The Roots of Health Inequality and the Value of Intra-Family Expertise[1]

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Motivation

- Extensive evidence of a positive correlation between SES and health (see, e.g., Deaton, 2002; Currie, 2009; Chetty et al., 2016)
- Causal mechanisms behind gradient less well understood
  - Initial endowments, access to care, health behaviors, ...
- This paper investigates the role of one possible underlying factor: **(unequal) access to health-related expertise**
  - Idea: If access to expertise improves health, then an unequal distribution of access to expertise generates health inequality
- Our aim is to investigate
  1. Whether access to health-related expertise improves health
  2. The importance of this channel in sustaining health inequality

Two empirical challenges

1. Individuals have access to many sources of health-related expertise. These streams of information are (i) hard to measure, and (ii) **not** randomly assigned.

   $\Rightarrow$ Zoom into particular measure of access to health expertise: **having a health professional (HP) in the extended family**

Two empirical challenges

1. Individuals have access to many sources of health-related expertise. These streams of information are (i) hard to measure, and (ii) **not** randomly assigned.

   ⇒ Zoom into particular measure of access to health expertise: **having a health professional (HP) in the extended family**

2. Need comprehensive data on health outcomes & detailed SES

   ⇒ Swedish administrative data!

- Beyond availability of data, Sweden a particularly attractive empirical context: universal health insurance system

This paper: What we do

1. Sweden as a "laboratory": shut down formal access channel
   - Examine whether there is any health-SES gradient left
2. Examine whether informal access to expertise, captured by a HP in the extended family, improves health outcomes
   - Average treatment effect and heterogeniety across SES
   - Exploit medical school lotteries & variation in timing of degree
3. Examine implications of our findings for health inequality

This paper: What we find

1. Sweden as a "laboratory": shut down formal access channel
   - Despite Sweden's universal HI and broad social safety net, we document substantial health inequality, across the life cycle
2. Impact of access to intra-family health-related expertise
   - Raises **preventive investments**: drug adherence, vaccine take-up in adolescence, cessation of smoking in pregnancy (all "cheap" from society's perspective)
   - Improves **physical heatlh**: lower mortality, lower rates of chronic "lifestyle-related" diseases
   - Effects similar or larger at lower SES
3. Examine implications of our findings for health inequality
   - Equalizing access to expertise across the income distribution could close as much as 18% of the health-SES gap

Related literature

- Family as a source of insurance, shocks, and **information**
  - E.g., Autor et al. (2017), Persson (forthcoming), Lee and Persson (2016), Persson & Rossin-Slater (2018), Fadlon & Nielsen (2017), Bell et al (2017), Hvide & Oyer (2018)
- Generally know that information and education affect health-related behavior - interaction with gradients?
  - E.g., Aizer & Stroud (2010), Oster et al. (2013), Bronnenberg et al. (2015), Hut & Oster (2018), Alsan et al (2018), Currie & Moretti (2003), McCrary & Royer (2011); lit on self-efficacy, patient education, ...
- Large literature across fields documenting existence of health gradients; underlying mechanisms not well understood
  - Recent overview in Lleras-Muney (2018)
  - Our contribution: (i) new evidence of non-mortality gradients using administratively measured income and health; (ii) causal estimates of effects of access to expertise on health at different SES

1. Data and institutional setting

2. Inequality in health throughout the life cycle

3. Intra-family expertise and health (I): non-parametric evidence

4. Intra-family expertise and health (II): addressing selection

5. Implications for health-SES gradient

6. Conclusion

Data

- Swedish administrative family, tax and healthcare records
- **Population sample**: all individuals born 1932-2016
  - Use different sub-samples depending on outcome
- **Socioeconomic information**: panel of annual tax records, education (occupation-coded), demographics (1991-2016)
- **Health outcomes**: birth records (1995-2016), inpatient records (1997-2016), specialist outpatient care records (2001-2016), and prescription drug records (2005-2017)
- **Family trees**: four generations of family members and in-laws
  - Children; parents; grandparents; siblings; cousins; aunts, uncles; in-laws, spouse, sibling's children.

Sweden: Key institutional features

- Population: 10 million
- Universal health insurance
  - Healthcare 11% of GDP (vs. 18% in US)
- Liquidity constraints irrelevant for healthcare access
  - Max out-of-pocket spending per year is $135 for health care and $270 for prescription drugs (per *household*)
  - Generous social safety net, no fees for schooling or university

⇒ "Shut down" differences in HI and formal access to care

⇒ Use precisely measured income rank as a measure of SES

Pronounced health inequality throughout life cycle

Despite universal health insurance and a generous social safety net:

Fact 1 Health inequality at the **end of life**

Pronounced health inequality throughout life cycle

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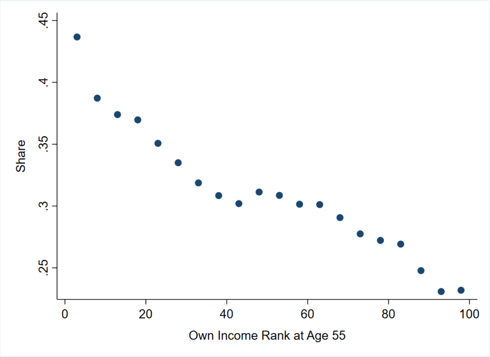
Fact 1 Health inequality at the **end of life**

Figure: Died by age 80



Pre-tax work-related income. Individuals ranked within birth cohort and gender.

Pronounced health inequality throughout life cycle

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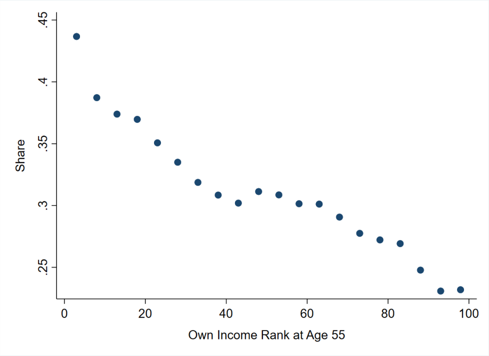

Pre-tax work-related income. Individuals ranked within birth cohort and gender.
U.S. comparison: age-75 mortality gradient **eqally steep** in Sweden and the U.S.

Pronounced health inequality throughout life cycle

Despite universal health insurance and a generous social safety net:

Fact 1 Health inequality at the **end of life**

- Mortality

Fact 2 Health inequality in **adulthood**

- Heart attacks, heart failure, diabetes, lung cancer Figure

Fact 3 Health inequality in **childhood to adolescence**

- HPV vaccination, inpatient stays Figure

Fact 4 Health inequality **very early in life**

- Tobacco in-utero, high-risk mother Figure

1. Data and institutional setting
2. Inequality in health throughout the life cycle
3. Intra-family expertise and health (I): non-parametric evidence
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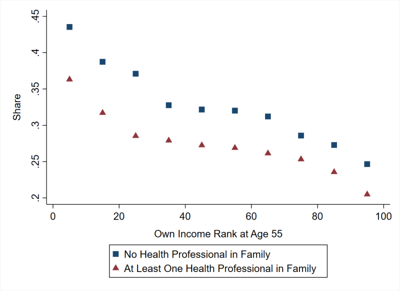
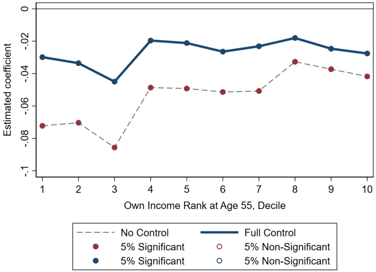
Mortality

(a) Died by age 80



(b) No/Full control for observables



In "family": HP's spouse, parents, parents-in-law, children, children-in-law, siblings, aunts and uncles, grandparents, and cousins.

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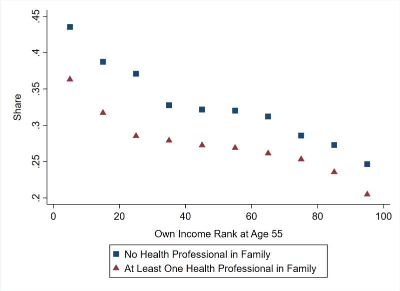

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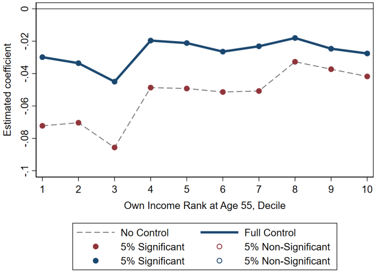


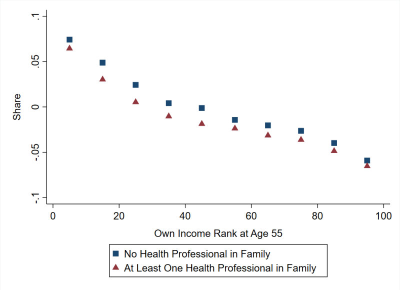
In "family": HP's spouse, parents, parents-in-law, children, children-in-law, siblings, aunts and uncles, grandparents, and cousins.

The set of full controls in panel (b) includes fixed effects for: own income percentile, highest-earning relative's income percentile, year of birth, gender, individual (discretized) educational attainment, and county of residence at age 55.

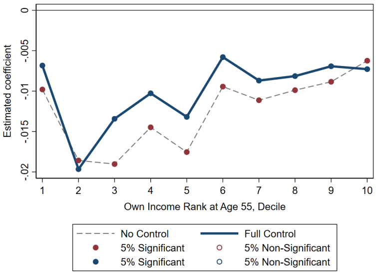
Exposure to health professional in family

Lifestyle-related diseases in adulthood

(a) Lifestyle Index



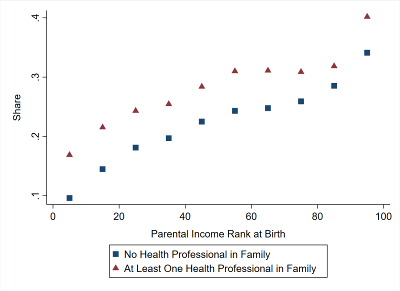
(b) Lifestyle Index, no/full controls



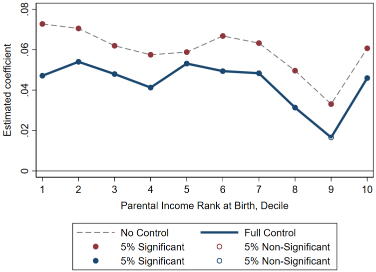
Z-score index of four chronic conditions that are commonly considered to be linked to lifestyle decisions: type II diabetes, heart attack, heart failure, and lung cancer.

Preventive behaviors at younger ages

(a) HPV vaccination

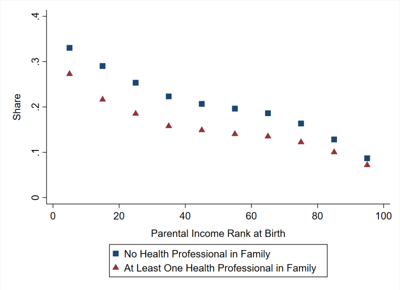


(b) HPV vaccination, no/full controls



Health early in life

(a) Tobacco exposure *in utero*



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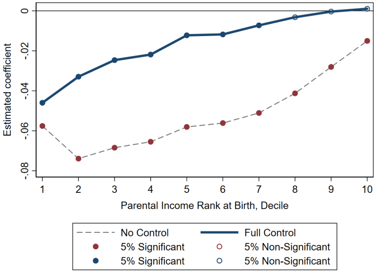
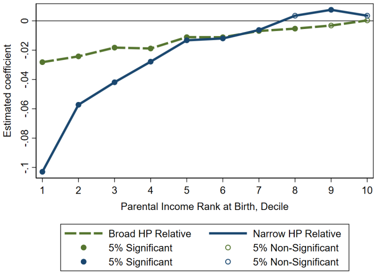


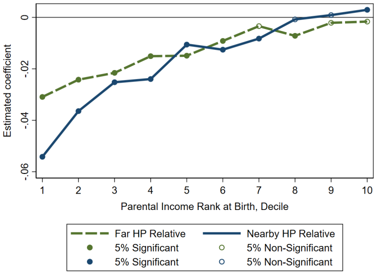
▸ More

Heterogeneity by proximity

(a) Tobacco *in utero*, by **family** proximity



(b) Tobacco *in utero*, by **geographic** proximity



- Effects more pronounced if the HP is a close relative (left), or lives close by (right) – especially at low SES

Definition

Mortality | Lifestyle-related diseases | HPV vaccination

Summarizing

1. Compared individuals with and without a HP in the family
   - Controlled for wide range of **observable** characteristics
   - As in, e.g., Bronnenberg, Dube, Gentzkow, Shapiro (2015)
2. Conclude: having an **HP** in family is associated with **better health and more health capital investments** throughout the life-cycle and across the SES gradient
   - Key: Effects are same or stronger at lower SES
3. Despite rich controls, concerns remain about potential **unobservables** correlated with having an HP in the family
   - Healthcare exposure, health interest, health culture and nudging within family, ..., may drive both

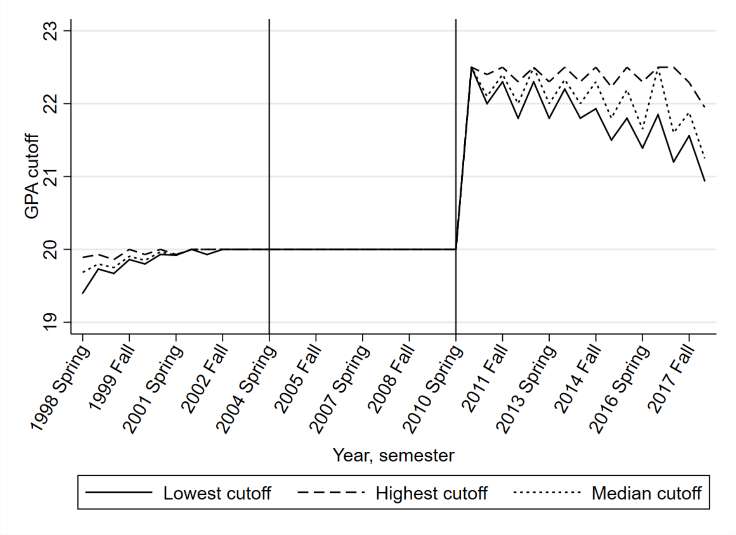
Strategies for addressing selection

1. Leveraging Sweden's medical school lotteries
   - Resembles "ideal" experiment! However, lotteries are recent:
     - Short follow-up period $\Rightarrow$ hard to study "slow-moving" conditions and mortality
     - Small sample $\Rightarrow$ hard to study heterogeneity
2. Event study design: variation in timing of becoming HP + compare to family members of lawyers
   - Both are high-status professions; similar income distributions

Sweden's (unintended) medical school lotteries

- University applications centralized
- "Sole" admission criterion: high-school GPA
- Student allocation mechanism yields sharp GPA admissions cutoff for each program (in each application cycle)
- Substantial grade inflation (Diamond & Persson, 2016)
  $\Rightarrow$ GPA cutoff hits top GPA at all medical schools
- **Admission randomized among applicants with top GPA**
- Idea: compare family members of applicants to medical school with a top GPA who were admitted ("lottery winners") and not admitted ("lottery losers")
  - Sample: Four generations of family members, including in-laws

Figure: Medical School Programs: Lowest, Median and Highest Cutoffs Per Term



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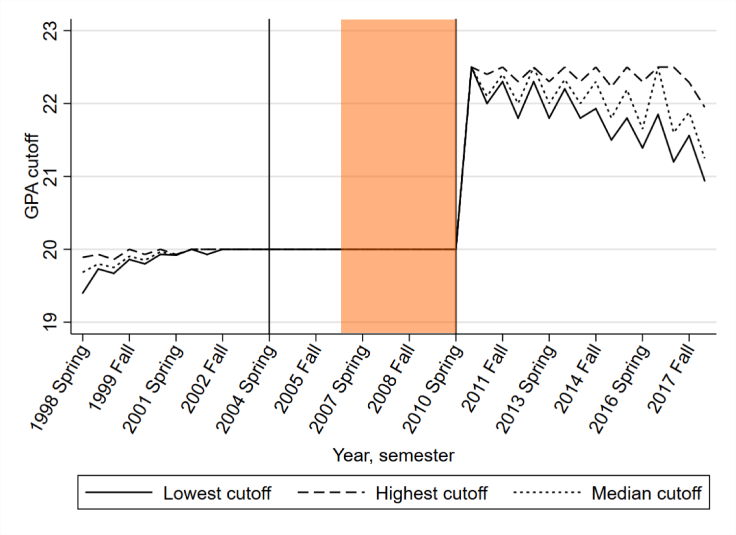

Empirical specification for MD lotteries

We estimate the following 2SLS relationship:

$$Y_{j(i)} = \delta MD_i + \beta_1 x_{j(i)} + \kappa_1 X_i + \epsilon_1 \tag{1}$$

$$MD_i = \gamma A_i + \beta_2 x_{j(i)} + \kappa_2 X_i + \epsilon_2 \tag{2}$$

- $Y_{j(i)}$: health outcome for applicant i's family member $j(i)$
- MD_i: an indicator variable that takes the value of 1 if applicant i matriculated into a medical program within the sample timeline
- **A_i: an indicator variable that takes the value of 1 if applicant i was admitted to med school at the first application attempt**
- X_i and $x_{j(i)}$: vectors of observables for applicant i and family member $j(i)$ - used to improve precision
- δ: the coefficient of interest that measures the effect of having a relative trained in medicine on health outcomes
- Cluster std. errors at family (i.e. applicant) level

Baseline balance on observables

	Admitted*	Not Admitted*	p-value
Medical School Matriculation	0.96	0.59	0.00
	(0.01)	(0.02)	
Demographics			
Female	0.57	0.60	0.41
	(0.50)	(0.49)	
Age	19.67	19.48	0.03
	(1.23)	(1.03)	
Number of siblings	1.82	1.80	0.84
	(1.06)	(1.06)	
Born in Sweden	0.97	0.95	0.45
	(0.18)	(0.21)	
Father born in Sweden	0.87	0.85	0.33
	(0.33)	(0.36)	
Mother born in Sweden	0.86	0.85	0.64
	(0.34)	(0.36)	
Parental income (10k krona, inflation-adjusted)			
Year before high school graduation	94.00	90.42	0.52
	(62.26)	(64.27)	
Year before first application	93.65	90.91	0.63
	(63.63)	(64.89)	
Number of applicants	188	555	

*Refers to admittance decision in **first** application cycle

Lottery analysis results: 2SLS (1/3)

- Present results separately for "older" and "younger" relatives
  - Outcomes capture **(i) preventive** and **(ii) physical** health
- Outcomes measured within 8 years of matriculation

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Table: Effects on older relatives (aged $\geq$ 50)

	ITT					
Outcomes per 1,000 Individuals	No Covariates (1)	With Covariates (2)	LATE (3)	Control Mean (4)	Control Complier Mean (5)	Obs (6)
Blood thinners	31	30	69	247	273	3134
	(17)	(15)	(34)			

First stage: γ=0.44 (s.e. 0.04). F-stat 675.

ITT implies a $\frac{30}{247} = 13$ % increase off of control mean (t-stat = 2.00)

LATE implies a $\frac{69}{273} = 25$ % increase off of control complier mean (t-stat = 2.03)

Income Distribution of 2SLS Sample | Income Effects

Lottery analysis results: 2SLS (2/3)

Table: Effects on older relatives (aged ≥ 50): LATE

		Preventive Health			Physical Health	
	(1) Health Index	(2) Statins	(3) Blood Thinners	(4) Diabetes Drugs	(5) Heart Attack	(6) Heart Failure
Matriculated	106***	79*	69**	34*	-34*	-51*
	(41)	(41)	(34)	(20)	(20)	(27)
Mean dep. var	4	293	273	76	48	83
S.D. dep. var	414	455	446	265	214	276
Obs	3,134	3,134	3,134	3,134	1,532	1,532

LATE implies increases in the likelihood of taking statins, blood thinners and diabetes drugs of 27%, 25%, and 45%, reslpectively; and reductions in the likelihood of heart attacks and heart failure (over sample period) of 71% and 61%, respectively.

Mean and S.D. are reported for control compliers. Health index in column (1) is constructed as the mean of z-scores of the following outcomes: use of statins/blood thinners/diabetes drugs/beta blockers/asthma drugs/vitamin D, number of preventable hospitalizations, addiction, heart attack, heart failure, lung cancer, and type II diabetes. All outcomes are oriented in the index such that positive means good.

More

Lottery analysis results: 2SLS (3/3)

Table: Effects on younger relatives: LATE

		Preventive Health		Physical Health	
	(1) Health Index	(2) HPV Vaccine	(3) No Hormonal	(4) Intestinal Infection	(5) Respiratory Infection
Matriculated	125**	202**	450**	-13	-16
	(55)	(89)	(177)	(13)	(23)
Mean dep. var	38	174	604	14	30
S.D. dep. var	418	380	492	117	172
Obs	4,113	1,192	514	4,113	4,113

First stage: γ=0.32 (s.e. 0.03). F-stat 417.

Mean and S.D. are reported for control compliers. Column 2: females aged 10-25; columns 3: females aged 10-20; columns 4-6: all aged $\leq$ 30. Health index in column (1) is constructed as the mean of z-scores of the following outcomes: HPV vaccination, not using hormonal contraceptives, addiction, injury/poisoning, number of inpatient stays, respiratory infection, intestinal infection, and chronic tonsil diseases. All outcomes are oriented in the index such that positive means good.

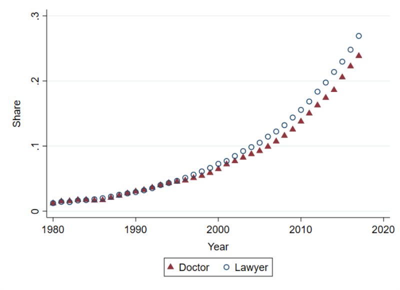
Empirical specification for event studies: doctor vs. lawyer

Exploit **timing of arrival** of an MD vs lawyer into the family

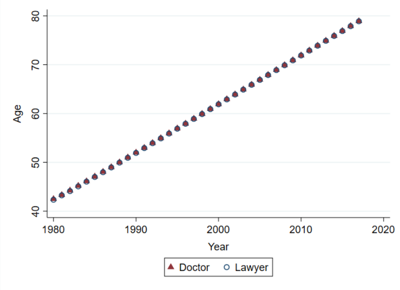
$$Y_{it} = \alpha_i + \sum_{\tau} \sigma_\tau D_{\tau,it} * Doc_i + \sum_{\tau} \kappa_\tau D_{\tau,it} + \gamma_t + \beta * X_{it} + \epsilon_{it} \quad (3)$$

- Y_{it}: health outcome of interest for individual i at time t
- α_i: individual fixed effects
- τ: number of years since the matriculation relative to time t
- γ_t : year fixed effects
- X_{it}: time-varying demographic controls (includes age FE)
- Doc_i: whether have a doctor (vs lawyer) family member
- σ_τ: coefficients of interest that measure the impact of an MD arriving into the family on the family members' health *relative* to the impact of the arrival of a lawyer
- Identifying assumption: parallel trends before kid acquires degree

Long-run health bonus: mortality (raw data)



(a) Cumulative mortality



(b) Average age

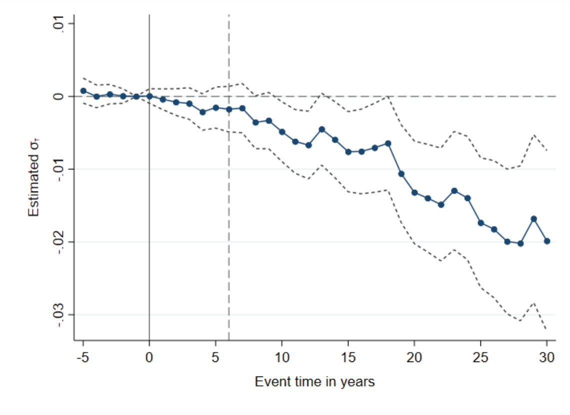
Sample: individuals born in Sweden between 1936 to 1940 who have at least one child with a medical or law degree. We exclude individuals who are health professionals themselves (either a doctor or a nurse) or who have a health professional spouse.

1995 (ages 55-60): difference in mortality trend emerges between lawyer-parents and doctor-parents: parents of doctors are dying at a slower rate than parents of lawyers.

By 2017: 243 per 1,000 lawyer-parents have died; 208 per 1,000 doctor-parents. Diff: 35 per 1,000 lives (14%) statistically significant at less than 1% level.

Long-run health bonus: mortality

Figure: Parents of individuals that become MDs vs. lawyers



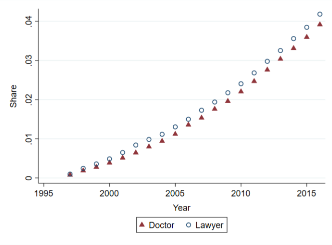
Slow-down in the relative mortality rate of MDs' family members emerge around $\tau = 8$

Mean among lawyers at event year 25: 0.17. Estimate suggests parents of doctors are **10** percent less likely to have died 25 years out.

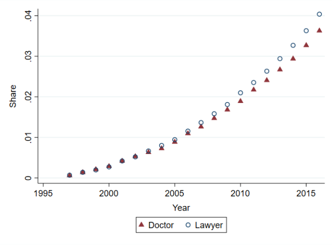
Income Distribution of Event Study Sample

Long-run health bonus: lifestyle-related conditions

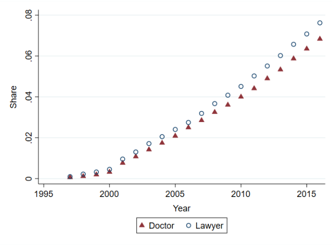
(a) Heart Attack



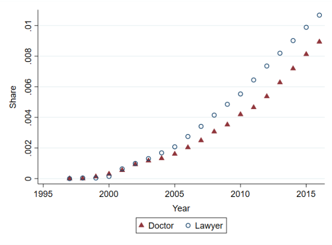
(b) Heart Failure



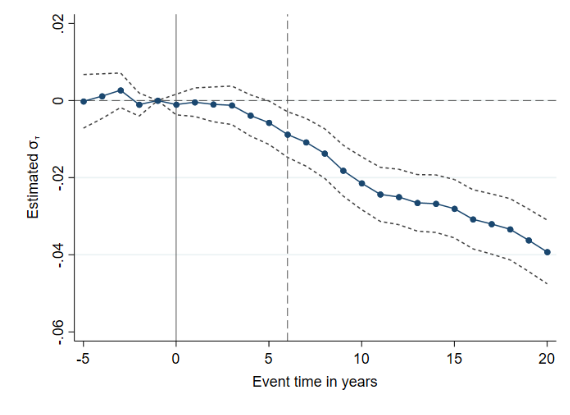
(c) Type II Diabetes



(d) Lung Cancer



Long-run health bonus: lifestyle-related conditions



Having a family member matriculated in medical school significantly reduces the long-run incidence of common chronic conditions that are frequently associated with lifestyle causes (type II diabetes, heart attack, heart failure, and lung cancer).

(Type II diabetes: 1 ppt decline at event year 15, relative to lawyer mean of 0.04.)

Heart attack | Heart failure | Type II diabtes | Lung cancer

Long-run health bonus: heterogeneity

		Heterogeneity by					
		Income		Family Tie		Geographic Proximity	
	Pooled	Below Median	Above Median	Close	Far	Close	Far
Outcomes	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Mortality							
τ=+15	-0.008	-0.008	-0.004	-0.006	-0.007	-0.010	-0.004
	(0.003)	(0.002)	(0.001)	(0.005)	(0.005)	(0.002)	(0.002)
τ=+25	-0.017			-0.020	-0.019		
	(0.005)			(0.007)	(0.008)		
Mean of Dep. Var. (at τ=+15/25)[a]	0.166	0.043	0.029	0.177	0.167	0.032	0.032
% Effect (at τ=+15/25)	10.2	18.6	13.8	11.3	11.4	31.3	12.5
No. of Obs.	1,222,675	1,132,787	1,652,427	461,996	474,659	1,338,214	1,603,283
B. Lifestyle Conditions Index[b]							
τ=+10	-0.021	-0.023	-0.019	-0.020	-0.015	-0.028	-0.022
	(0.003)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
τ=+15	-0.028	-0.026	-0.025	-0.028	-0.022	-0.035	-0.026
	(0.004)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.005)
Mean of Dep. Var. (at τ=+15)[a]	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No. of Obs.	5,077,267	1,843,234	2,670,101	2,034,144	2,319,347	2,282,660	2,699,245

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4. Intra-family expertise and health (II): addressing selection

5. Implications for health-SES gradient

6. Conclusion

Interpreting findings

- Three distinct channels through which HPs can be improving health of family members:
  1. "Information and reminders"- can transmit additional objective knowledge, improve subjective perception of information, and are likely to nag about health behaviors
  2. "Income effects" - economic returns to becoming a medical doctor (Ketel et al., 2016) No evidence in our setting
  3. "Social capital" - jumping lines for appointments with more desirable physicians, preferential treatments
- Policy can only imitate intra-family experitise that leads to **scalable** behaviors
- Hence the policy-relevant question is: Does an "information / reminders / nagging" channel exist?

Evidence of an "information / reminders" channel

1. Strongest impact of HP is on (i) heart disease; (ii) adherence to heart medication for adults; (iii) immunizations for adolescents and (iv) smoking during pregnancy
   - Lifestyle-related; "low-tech" and cheap preventives $\Rightarrow$ Points to knowledge and nagging rather than preferential access
2. We investigated social capital channel directly:
   - No diff in prob. of getting invasive heart attack treatment ▸ Table
   - No diff in conditional treatment intensity of a heart attack ▸ Table
   - Do not observe longer hospital stays after childbirth ▸ Figure
   - Do find that HP families get e.g. breast cancer surgery faster (consistent with other literature that has documented "social capital" inequality in cancer treatments) ▸ Table

- N.B. broader literature provides mixed evidence of access to healthcare significantly affecting mortality and morbidity, so not clear that "social capital" could save lives even if at play

Implications for health-SES gradient

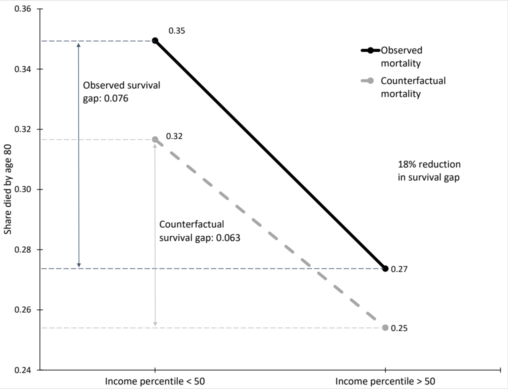
- Using HPs as a measure of exposure to health expertise yields
  1. Expertise raises health investments and improves health
  2. Treatment effects similar, or even larger, at lower SES
- (1) and (2) jointly imply that differential access to expertise across the income distribution can sustain a health-SES gradient – even when "systemic" factors are equalized
  - Create a "universal access to expertise" counterfactual
  - Inputs: (i) estimated treatment effects, and (ii) baseline distribution of access to expertise
  - Data from the European Social Survey suggests college share as proxy for baseline access to expertise

▸ Distribution of expertise

Counterfactual: Universal access to expertise

Consider back of the envelope calculation:

1. Assume 7% baseline expertise in the first half of the income distribution and 31% in the second half.
2. Assume uniform treatment effect on mortality of 10%



Providing universal access to expertise, and thereby equalizing access to expertise across the SES spectrum, could close as much as 18 percent of the health gap.

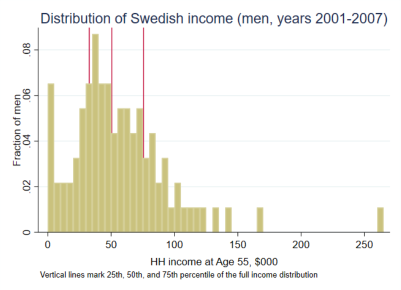
1. Data and institutional setting
2. Inequality in health throughout the life cycle
3. Intra-family expertise and health (I): non-parametric evidence
4. Intra-family expertise and health (II): addressing selection
5. Implications for health-SES gradient
6. Conclusion

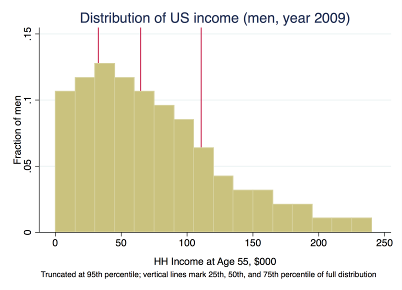
Conclusion

1. Document strong SES gradients in mortality and health - *despite equalized formal access and a wide safety net*
   - Emerge in early childhood and steepen over time
2. Having a health professional in the family improves health throughout the life-cycle
   - Simple, scalable, preventive investments are an important channel: drug adherence, vaccinations, prevention of diabetes, not smoking during pregnancy
3. Implementing public health policies that imitate intra-family expertise can close a meaningful share of the health-SES gap
   - Differential access to expertise across income distr (due to differences in education and familial transfers of information) likely large, and can sustain health-SES gradient – even when formal access to healthcare is equalized and safety net generous

Appendix

Income distribution in the US vs. Sweden





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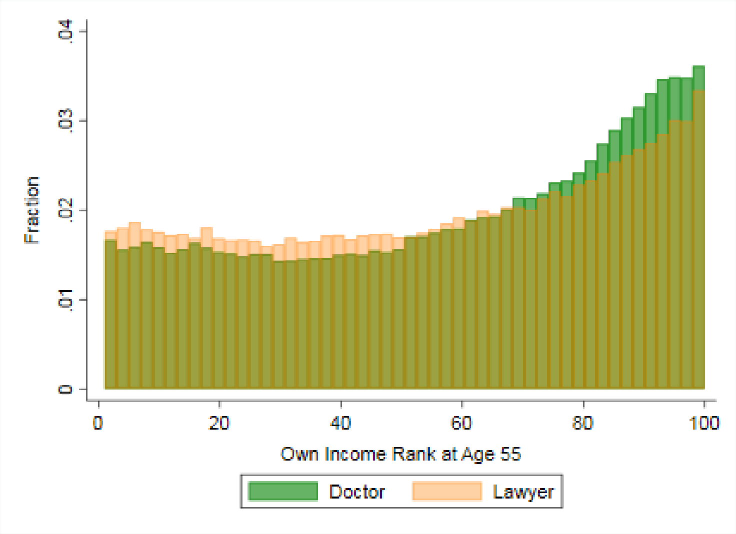
Income Distribution of Event Study Sample



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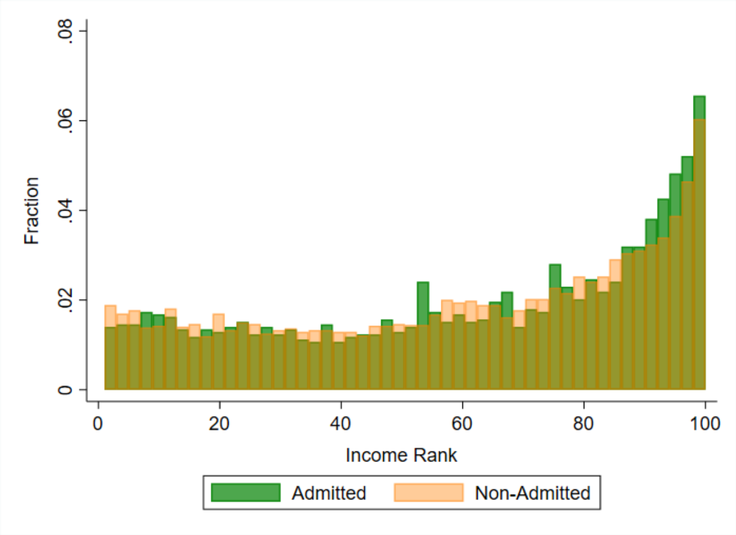
Income Distribution of 2SLS Sample



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Treatment conditional on heart attack

	More vs. Less Invasive		Procedure vs. none	
	(1) No Control	(2) Full Control	(3) No Control	(4) Full Control
Health professional kid	0.002	0.000	0.023***	-0.007
	[0.004]	[0.004]	[0.007]	[0.006]
Mean, Dep. Var	0.01	0.01	0.22	0.22
S.D. Dep. Var	0.12	0.12	0.42	0.42
R-Squared	0.000	0.062	0.000	0.331
Obs	17,186	17,186	77,256	77,256

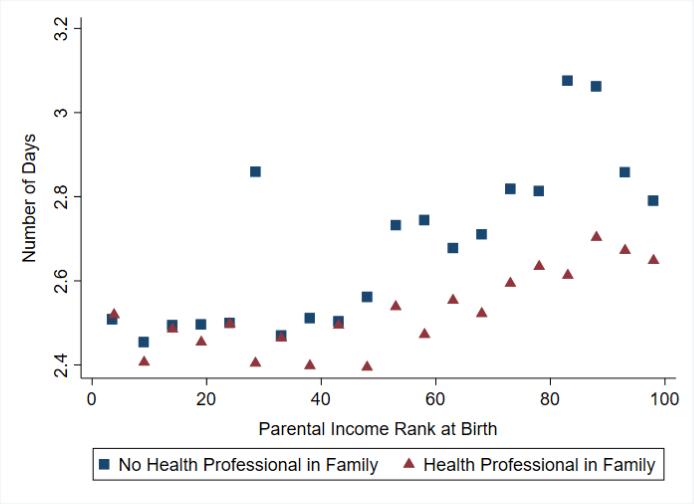
Sample restricted to individuals with first occurrence of heart attack and born between 1936-1961. Standard errors clustered by family. The set of full controls include: income percentile at age 55 FE, gender FE, birth year FE, municipality of residence in the year of the first heart attack FE, maximum education FE, and FE for age at the first heart attack. Back

Length between first breast cancer diagnosis and surgery

	Kid Health Prof.		Daughter Health Prof.	
	(1) No Control	(2) Full Control	(3) No Control	(4) Full Control
Health professional	-13.150**	-7.223	-17.940***	-11.729*
	[6.553]	[6.577]	[6.527]	[6.614]
Mean, Dep. Var	62.08	62.08	61.97	61.97
S.D. Dep. Var	367.01	367.01	366.32	366.32
R-Squared	0.000	0.038	0.000	0.038
Obs	36,765	36,765	36,309	36,309

Breast cancer surgery refers to mastectomy or lumpectomy. Sample restricted to female breast cancer patients born between 1936-1961. Standard errors clustered by family. The set of full controls include: income percentile at age 55 FE, gender FE, birth year FE, municipality of residence in the year of the surgery, maximum education FE, and type of surgery underwent (mastectomy vs. lumpectomy). Back

Number of postpartum hospital days



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Income effects of medical school matriculation

	(1) No Control	(2) Control
Matriculated	451.607	472.530
	[325.375]	[385.826]
Mean dep. var	3952.16	3952.16
S.D. dep. var	1657.28	1657.28
Obs	487	487

Table reports 2SLS estimation results for applicants whose last medical school application attempt is in 2009 or before. Income is measured as income in year 2016. Robust standard errors. Controls in column 2 include: birth year fixed effects, gender, and a dummy that equals one if the applicant is born in Sweden. Back

Income effects

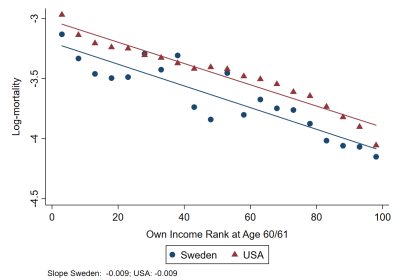
- Concern: do families that "win" a physician merely become richer relative to families that loose the MD lottery?
- Several pieces of evidence suggest results not driven by income effects
  - No income gains to "winning" the medical school lottery
    ▸ Income Impacts of Medical School Matriculation
  - Many relatives we look at do not live in the same household as the HP and so are not directly exposed to physician's HH income
  - Similarly, given Swedish institutional environment, elderly individuals not directly exposed to physician's HH income, as likely to live separately

▸ Back1 ▸ Back2

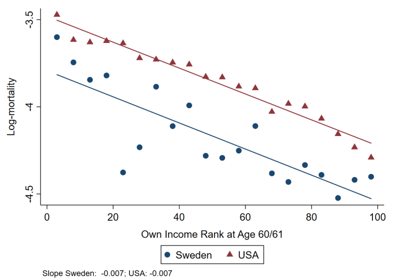
Gradient in mortality: comparison to the US

- Figures plot 1-year log mortality against own income rank in each country.
- Use combination of age at death and age of income measurement for which we can construct estimates that can be directly compared to those reported for the U.S. in Chetty et al. (2016).
- Income measure: positive Adjusted Gross Income (AGI). Also includes capital-based income and non-disability government transfers.
- Sweden has a lower mortality *level*, but we **cannot reject identical gradients**.

(a) Mortality at Age 75, Men



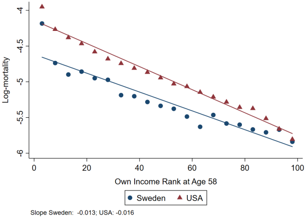
(b) Mortality at age 75, Women



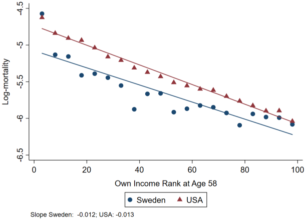
Gradient at earlier ages | Income distribution | Back

Gradient in mortality: comparison to the US

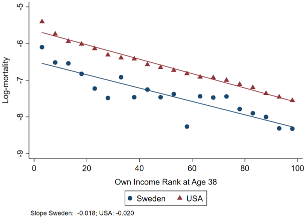
(a) Mortality at Age 60, Men



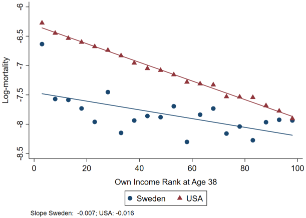
(b) Mortality at Age 60, Women



(c) Mortality at Age 40, Men



(d) Mortality at Age 40, Women



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Gradient in morbidity at older ages

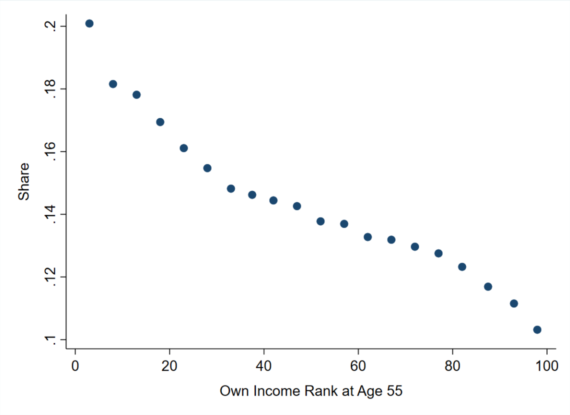

Figure: Lifestyle-related diseases

Diseases include type II diabetes, heart attack, heart failure, and lung cancer.

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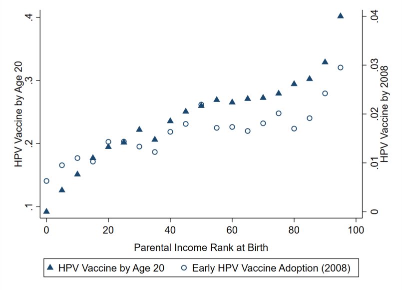
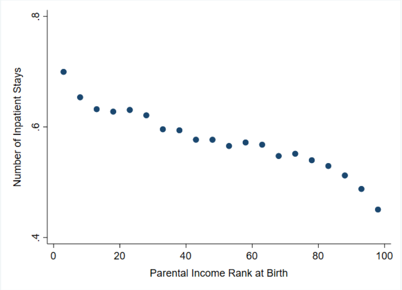
Gradient in health at younger ages

(a) HPV Vaccine, by Age 20



(b) Number of Inpatient Stays, Age 0-5



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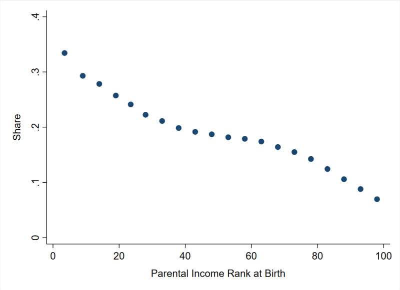
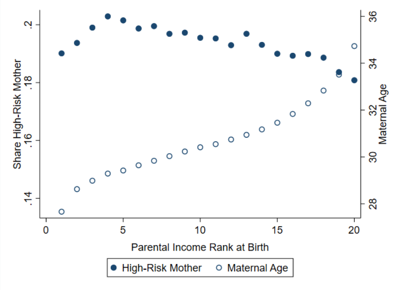
Gradient in health at birth

(a) Tobacco exposure, in-utero



(b) Maternal Age/High-Risk Mother



A high-risk mother is defined as whether the mother has any of the following conditions during pregnancy: chronic kidney diseases, diabetes, epilepsy, lung diseases, systemic lupus erythematosus (SLE), ulcerative colitis, hypertension, or urinary tract infections.

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Exposure to a health professional in family

Figure: Share of population with a doctor or nurse family member

Notes: Sample: 1936-1937 cohorts. Family members include spouse, sibling, cousin, child, child-in-law, niece/nephew, and grandchild.

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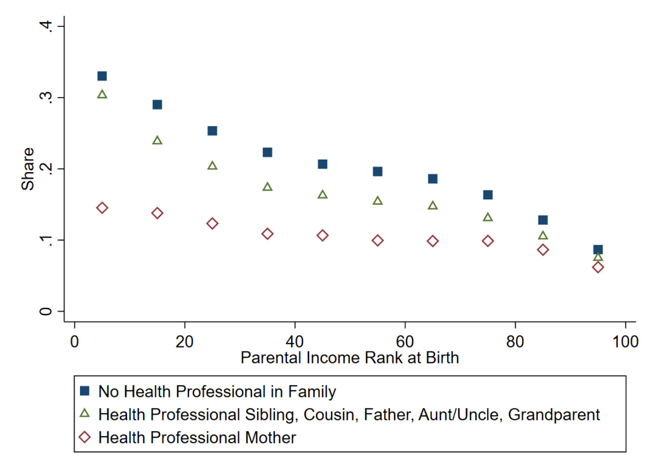
Tobacco exposure *in utero*: finer relative division

Figure: Tobacco exposure *in utero*



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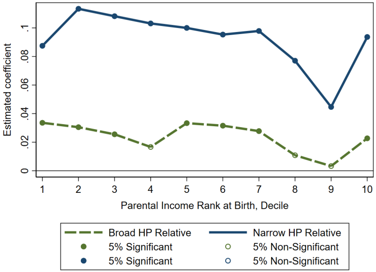
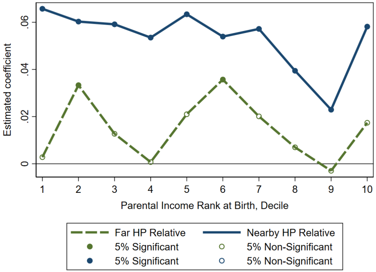
HPV Vaccination

(a) HPV Vaccination, by Age 20



(b) HPV Vaccination, by Age 20



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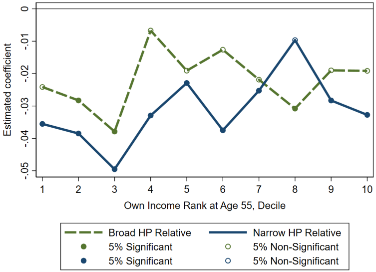
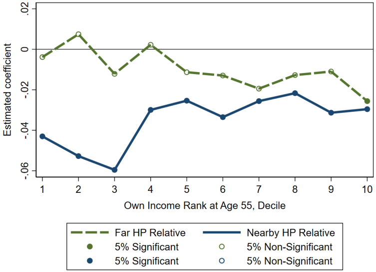
Mortality

(a) Died by Age 80



(b) Died by Age 80



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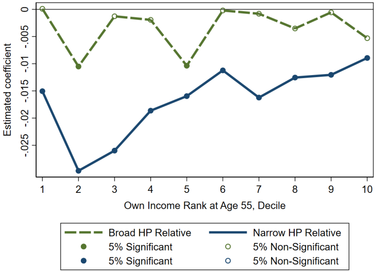
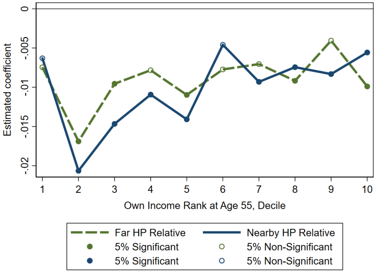
Life-style related diseases

(a) Lifestyle-Related Conditions, Age 55+



(b) Lifestyle-Related Conditions, Age 55+



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Distribution of expertise at baseline

(a) Distribution of health expertise

	Prefer Seeing Same Doctor (1)	Believe Doctor Always Tells Truth (2)	Regular Vegetables (3)	Regular Fruit (4)	Regular Sport (5)	Not Smoking (6)	Good Health (7)
No College Degree	0.06	-0.07	-0.19	-0.16	-0.06	-0.14	-0.06
	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)
No. of Obs.	927	927	738	738	738	738	927
Mean of Dep. Var.	0.70	0.28	0.77	0.55	0.56	0.84	0.76
Std. Dev. of Dep. Var.	0.46	0.45	0.42	0.50	0.50	0.36	0.43
Age Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights Used	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Year	2004	2004	2014	2014	2014	2014	2004

(b) Share older adults with $\geq$ college

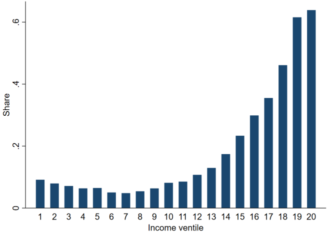

Table (a) reports OLS relationship between the level of education and health-related behaviors. The analysis is based on the 2004 and 2014 waves of the European Social Survey for Sweden.

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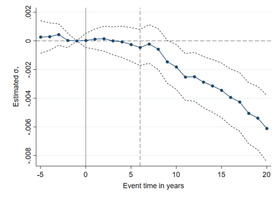
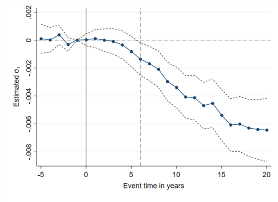
Long-run health bonus: lifestyle-related conditions

Figure: Doctor in the Family and Long-Run Health Bonus: Event Studies

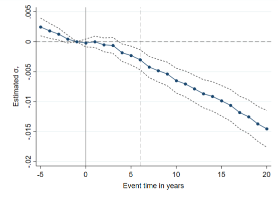
(a) Heart Attack



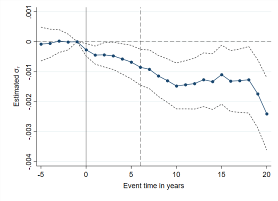
(b) Heart Failure



(c) Type II Diabetes



(d) Lung Cancer



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Definition

For tobacco exposure in utero:

- A **broad** family tie is defined as having a health professional who is a sibling, cousin, aunt/uncle, or grandparent. A **narrow** family tie is defined as having a health professional who is a parent.
- A child is defined to have a **nearby** health professional relative if in the year of birth, a health professional relative lived in the same county as the mother, and defined to have a **far** health professional if the health professional relative lived in a county different from the mother's in the year the child was born.

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Controls

When outcome is drug purchase, we control for having any condition that may warrant the need for this medication. In addition to the controls that we include to improve precision, the subset of regressions where the outcome captures individuals drug purchases also includes controls for the presence of asthma, type II diabetes, heart failure, ischemic heart diseases, stroke, hyperlipidemia, and hypertension

▸ Back

Controls in 2SLS

- $x_{j(i)}$: Family member's birth year fixed effects, gender, educational attainment, family tie fixed effects (e.g., sibling, parent), and whether the family member was born in Sweden.
- In regressions using statins, blood thinners, diabetes drugs, beta blockers, and asthma drugs as the outcome, $x_{j(i)}$ also includes controls for relevant chronic conditions that may warrant the need for this medication: dummies for whether the family member has asthma, type II diabetes, heart failure, ischemic heart diseases, stroke, hyperlipidemia, or hypertension.
- X_i: The applicant's birth year fixed effects and gender, whether the applicant was born in Sweden, and the number of medical schools that the applicant applied to in the first application cycle.

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