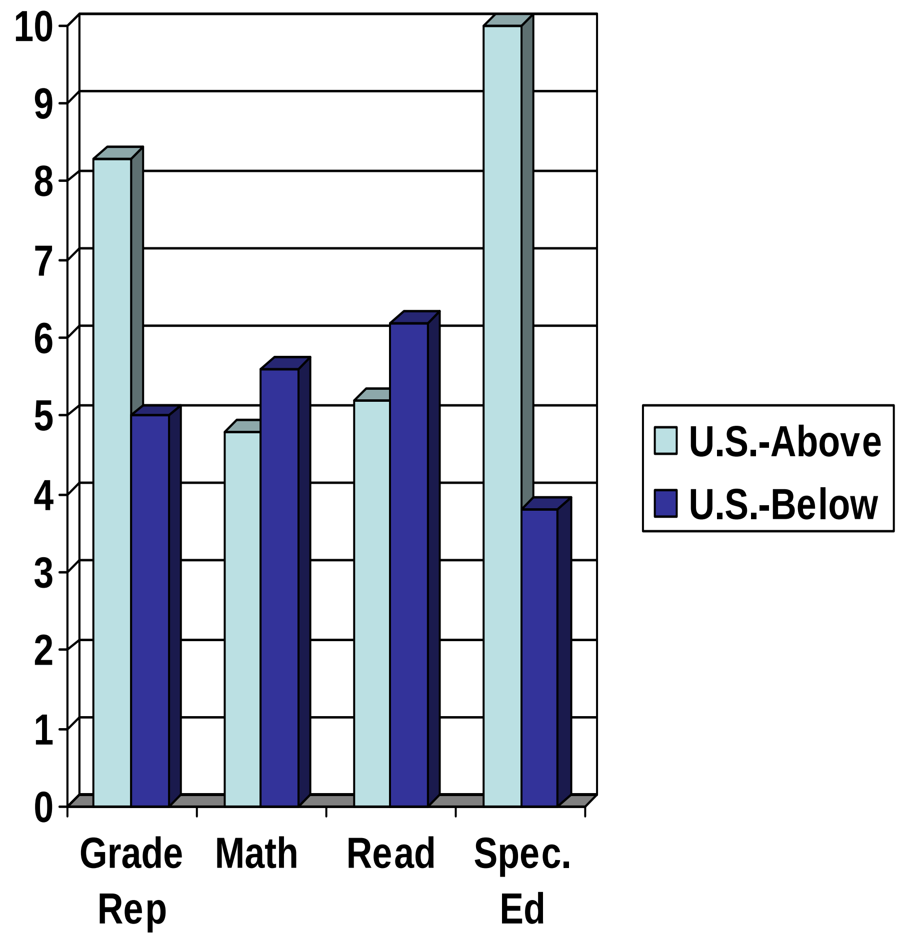
	Dependent Variable:			
	Total O-levels passed by age 16 (OLS)	Indicator: Passed O-level exam by age 16 (probit)		Completed Education Index (ordered probit)
		English	Math	
Ln(family income) at age 16	0.636 (0.129)	0.103 (0.025)	0.084 (0.020)	0.231 (0.063)
Indicator: moderate prenatal smoking	–0.280 (0.060)	–0.036 (0.011)	–0.044 (0.008)	–0.149 (0.029)
Indicator: heavy prenatal smoking	–0.437 (0.067)	–0.058 (0.012)	–0.064 (0.009)	–0.225 (0.033)
Indicator: variable prenatal smoking	–0.452 (0.093)	–0.088 (0.016)	–0.045 (0.013)	–0.237 (0.046)
Indicator: low birth weight	–0.464 (0.091)	–0.076 (0.016)	–0.057 (0.012)	–0.225 (0.046)
# chronic conditions, age 7	–0.310 (0.057)	–0.072 (0.015)	–0.050 (0.013)	–0.291 (0.035)
# chronic conditions, age 16	–0.184 (0.040)	–0.058 (0.010)	–0.029 (0.008)	–0.202 (0.025)
Height at age 23 (meters)	1.840 (0.329)	0.252 (0.063)	0.228 (0.051)	1.395 (0.168)

Currie and Stabile (2006) use data from the U.S. (NLSY) and Canada (NLSCY) to examine the long term consequences of Attention Deficit Hperactivity Disorder (ADHD, or Hyperkinetic Disorder). This is the most common mental health disorder of childhood, affecting ~4-5% of children.

We estimate models with household fixed effects in order to compare siblings with different scores on a test for ADHD symptoms that was administered to all children.

Mean Differences Between Children Above and Below the 90th Percentile of an ADHD Screener Score





Source: Currie and Stabile (2004)

Currie and Tekin (2007) examine the effect of child maltreatment (a leading cause of injuries) on children's future propensity to commit crime.

They use data from the U.S. Add Health survey, which began interviewing adolescents in 1995, and followed them through 2001. Questions about maltreatment were added to the last wave. They are retrospective and refer to the time before they were in the 6^{th} grade (about 11-12 years old).

The Add Health oversampled twins, and identical twins.

Some interim conclusions:

- Early scores and health problems are predictive of future problems.
- Pregnancy certainly seems to be a “critical period”
- 0-3 may not be so special relative to other child ages (critical periods may be very specific to particular capabilities).
- Mental health problems are prevalent and have especially large effects on outcomes relative to common physical problems.
- Abuse and neglect is prevalent and often has long term consequences.

Table 3
Effects of Any Maltreatment [a] on Criminal Activity

	OLS	Twins Sample-OLS	Twin FE	Identical Twin FE
Any Non-drug				
Any Maltreatment	0.163***	0.287***	0.538***	0.375*
	(0.034)	(0.058)	(0.124)	(0.189)
R-squared	0.18	0.34	0.68	0.58
N	1,115	482	292	150
Damaged Property				
Any Maltreatment	0.096***	0.104**	0.288***	0.125
	(0.029)	(0.051)	(0.101)	(0.134)
R-squared	0.15	0.26	0.62	0.57
N	1,115	483	292	150
Assault				
Any Maltreatment	0.119***	0.249***	0.305***	0.375***
	(0.027)	(0.052)	(0.093)	(0.151)
R-squared	0.16	0.36	0.69	0.49
N	1,116	483	292	150
Any Hard Drug				
Any Maltreatment	0.048*	0.097*	0.383***	0.125
	(0.029)	(0.057)	(0.094)	(0.113)
R-squared	0.13	0.28	0.72	0.74
N	1,117	484	292	150
Robbery				
Any Maltreatment	0.034**	0.079**	0.183***	0.375***
	(0.015)	(0.033)	(0.054)	(0.071)
R-squared	0.13	0.31	0.61	0.63
N	1,116	484	292	150

[a] Using >10 cut off for physical abuse.
Notes: Standard errors in parentheses. A *, **, *** indicates significance at 90%, 95%, 99% respectively. Controls include: main alleles for each genetic marker, child age, race, ethnicity, child U.S. born, child birth weight (<1500, 1500-2500, >2500 grams, missing); first born, first born missing; mom's education (<HS, HS, >HS, missing); Father ever jailed (or ever jailed missing); Parents' religion (Catholic, Baptist, Other Protestant, Other, None, Missing); Number of siblings (none, 1, 2, 3, 4, missing); Father present (biological, step, or missing); Family on AFDC in wave 1 (or missing); Poverty status (<=5, .5-1, 1-2x, >2x, missing); Mother's age at birth (<=19, 20-30, 31-40, 41+, missing); State fixed effects. Models in the first three columns also include indicators for genetic markers. Twin FE models include the indicators for very low birth weight and low birth weight, as well as the genetic markers (except for the Identical Twin FE models).

Currie and Widom (2009) compare maltreated with matched controls, average age 41.