The Intergenerational Transfer of Education Credentials and Health: Evidence from the 2008 General Social Survey-National Death Index

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Abstract: **Background**. The educational attainment of a parent is a powerful predictor of children's wellbeing, but little is known about why this is the case. **Methods**. We used the 2008 General Social Survey to explore factors that may explain the relationship between one's father's education and one's own mortality. These include (1) intellectual traits, (2) material wellbeing, (3) psychological characteristics, (4) personality characteristics, and (5) social capital. **Results**. The education credentials of one's father are significantly associated with one's risk of death. The strongest mediators are own educational attainment, family income, home ownership, and subjective socioeconomic status. To a lesser extent, respondents' happiness with friends and work and social bonding were also pathways. **Conclusions**. A father's educational attainment appears to influence his children's health, and may do so not only by improving the child's material circumstances but also through his or her educational attainment and other psychological and social characteristics.

Key words: Intergenerational; socioeconomic status; survival analysis; General Social Survey; National Death Index.

The Servicemen's Readjustment Act of 1944 following World War II greatly increased the number of Americans with higher education.[1] Such improvements in educational attainment are strongly linked to a variety of positive life outcomes, including a longer, healthier life,[2–6] greater job satisfaction, and better work conditions.[7] There is also a direct effect of education on cognitive traits and non-cognitive traits (e.g., learning to navigate social relationships with peers).[8]

The benefits of schooling are not only related to the wellbeing of individuals but also have implications across generations. These benefits—the material as well as the cognitive and social—may all be transferred to children. It is well established, for instance, that more educated parents have more educated children.[9] In addition, children of parents with high educational attainment tend to be exposed to more vocabulary, more

advanced math skills, and receive greater positive affirmation than children of parents with less educational attainment.[10,11] This may explain why the information, values, ideas, and beliefs that students acquire while in school produce intergenerational health benefits.[12–16] That children acquire a variety of cognitive and non-cognitive traits from well-schooled parents raises the intriguing idea that a short-term social policy such the Servicemen's Readjustment Act might permanently and fundamentally alter the collective ideas, beliefs, values, and cognitive traits of society as a whole for generations. This most clearly occurs by educating less advantaged people who would otherwise have not had the opportunity to achieve these levels of schooling and who transmit these changes to the next generation in their families. Such a policy could have significant implications for the health of at least two generations. It is also plausible that such a policy could weave knowledge and norms into the collective social fabric for even more generations to come.

In this paper, we use a unique dataset first to establish that the health benefits of higher educational attainment are passed on to children, and second to examine how this might occur. With respect to the former question, there is already a body of work suggesting that parental education is related to offspring's health and mortality.[4–6] Much less is known about the latter question, however. Possibly, parents who attended college have acquired traits that later influenced their children's own educational attainment, income, home ownership, subjective perceptions, and social capital—traits that have all been linked to health and longevity.[17–20] Such traits might include knowledge, personality characteristics, IQ, or even social/environmental characteristics such as perceived trust in others (which is one foundation upon which social capital is built).[21,22] We explore the intergenerational transfer of a number of characteristics and resources, including: (a) intellectual traits (i.e., verbal IQ), (b) material wellbeing (represented here by home ownership), (c) psychological characteristics (e.g., happiness), (d) personality characteristics (e.g., optimism), and (e) social capital (e.g., ties with family and friends). We also consider the mediating role of the respondent's own education and income and self-rated health.

Methods

Data. Our analysis was performed using the 2008 General Social Survey-National Death Index (2008 GSS-NDI) dataset, which links the 1978–2002 waves of the GSS to NDI data through 2008.[23] The 2008 GSS-NDI provides three decades of data that can be weighted to be representative of the U.S. non-institutionalized civilian population. It includes a total of 32,830 people, of whom 9,271 were deceased as of 2008. The mortality linkage has been extensively tested and validated.[23,24]

For this analysis, we excluded the Black and Hispanic oversamples in the 1982 and 1987 waves (for a total n=32,173); removed subjects missing data on education, age, gender, race, and survey year (n=120); removed subjects with missing information on income (n=3,144). We also excluded subjects who do not report information on their fathers' educational attainments. This includes subjects who report that this is not applicable (n=4,423), those who report that they do not know their father's educational attainment (n=1,674), and those with no response (n=173). This left us with 22,759

individuals followed over 361,807 person-years, and capturing 5,990 deaths over this time period. The sample sizes change a good deal in each analysis because some explanatory variables were not obtained in particular waves of the GSS. However these omissions were systematic and should not affect the representativeness of our sample. All analyses are weighted using the GSS-provided sampling weights.

Measures. Our principal outcome of interest was mortality hazards. Our primary independent variable is the father's highest degree. This variable is grouped into five categories, less than high school, high school diploma, junior college degree, bachelor's degree, graduate degree, respectively. Because the number of observations for the junior college group is extremely small, we combined junior college and high school into one single group for the analyses.

The decade of interview included two categories: whether individuals were surveyed in 1980–1990 or in 1990–2008. We also broke down the second group further, but results did not differ for the two recent decades. We controlled for age, race, and gender to capture fixed socio-demographic characteristics (as confounders). We chose not to control for factors that plausibly link the mechanism of interest, such as smoking or drinking, in the happiness-mortality hazards pathway.

We defined non-fixed characteristics as potential explanatory variables. Specifically, we explored five domains of items captured in the GSS:

(1) *Verbal IQ*. IQ was measured in the GSS through a 10-item vocabulary test based on the Gallup-Thorndike verbal intelligence test, with a total score ranging from 0–10 words correct. Larger numbers indicate more words were correct.

(2) *Socioeconomic Status* (SES). We included a number of measures of SES: whether respondent owned his or her house or rented it; income in quintiles; and respondents' own educational attainments (based on degree attainment information in the GSS).

(3) *Relative SES*. Respondents' relative SES was calculated in terms of responses to three items from the GSS: relative income, measured in response to a question "compared with American families in general, would you say your family income is far below average, below average, average, above average, or far above average?" (with response categories ranging from far above to far below average); respondent's satisfaction with his/her financial situation based on a response to "We are interested in how people are getting along financially these days. So far as you and your family are concerned, would you say that you are pretty well satisfied with your present financial situation, more or less satisfied, or not satisfied at all?" with response categories of pretty well satisfied, more or less satisfied, not at all satisfied ; and subjective class identification identified in response to a question asking about "If you were asked to use one of four names for your social class, which would you say you belong in: the lower class, the working class, the middle class, or the upper class?" with response categories ranging from lower to upper class. Items were averaged together and the overall index ranged from 1 to 4.

(4) *Psychological wellbeing*. Psychological wellbeing included measures of self-reported overall happiness ("If you were to consider your life in general, how happy or unhappy would you say you are, on the whole?"); reported marital happiness ("Taking things all together, how would you describe your marriage? Would you say that your marriage is very happy, pretty happy, or not too happy?"; and satisfaction with one's job ("On the whole, how satisfied are you with the work you do—would you say you are

very satisfied, moderately satisfied, a little dissatisfied, or very dissatisfied?"), and with friends and non-work hobbies.

(5) *Social characteristics.* Social characteristics included responses to the following measures of social capital: "Would you say that most of the time people try to be helpful, or that they are mostly just looking out for themselves? "; "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?"; and social support, which included responses to how often the respondent spends time with friends, relatives, and family or go to bars/taverns, as well as religious activity, which may capture another side of social capital/connectedness.

(6) *Optimism.* Optimism was measured in the GSS through a question asking: "The way things are in America, people like me and my family have a good chance of improving our standard of living—do you agree or disagree?".

Parental education. Parental education could have been coded in a variety of different ways: father's education, mother's education, maximum education, or some average. We chose to focus primarily on father's education because for older cohorts within developed nations, the father's highest degree may be a better predictor of familial socioeconomic status than the mother's highest degree.[25] In the U.S., for instance, in the 1940s through the late 1960s few women obtained college or university degrees.[25] As a sensitivity analysis, we also replicated all analyses using mother's education instead of father's education and provide these results in the Appendix tables (Tables A-2 to A-5).

As described above, the GSS includes a variety of scales measuring different social and psychological domains. We took the items from the GSS and performed explanatory factor analyses to reduce the dimensionality of domains 3, 4, and 5 enumerated above, which contained multiple survey items. The analysis identified housing tenure and subjective perception of socioeconomic status as distinct domains (satisfaction with financial situation and subjective assessment of financial situation relative to average, factor loadings ranging from 0.53 to 0.61). Within the psychological domains, two factors were identified: existential satisfaction (overall happiness, happiness with marriage, and satisfaction with job, factor loading ranging from 0.33 to 0.59) and satisfaction with leisure time (friends and hobbies, factor loadings ranging from 0.41 to 0.42). Within the social capital domain, we have four distinct factors, bridging social capital (trust in others, feeling that people look out for themselves, factor loadings ranging from 0.48 to 0.49) frequency of contact with friends (factor loadings ranging from 0.41to 0.43); frequency of contract with family (factor loadings ranging from 0.63 to 0.67); and frequency of involvement in religious activities (factor loadings ranging from 0.61 to 0.72). Within each domain, items were averaged together for one score. Specific items in each scale are described in more detail in Appendix Table A-1 along with descriptive statistics.

Finally, we also explored whether self-rated health played a meditational role, since having fathers with higher education degrees might improve respondent's health. Similarly, we also included family income and respondent's education to see their meditational effects.

Statistical analyses. We use discrete time hazard models to calculate the hazard ratios (HR) for those parents with the highest degree levels relative to those with less than a high school diploma. These models estimate the proportion of the sample that

experiences the event (in this case, death) during a specific time period (beginning in 1978, with sampling conducted through 2002 and mortality follow-up through 2008).[26] Our dependent variable is the vital status of the individual within a given year, which is dichotomous in nature (alive/dead). We chose the most parsimonious functional form for our models, and the quadratic form provided the best model fit. We calculate hazard rates using the complementary log-log link.[27]

To test the proportional hazard assumption, we first examined the interaction of duration of survival and the father's highest degree, which was not significant. Then, we plotted the log-log survival curves for each group of the father's highest degree, and these were proportional. This suggests that we employed the appropriate survival analysis, the cloglog, which yields a HR.

To test the influence of our constructed domains on the parental education-mortality hazards relationship, we employed a traditional mediation approach that combined item responses as a continuous variable.[28,29] First, we checked the relationship between the father's highest degree and the explanatory variables under study. If this relationship is significant, we next examined whether adding explanatory variables reduced the total effect of the father's education on mortality by measuring changes in the hazard ratio (ΔHR). Potential psychosocial and material explanatory variables were added one at a time to the baseline regression, and were tested in separate models. The GSS-NDI was approved by the Columbia University Institutional Review Board.

Results

Table 1 shows the descriptive characteristics of the sample by the father's educational attainment. Respondents with less-educated fathers tend to be older, non-White, less well off, and with less educational attainment. College graduation rates were 13% for individuals whose fathers had less than a high school education, 26% of respondents whose father completed high school, 54% of respondents whose fathers have a bachelor's degree, and 61% of respondents whose father's obtained graduate degrees themselves. Similarly, subjective SES (opinion of family income, satisfaction with financial situation, and social class) differed by the respondent's father's education. Respondents with the least-educated fathers, for example, have an average subjective SES score of 2.43 (out of 4) compared with 2.75 for those respondents whose father completed a graduate degree. Twenty-eight percent of individuals whose fathers do not complete high school are in fair or poor health compared to 14% of those whose fathers completed high school, and 10% of those whose fathers completed college or have a graduate degree. Individuals with less-educated fathers are also less likely to be homeowners and are less satisfied with their marriages, families, and jobs. They also have less social capital measured as frequency of contact with family and friends or measured as social bonding or trust. The means and standard deviations for the individual items that constitute the constructed scales we use are provided in Appendix Table A-1.

Table 2 depicts the adjusted HRs associated with each additional degree garnered by the respondent's father. We present five models. The first model depicts the HR for each level of parental education for the total sample with controls for the respondent's age, gender, race, and survey decade. The second model is similar to Model 1 only

Table 1.

DESCRIPTIVE CHARACTERISTICS OF THE SAMPLE BY FATHER'S EDUCATION. 2008 GENERAL SOCIAL SURVEY–NATIONAL DEATH INDEX[a]

		Father's Education			
		< High School	High School Graduate	Bachelor Degree	Graduate Degree
Age (Mean, SD)[b] (n=22,759)		49.70 (16.61)	38.05 (13.85)	36.42 (13.41)	36.09 (13.10)
Gender (%) (n=22,759)	Male	45.69	47.72	48.86	50.79
	Female	54.31	52.28	51.14	49.21
Race (%) (n=22,759)	White	83.90	88.66	90.74	91.82
	Black	11.62	7.59	3.27	3.41
	Other	4.48	3.75	5.98	4.77
Verbal IQ		5.66 (2.12)	6.37 (1.94)	7.06 (1.98)	7.29 (1.92)
Respondent's Education (%) (n=22,759)	Less Than High School	31.16	8.22	3.35	2.27
	High School	37.34	33.47	11.76	10.20
	College	18.77	32.16	30.59	26.18
	Graduate	12.73	26.15	54.30	61.34
Income Quintile (%) (n=22,759)	Lowest	18.13	9.75	9.77	13.05
	Quintile 2	20.80	14.78	12.10	10.09
	Quintile 3	21.44	20.43	17.48	15.34
	Quintile 4	21.08	25.56	22.39	22.58
	Highest	18.56	29.48	38.26	38.93

Table 1. (*continued*)

		Father's Education			
		< High School	High School Graduate	Bachelor Degree	Graduate Degree
Self-Related Health (%)	Excellent	27.06	37.06	47.82	46.99
(n= 16,020)	Good	45.71	49.27	42.34	43.23
	Fair	20.71	11.54	8.55	8.21
	Poor	6.52	2.12	1.29	1.58
House Tenure (%) (n=11,731)	Rent Home	74.70	68.76	63.53	59.45
	Own Home	25.30	31.24	36.47	40.55
Optimism about social mobility	Optimistic	70.07	72.41	76.68	75.31
(n=6,103)	Not optimistic	29.93	27.59	23.32	24.69
Constructed Scales[c] (Mean, SD)	Religious Activity (n=22,708) (range: 1–4)	2.27 (.69)	2.13 (.69)	2.09 (.71)	2.11 (.71)
	Subjective Perception of SES (n=22,742) (range: 1–4)	2.43 (.55)	2.53 (.55)	2.73 (.57)	2.75 (.58)
	Psychological Capital 1 (21,844) (range: 1–4)	1.63 (.52)	1.65 (.52)	1.67 (.52)	1.67 (.54)
	Psychological Capital 2 (10,989) (range: 1–3)	1.27 (.38)	1.30 (.40)	1.36 (.42)	1.43 (.48)
	Social Capital 1 (15,350) (range: 1–2)	1.43 (.42)	1.45 (.42)	1.50 (.43)	1.54 (.42)
	Social Capital 2 (14,226) (range: 1–4)	2.36 (.74)	2.41 (.71)	2.52 (.74)	2.84 (.73)
	Social Capital 3 (14,224) (range: 1–4)	2.20 (.76)	2.19 (.74)	2.08 (.79)	2.12 (82)

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[a]Weighted using survey weights. Standard deviations (SD) in parenthesis (where applicable).
[b]Ns for respondent education groups are as follows: n=1,146 less than high school; n=8,474 high school; n=1,982 some college; and n=1,257 college+ for a total of 22,759.
[c]Additional detail on constructed scales provided in the appendix.

Table 2.

ADJUSTED HAZARD RATIO ASSOCIATED WITH EACH DEGREE OF FATHER'S EDUCATION. 2008 GENERAL SOCIAL SURVEY—NATIONAL DEATH INDEX

Father's education	Total Sample	Baseline[+] Education	Baseline[+] Income	Male[a] Baseline	Female[a] Baseline
Less than high school	1	1	1	1	1
High school graduate	.902**	.958	.932[+]	.886*	.921
	[.840, .970]	[.888, 1.033]	[.867, 1.003]	[.802, .980]	[.831, 1.022]
Bachelor degree	.824**	.927	.861*	.827*	.815[+]
	[.716, .947]	[.801, 1.072]	[.748, .991]	[.688, .994]	[.657, 1.011]
Graduate degree	.824*	.939	.863[+]	.757*	.900
	[.696, .976]	[.788, 1.118]	[.728, 1.023]	[.596, .961]	[.709, 1.143]
N	22,759	22,759	22,759	11,574	12,445

[+]p<.10, * p<.05, ** p<.01
[a]Differences by gender are not statistically significant.
Notes: Models control for age, gender, survey year in decades, and race. 95% confidence intervals in parentheses. Weighted using survey weights.

with an additional covariate: the educational attainment of the respondent. Model 3 again replicates Model 1, this time controlling for respondent's income quintile. The 4th and 5th models depicted here are identical to Model 1 only they are presented for males and females separately.

In the second model in Table 2, after we include respondents' own education (highest degree), the associations between the father's schooling and the respondent's mortality are no longer statistically significant. The inclusion of the respondent's income (in quintiles) in Model 3, however, reduces the association between parental education level and hazard of dying to a lesser extent, and the comparisons remain either statistically significant or marginally so.

There is a hint that having a father with a graduate degree may be more protective for men (HR=0.76; CI=0.60,0.96) than women (HR=0.90; CI=0.71,1.14). However, these gender differences are not statistically significant when we look at a gender interaction in the pooled models. Because we do not find statistically significant differences between men and women, we pool across gender in the mediation analyses.

As discussed above, we also examined these same models for the mother's level of schooling instead of the father's level of schooling. The results were very similar, though slightly weaker in the baseline model. One difference worth noting is that having a mother with a graduate degree was slightly more protective for women (HR=0.68; CI=0.45,1.03) than men (HR=0.82; CI=0.56,1.20), the opposite of the result we find in the gender-stratified results in Table 2. Once again, this difference was not statistically significant.

In Table 3, we examine the associations between 11 potential mediating variables that

Table 3.

HAZARD RATIOS AND PERCENTAGE CHANGE IN HAZARD RATIOS ASSOCIATED WITH VARIOUS MEASURES OF MATERIAL AND PSYCHOSOCIAL CHARACTERISTICS. 2008 GENERAL SOCIAL SURVEY—NATIONAL DEATH INDEX

Measures	Description	N	Model I	Model II		% Change in HR
			Father's Education Only[a]	Father's Education With Mediator	Mediator	
Verbal IQ Score		11,686	.824 [0.642,1.057]	.870 [0.676,1.119]	.969** [0.950,0.988]	5.29
Respondents' Education	Respondents' Education, in Years	22,759	.824* [0.696,0.976]	.892 [0.750,1.061]	.979* [0.970,0.989]	7.62
Family Income	Quintile Income	22,759	.824* [0.696,0.976]	.867+ [0.731,1.027]	.924** [0.903,0.945]	4.96
Health	Self-Rated Health	22,759	.824* [0.696,0.976]	.896 [0.734,1.094]	.820** [0.788,0.853]	8.04
Housing Tenure	Own Dwelling	11,731	.863* [0.696,0.976]	.847 [0.671,1.070]	.804** [0.733,0.883]	-1.89
Subjective SES	Opinion and Satisfaction from SES	22,708	.824* [0.696,0.976]	.854+ [0.721,1.012]	.909** [0.862,0.958]	3.51
Psychological Capital 1	General Satisfaction from Life, Marriage, and Job	21,844	.820* [0.691,0.972]	.829* [0.700,0.984]	.875** [0.829,0.923]	1.09
Psychological Capital 2	Satisfaction from Friends and Family	10,989	.851 [0.682,1.061]	.869 [0.697,1.084]	.862** [0.794,0.936]	2.07

Table 3. (*continued*)

Measures	Description	N	Model I Father's Education Only[a]	Model II Father's Education With Mediator	Model II Mediator	% Change in HR
Social Capital 1	Social Bonding (Helpful/Trust)	15,350	.793* [0.644,0.977]	.814+ [0.660,1.003]	.862** [0.791,0.939]	2.58
Social Capital 2	Frequent Meeting with Friends	14,226	.802* [0.647,0.994]	.805* [0.650,0.999]	.977 [0.922,1.035]	0.37
Social Capital 3	Frequent Meeting with Family	14,224	.802* [0.647,0.994]	.803* [0.648,0.995]	1.015 [0.969,1.064]	0.12
Religious Activity	Frequent Involvement in Religious Activities	22,708	.825* [0.697,0.977]	.823* [0.695,0.974]	.945** [0.905,0.986]	−0.24
Optimism about Social Mobility	Optimistic	6,103	.924 [0.636,1.342]	.915 [0.630,1.329]	1.120 [0.958,1.310]	−0.98

+p<.10, * p<.05, ** p<.01
[a]As in the prior models, father's education is coded as a four category degree variable. Coefficients displayed are for graduate degree (with reference category <HS).
Notes: Sample sizes for Models I and II are identical and includes only respondents with complete data on the mediating factor. All models control for age, gender, race, and survey year. Confidence intervals in parentheses. Weighted using survey weights.

may explain the link between the father's educational degree and one's own mortality. The first model shows the hazard ratio for the father's degree from the baseline model with the father's own education, as well as controls for age, sex, race, and decade of interview for the respondent. Coefficients in the baseline model as well as numbers vary by row due to missing data on the mediating variables.

In the second model, we incorporate one of the 11 mediating variables and present the hazard ratio for the father's education (graduate degree) and the hazard ratio for the mediator itself. For example, when adding the respondent's educational attainment, the hazard ratio for the *respondent's* educational attainment is 0.98 (CI=0.97,0.99), and is statistically significant. We run separate models for each of the 11 mediators and present the percent change in the hazard ratio to determine the extent to which the original hazard ratio is explained upon inclusion of this mediator. For example, the respondents' educational attainment reduced the hazard ratio for having a father with a graduate degree relative to having a father who is a high school dropout from 0.82 to 0.89, or a 7.6% reduction in the hazard ratio.

Nearly all mediating factors are significant in these models. The respondent's IQ, education, family income, health, homeownership, subjective perception of SES, and religious activity are also all related to a moderate or fairly large change in the hazard of dying over the study period. The factors used as a proxy for psychological capital (i.e., one's self-rated satisfaction from one's life, marriage, and job) were also significantly associated with a reduction in the risk of dying. The only factors not significantly associated with the risk of dying are two of the domains of social capital and optimism.

None of these factors are especially powerful mediators in isolation, but several stand out as having noticeable effects. The strongest pathways are the socioeconomic factors, including the respondent's own educational attainment, family income, and the respondents' subjective perception of their own SES. A respondent's self-rated health also mediates the association between the father's having a graduate degree and mortality (relative to being a high school dropout). These two are the strongest pathways, among those that we examined here, through which father's educational degree is related to mortality. The second part of psychological capital—the satisfaction one derives from his or her friends and job—also shows a fairly substantial mediating effect, as does the second domain of social capital, but we do not see quite as much for the other parts of psychological and social capital.

Discussion

We explore some of the ways in which a father's education are associated with his children's prospects for living a long life. Verbal IQ, for instance, is very strongly correlated with overall IQ, and generally serves as a proxy measure for "intelligence."[30] The correlation between verbal IQ and mortality can be attributed both to one's genetic potential and environment,[31–33] and both are plausibly transferred from parent to child. Moreover, our findings that respondent's own SES but also other social and psychological factors explain the relationship between parental education and one's mortality suggest that it is likely both the father's social experiences in college and the socioeconomic benefits of having a diploma that produce lasting intergenerational effects on health.[34]

We found that the respondents' own educational attainment explains about 8% of the change in the coefficient on parental education, suggesting that the father's influence on his children's educational aspirations influences their opportunity to live a long life. This adds to a growing body of evidence suggesting that the association between educational attainment and mortality is causal. However, this is not definitive because a father's educational attainment could also influence his children's attitudes, lifestyle, and behaviors in many other ways.

Self-rated health is a powerful predictor of how long one lives overall,[24] and also accounts for about 8% of the change in the coefficient on parental education. This suggests that paternal educational attainment influences health (and thus chronic diseases rather than just acute causes of death, such as accidents) as well as longevity. It should be kept in mind that it may also be that one's perceptions of his or her health are influenced by parental beliefs. That is, parents who complain about their health may also have children who rate their health poorly, irrespective of their actual health status. Other aspects of the respondents' socioeconomic situation—both subjective and objective—matter too, including, income, homeownership, and subjective SES. Finally, one's satisfaction with friends and work and social bonding were important characteristics. Although it is well-known that structural social capital (measured as the amount of time one visits friends/family or engages in civic organizations) is related to both health[35] and education,[36] we do not find it to be an important determinant of how the survival benefits of higher educational attainment are transmitted to his or her children.

In sensitivity analyses, we also examined mother's level of schooling instead of the father's schooling, and found that having a mother with a graduate degree was slightly more protective for women than for men. While this difference was not statistically significant, it might hint that the benefits of parents who attend graduate school may extend more to the same-sex child than an opposite-sex one.

There are several limitations to our study. First, our data are subject both to confounding and reverse causality. While exploring parental transmission avoids reverse causation associated with the SES-health association (e.g., loss of income can lead to sickness, or that sickness can lead to a loss of income[37]) and confounding by third variables (e.g., sick students are probably less likely to go far in school), many other plausible confounders remain. Second, we do not have very detailed information on structural aspects of the respondents' social networks, such as the actual number of friends in the social network, which have been shown elsewhere to be related adult health.[38] In addition, because not all measures are available in all years, we cannot run combined models with all mediators to get an assessment of the additive effects of these mediators. Finally, there are many characteristics that we could not include in our analyses because they were not available.

As a result of the Serviceman's Readjustment Act, the post-World War II baby boom generation may have acquired traits that later influenced their children's own educational attainment, income, health, housing tenure, and subjective perceptions. These characteristics may have influenced their children's health, and, ultimately, their survival.[5,6,39–41] Our findings are at least suggestive that this act may have transformed both the belief and health landscape of the U.S. for generations.

Appendix Table A-1.

MEANS AND STANDARD DEVIATIONS FOR COMPONENTS OF CONSTRUCTED SCALES BY FATHER'S EDUCATION

		Father's Education							
		< High School		High School Graduate		Bachelor Degree		Graduate Degree	
Religious Activity (22,708)	Attendance (range: 1–4)	2.27	(0.69)	2.13	(0.69)	2.09	(0.71)	2.11	(0.71)
	Strength of affiliation (range: 1–3)	2.15	(0.99)	1.99	(0.94)	1.97	(0.92)	1.97	(0.91)
	Prayer (range: 1–3)	2.36	(0.60)	2.24	(0.64)	2.19	(0.67)	2.24	(0.69)
Subjective Perception of SES (n=22,742)	Satisfaction with family income (range: 1–5)	2.40	(0.80)	2.23	(0.84)	2.13	(0.86)	2.15	(0.85)
	Satisfaction with financial situation (range: 1–3)	2.43	(0.55)	2.53	(0.55)	2.73	(0.57)	2.75	(0.58)
	Satisfaction with socioeconomic class (range: 1–4)	2.84	(0.80)	3.02	(0.82)	3.22	(0.88)	3.28	(0.90)
Psychological Capital 1 (n=21,844)	General happiness (range: 1–3)	2.06	(0.74)	2.03	(0.73)	2.18	(0.73)	2.16	(0.72)
	Marital happiness (range: 1–3)	2.40	(0.63)	2.54	(0.61)	2.77	(0.60)	2.82	(0.60)
	Job/home happiness (range: 1–4)	1.67	(0.54)	1.67	(0.52)	1.65	(0.52)	1.63	(0.52)
Psychological Capital 2 (10,989)	Satisfaction with friends (range: 1–3)	1.77	(0.63)	1.75	(0.59)	1.69	(0.58)	1.69	(0.58)
	Satisfaction with hobbies (range: 1–3)	1.41	(0.54)	1.38	(0.53)	1.36	(0.52)	1.31	(0.50)
Social Capital 1 (15,350)	People helpful (range: 1–2)	1.68	(0.79)	1.70	(0.78)	1.70	(0.78)	1.66	(0.78)
	People can be trusted (range: 1–2)	1.43	(0.48)	1.36	(0.42)	1.30	(0.40)	1.27	(0.38)
Social Capital 2 (14,226)	Frequency of time with friends (range: 1–4)	1.33	(0.52)	1.29	(0.49)	1.27	(0.46)	1.22	(0.43)
	Frequency of time at bar (range: 1–4)	1.53	(0.64)	1.42	(0.56)	1.33	(0.51)	1.32	(0.52)
Social Capital 3 (14,224)	Time spent with relatives (range: 1–4)	1.54	(0.42)	1.50	(0.43)	1.45	(0.42)	1.43	(0.42)
	Time spent with parents (range: 1–4)	1.47	(0.50)	1.45	(0.50)	1.42	(0.49)	1.41	(0.49)
	Time spent with siblings (range: 1–4)	1.61	(0.49)	1.55	(0.50)	1.48	(0.50)	1.45	(0.50)

Notes: Standard deviations in parentheses. Weighted using survey weights.

Appendix Table A-2.

MEANS AND STANDARD DEVIATIONS FOR COMPONENTS OF CONSTRUCTED SCALES BY MOTHER'S EDUCATION

		Father's Education			
		< High School	High School Graduate	Bachelor Degree	Graduate Degree
Religious Activity (26,155)	Attendance (range: 1–4)	2.13	2.00 (0.99)	1.99 (0.94)	1.92 (0.90)
	Strength of affiliation (range: 1–3)	2.35	2.24 (0.60)	2.24 (0.64)	2.14 (0.66)
	Prayer (range: 1–3)	2.42	2.23 (0.79)	2.14 (0.84)	2.03 (0.85)
Subjective Perception of SES (n=26,198)	Satisfaction with family income (range: 1–5)	2.80	3.02 (0.80)	3.19 (0.84)	3.21 (0.91)
	Satisfaction with financial situation (range: 1–3)	2.03	2.03 (0.75)	2.13 (0.73)	2.17 (0.73)
	Satisfaction with socioeconomic class (range: 1–4)	2.39	2.53 (0.64)	2.73 (0.62)	2.78 (0.63)
Psychological Capital 1 (n=25,119)	General happiness (range: 1–3)	1.80	1.75 (0.63)	1.68 (0.60)	1.72 (0.59)
	Marital happiness (range: 1–3)	1.41	1.39 (0.55)	1.35 (0.54)	1.30 (0.51)
	Job/home happiness (range: 1–4)	1.71	1.71 (0.81)	1.67 (0.79)	1.65 (0.82)
Psychological Capital 2 (12,428)	Satisfaction with friends (range: 1–3)	1.34	1.29 (0.53)	1.25 (0.49)	1.20 (0.45)
	Satisfaction with hobbies (range: 1–3)	1.55	1.42 (0.65)	1.37 (0.56)	1.32 (0.52)
Social Capital 1 (17,640)	People helpful (range: 1–2)	1.50	1.45 (0.50)	1.38 (0.50)	1.40 (0.49)
	Attendance (range: 1–4)	1.64	1.55 (0.48)	1.45 (0.50)	1.42 (0.50)
Social Capital 2 (16,344)	Strength of affiliation (range: 1–3)	2.37	2.11 (0.93)	1.99 (0.82)	1.87 (0.77)
	Prayer (range: 1–3)	3.36	2.95 (0.95)	2.80 (1.01)	2.74 (1.02)
Social Capital 3 (16,339)	Satisfaction with family income (range: 1–5)	1.92	1.98 (0.89)	2.14 (0.85)	2.01 (0.83)
	Satisfaction with financial situation (range: 1–3)	2.23	2.16 (1.07)	2.30 (0.93)	2.23 (0.86)
	Satisfaction with socioeconomic class (range: 1–4)	2.38	2.38 (0.96)	2.47 (0.88)	2.39 (0.84)

Notes: Standard deviations in parentheses. Weighted using survey weights.

Appendix Table A-3.

DESCRIPTIVE CHARACTERISTICS OF THE SAMPLE BY MOTHER'S EDUCATION. 2008 GENERAL SOCIAL SURVEY—NATIONAL DEATH INDEX

		Mother's Education				
		< High School	High School Graduate	Bachelor Degree	Graduate Degree
Age (Mean, SD) (n=26,218)		49.87 (17.00)	38.44 (13.80)	36.76 (13.71)	33.13 (11.61)
Gender (%) (n=26,218)	Male	43.36	47.61	47.95	48.24
	Female	56.64	52.39	52.05	51.76
Race (%) (n=26,218)	White	79.26	88.00	88.11	89.61
	Black	14.60	9.10	6.83	7.06
	Other	6.14	2.89	5.06	3.33
Verbal IQ 13,382		2.99 (1.10)	3.44 (.99)	3.74 (1.01)	3.87 (.99)
Respondent's Education (%)(n=26,218)	Less Than High School	35.68	8.51	3.94	3.05
	High School	35.94	32.53	13.08	12.28
	College	17.26	31.30	31.71	26.71
	Graduate	11.13	27.66	51.28	57.95
Income Quintile (%) (n=26,218)	Lowest	20.82	10.35	11.65	14.62
	Quintile 2	21.70	15.53	13.32	13.41
	Quintile 3	21.08	20.55	17.44	14.31
	Quintile 4	19.61	25.06	21.86	20.62
	Highest	16.80	28.50	35.74	37.03

Appendix Table A-3. (*continued*)

		Mother's Education			
		< High School	High School Graduate	Bachelor Degree	Graduate Degree
Self-Related Health (%)	Excellent	25.46	37.40	45.79	50.91
(n= 18,524)	Good	45.34	48.75	42.91	38.34
	Fair	22.16	11.68	9.25	8.91
	Poor	7.03	2.17	2.06	1.84
House Tenure (%)	Rent Home	70.96	68.25	59.56	56.81
(n= 13,543)	Own Home	29.04	31.75	40.44	43.19
Optimism about social	Optimistic	69.40	72.93	75.60	68.92
mobility (n= 7,194)	Not optimistic	30.60	27.07	24.40	31.08
Constructed Scales	Religious Activity (n=26,155) (range: 1–4)	2.27 (.69)	2.13 (.70)	2.12 (.70)	2.03 (.71)
(Mean, SD)	Subjective Perception of SES (n=26,198) (range: 1–4)	2.40 (.56)	2.53 (.56)	2.68 (.60)	2.73 (.55)
	Psychological Capital 1 (25,119) (range: 1–4)	-.70 (.56)	-.68 (.53)	-.63 (.53)	-.64 (.54)
	Psychological Capital 2 (12,428) (range: 1–3)	-.44 (.49)	-.35 (.43)	-.31 (.39)	-.26 (.36)
	Social Capital 1 (17,640) (range: 1–2)	-.57 (.42)	-.50 (.42)	-.42 (.42)	-.43 (.42)
	Social Capital 2 (16,344) (range: 1–4)	-1.86 (.73)	-1.53 (.73)	-1.39 (.74)	-1.30 (.74)
	Social Capital 3 (16,339) (range: 1–4)	-1.09 (0.83)	-1.09 (.79)	-1.20 (.78)	-1.10 (.81)

Notes: Ns for respondent education groups are as follows: n=5,186 less than high school; n=8,257 high school; n=6,541 some college; and n=6,234 college+ for a total of 26,218.
Weighted using survey weights. Standard deviations (SD) in parenthesis (where applicable).

Appendix Table A-4.

ADJUSTED HAZARD RATIO ASSOCIATED WITH EACH DEGREE OF MOTHER'S EDUCATION

Mother's education	Total Sample	Baseline+education of respondents	Baseline+ income	Male[a] Baseline	Female[a] Baseline
Less than high school	1	1	1	1	1
High school graduate	.915**	.985	.957	.889**	.948
	[.859, .976]	[.921, 1.053]	[.897, 1.022]	[.813,.972]	[.865, 1.038]
Bachelor degree	.908	1.032	.960	.920	.892
	[.792, 1.042]	[.895, 1.190]	[.836, 1.102]	[.762,1.112]	[.730, 1.089]
Graduate degree	.769+	.884	.798	.820	.687+
	[.578, 1.022]	[.663, 1.179]	[.600, 1.062]	[.559,1.202]	[.451, 1.047]
N	24,942	24,942	24,942	11,030	13,912

+p<.10, * p<.05, **p<.01
[a]Differences by gender are not statistically significant.
Notes: Models control for age, gender, survey year in decades, and race. Confidence intervals in parentheses. Weighted using survey weights.

Appendix Table A-5.

HAZARD RATIOS AND PERCENTAGE CHANGE IN HAZARD RATIOS ASSOCIATED WITH VARIOUS MEASURES OF MATERIAL AND PSYCHOSOCIAL CHARACTERISTICS. 2008 GENERAL SOCIAL SURVEY—NATIONAL DEATH INDEX

Measures	Description	N	Model I Mother's Education Only[a]	Model II Mother's Education with Mediator	Mediator	% Change in HR
Verbal IQ Score		13,382	.838 [.568, 1.238]	.889 [.602, 1.313]	.967** [.949,.985]	5.74
Respondents' Education	Respondents' Education, in Years	26,218	.769+ [.578, 1.022]	.841 [.631, 1.120]	.977** [.969,.986]	8.56
Family Income	Quintile Income	26,218	.769+ [.578, 1.022]	.798 [.600, 1.061]	.915** [.896,.934]	8.63
Health	Self-Rated Health	18,524	.676* [.470, .973]	.725+ [0.504, 1.044]	.823** [.793,.855]	6.75
		13,543	.907 [.643, 1.279]	.899 [0.637, 1.269]	.805** [.739,.876]	−.88
Housing Tenure	Own Dwelling	26,198	.769+ [.578, 1.022]	.802 [0.603, 1.068]	.893** [.850,.938]	4.11
Subjective SES	Opinion and Satisfaction from SES	25,119	.792 [.596, 1.053]	.802 [.603, 1.067]	.881** [.838,.926]	4.11
Psychological Capital 1	General Satisfaction from Life, Marriage, and Job					
Psychological Capital 2	Satisfaction from Friends and Job	12,428	.880 [.618, 1.254]	.905 [.635, 1.290]	.862** [.798,.930]	2.76 3.66

Appendix Table A-5. (*continued*)

Measures	Description	N	Model I	Model II		%
			Mother's Education Only[a]	Mother's Education with Mediator	Mediator	Change in HR
Social Capital 1	Social Bonding (Helpful/Trust)	17,640	.868	.901	.841**	.36
			[.622, 1.211]	[.645, 1.258]	[.775, .912]	
Social Capital 2	Frequent Meeting with Friends	16,344	.892	.895	.985	.36
			[.634, 1.256]	[.635, 1.260]	[.934, 1.040]	
Social Capital 3	Frequent Meeting with Family	16,339	.893	.899	1.035	.67
			[.634, 1.257]	[.638, 1.265]	[.990, 1.082]	
Religious Activity	Frequent Involvement in Religious Activities	26,155	.769+	.766+	.946**	-.39
			[.579, 1.023]	[.576, 1.019]	[.909, .985]	
Optimism about Social Mobility	Optimistic	7,194	.955	.955	1.099	.00
			[.532, 1.715]	[.532, 1.715]	[.955, 1.264]	

+p<.10, * p<.05, ** p<.01

[a]As in the prior models, mother's education is coded as a four category degree variable. Coefficients displayed are for graduate degree (with reference category <HS).
Notes: All models control for age, gender, race, and survey year. Confidence intervals in parentheses. Weighted using survey weights.

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