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Education and the Gender Gaps in Health and Mortality

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Abstract The positive associations between education and health and survival are well established, but whether the strength of these associations depends on gender is not. Is the beneficial influence of education on survival and on self-rated health conditioned by gender in the same way, in opposite ways, or not at all? Because women are otherwise disadvantaged in socioeconomic resources that are inputs to health, their health and survival may depend more on education than will men's. To test this hypothesis, we use data from the National Health Interview Survey-Linked Mortality Files (NHIS-LMF). We find that education's beneficial influence on feeling healthy and on survival are conditional on gender, but in opposite ways. Education has a larger effect on women's self-rated health than on men's, but a larger effect on men's mortality. To further examine the mortality results, we examine specific causes of death. We find that the conditional effect is largest for deaths from lung cancer, respiratory disease, stroke, homicide, suicide, and accidents. Because women report worse health but men's mortality is higher, education closes the gender gap in both health and mortality.

Keywords Education · Gender · Self-rated health · Mortality

Introduction

The positive associations between education and health and survival are well established, but whether the strength of these associations depends on gender is not. Sex

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differences in health are paradoxical. Women report worse health than men, yet they live longer. Do sex differences in the effect of education on health and survival show a similar paradox? To date, no one has examined the question of whether the beneficial influence of education on survival and on self-rated health is conditioned by gender in the same way, in opposite ways, or not at all. We propose that because women are otherwise disadvantaged in socioeconomic resources that are inputs to health, their health and survival will depend more on education than will men's.

Why Are Gender Differences in Education's Effect on Health and Mortality Important?

Increasing educational attainment is key to reducing socioeconomic health disparities (Ross and Mirowsky 2010b). The well-educated have better health and lower mortality as a direct result of education and indirectly by way of employment and income (Hummer and Lariscy 2011; Mirowsky and Ross 2003). Does education have the same beneficial effect on health and survival for both men and women? Gender disparities in health also persist. Are women doubly disadvantaged in terms of health because they have lower levels of self-rated health and because education makes less of a difference to them? Or can education help women overcome their health disadvantage, possibly raising their subjective health to the same high levels as men's? If the latter is the case, education might also help reduce gender disparities in health. The same questions can be asked about gender disparities in mortality. Here, men's disadvantage could be made worse if education makes less of a difference to men's mortality than to women's. On the other hand, men's higher mortality could be reduced and gender disparities lessened if education makes more of a difference to men. If a conditional effect of education exists, will it increase or decrease gender disparities in health and mortality? This is an important question for population health policy.

Gender and Health

Women report worse health than men, despite the fact that they live longer. Women experience more nonfatal illnesses of all kinds throughout life; men experience more life-threatening illnesses that develop with age (Arber 1997; Bird and Rieker 2008; Case and Paxson 2005; Gorman and Read 2006; Ross and Bird 1994; Verbrugge 1985, 1989). Even excluding reproductive conditions, women have more health problems than men. Women have more nonfatal chronic conditions (lasting longer than three months), such as varicose veins, hemorrhoids, constipation, gallbladder conditions, colitis, eczema, dermatitis, chronic bronchitis, asthma, thyroid conditions, chronic sinusitis, ulcers, back pain, headaches, bursitis, and arthritis. Women also have more acute conditions (lasting fewer than three months), such as upper-respiratory infections, gastroenteritis, and other short-term infectious diseases. Men's self-reported health advantage remains over the life course, but it is smallest in later life when men begin to suffer fatal health conditions (Ross and Bird 1994). Men suffer more life-threatening chronic diseases, including coronary heart disease, cancer, stroke, emphysema, cirrhosis, kidney disease, and atherosclerosis, all of which

are leading causes of death (Case and Paxson 2005; Verbrugge 1985, 1989; Waldron 1997). Of the 15 leading causes of death, diabetes is the only one for which women's rates even approach men's. Partly as a result of older men's excess of fatal diseases, men's life expectancy is about six fewer years than women's.

Health problems that women experience may be minor from a medical viewpoint, but they are not so minor in women's daily lives (Ross and Bird 1994). Verbrugge calls this the "iceberg of morbidity": the visible tip of the iceberg is male, but the bulk of it is female (1985). Self-rated health indicates subjective quality of life. Compared with men, women may experience more day-to-day stress associated with socioeconomic disadvantage, such as poorly paying jobs, economic hardship, routine and oppressive work, and low household income, all of which contribute to poor health. However, men may engage in more dangerous and destructive habits, such as smoking, heavy drinking, using guns, getting in fights, or drinking and driving (Arber and Ginn 1993; Ostrove and Adler 1998; Pampel 2002; Ross and Bird 1994; Umberson 1992; Wamala et al. 2001). Men's dangerous lifestyles may contribute more to fatal health problems that result in earlier death, and less to the everyday, nonfatal, stress-related problems that women experience more (Ross and Bird 1994).

Education and Health

By every measure, American adults with higher levels of education enjoy better health and survival than those with lower levels of education. The better-educated feel healthier; suffer fewer aches and pains; have fewer chronic diseases, less psychophysiological distress, and fewer impairments; and live longer (Mirowsky and Ross 2003).

Human Capital

Education is a critical resource in the pathway to health because it is a resource itself, and the human capital that it indicates helps people generate other resources (Mirowsky and Ross 2003, 2005). A resource is something that helps one achieve goals. Good health is a goal that most Americans value. Education has qualities that go beyond those of other resources that help achieve goals because it indicates resourcefulness, or the ability to meet situations effectively. Schooling builds real skills and abilities—"human capital"—on several levels of generality. On the most general level, education teaches people to learn. It develops one's ability to write, communicate, solve problems, analyze data, develop ideas, and make and implement plans. It develops broadly useful analytic skills, such as observing, experimenting, summarizing, synthesizing, interpreting, and so on. In school, one encounters and solves problems that are progressively more difficult, complex, and subtle. The more years of schooling, the greater the cognitive development, characterized by flexible, rational, and complex strategies of thinking. Higher education teaches people to think logically and rationally, see many sides of an issue, and analyze problems and solve them (Hyman et al. 1976; Kingston et al. 2003; Pascarella and Terenzini 1991; Spaeth 1976). It also develops effective habits and attitudes, such as dependability, motivation, effort, trust, and confidence (Kohn and Slomczynski 1993). In particular, the process of learning creates confidence in the ability to solve problems. Education

instills the habit of meeting problems with attention, thought, action, and perseverance. Thus education increases effort, which—like ability—is a fundamental component of problem-solving (Wheaton 1980). Apart from the value of the skills and abilities learned in school, the process of learning builds the confidence, motivation, and self-assurance needed to *attempt* to solve problems. Because education develops competence on many levels, it gives people the ability and motivation to shape and control their lives, achieve their goals, cope actively and flexibly, prevent problems, and prepare for those problems that cannot be prevented (Mirowsky and Ross 1998, 2003, 2007; Wray et al. 1998). In contrast, the poorly educated may not possess the resources necessary to achieve their goals, which produces a sense of powerlessness, fatalism, and helplessness. Education increases learned effectiveness; its absence produces learned helplessness (Mirowsky and Ross 2005).

Resource Substitution

Education may be especially important to the health of people who are otherwise disadvantaged (Mirowsky and Hu 1996; Pampel and Rogers 2004; Ross and Mirowsky 2006, 2010a; Schnittker 2004; Sen 1997). According to the theory of resource substitution, education benefits health most among people with fewer alternative resources (Mirowsky and Ross 2003; Mirowsky et al. 2000; Ross and Mirowsky 2006, 2010a). Resources can substitute for one another; one can fill the gap if the other is absent, and each has less of an effect if the other is present. More resources, alternatives, choices, and options make any one resource less critical. Thus, the very people who need other resources most in order to cope with their disadvantaged conditions or statuses are the least likely to have them.

Gender, Education, and Health

When applied to gender, the resource substitution and human capital perspectives imply that education may be more important to women's health than to men's for the very reason that women have fewer socioeconomic resources of other kinds, such as power, authority, earnings, household income, and wealth. Women face more economic dependency and have restricted opportunities for full-time employment; their work is more routine, less autonomous, and less fulfilling (Epstein 2007; Bird and Rieker 2008; Ross and Bird 1994; Ross and Mirowsky 2006) in large part because women receive fewer labor market returns to education (Kilbourne et al. 1994; Reskin and Padavic 1994). The absence of alternative resources means women are especially dependent on education itself for well-being (Ross and Mirowsky 2006, 2010a; Sen 1997, 1999). Women with low levels of education may suffer more health problems than men for the very reason that they have fewer alternative resources to call on. The theory of resource substitution predicts that education's beneficial effect on health and survival is more positive for women.

Previous Evidence

To date, there is little evidence one way or the other as to whether education has a significantly larger effect on women's health and survival than on men's. Some

research on psychological well-being suggests that education benefits women more than men (Glenn and Weaver 1981; Mirowsky and Ross 2003; Reynolds and Ross 1998; Ross and Mirowsky 2006). There is less research on physical health, some of which finds that education is more important to women's levels of physical impairment than to men's (Ross and Mirowsky 2010a), but some of which is inconclusive (Matthews et al. 1999; Thurston et al. 2005). Furthermore, there is little consensus as to whether education has a significantly larger effect on women's mortality than men's, although there is more research on that topic than there is on health. Kitagawa and Hauser found a larger impact of education on women's mortality than men's (1973), but more recent studies have sometimes found that education is more strongly related to men's mortality (Bassuk et al. 2002; Montez et al. 2009), although only modestly (Zajacova and Hummer 2009). Some found that for deaths from respiratory problems and accidents, education has a larger effect for men (Regidor et al. 2003; Steenland et al. 2002), while others found that education has a larger effect on women's mortality from cardiovascular and cerebrovascular causes, which are two of the three leading causes of death in the United States (Huisman et al. 2005; Regidor et al. 2003). Some found no significant gender differences for most causes (Steenland et al. 2002; Regidor et al. 2003; Avendano et al. 2004) or for all causes (Regidor et al. 2003; Zajacova 2006). To date, the answer to the question, "Do women depend more on education for their health and survival than men?" is inconclusive.[1]

Methods

Data

We used data from the National Health Interview Survey-Linked Mortality Files (NHIS-LMF) (Lochner et al. 2008). The LMF uses a sequential matching scheme based on several identifying variables to link the National Death Index through 2002 to the 1986–2000 cross-sectional waves of the NHIS. The NHIS is an annual household survey using a nationwide sample of the civilian, noninstitutionalized population of the United States. Proportional weights are used to make results representative of the noninstitutionalized U.S. population, and the standard errors are adjusted using SAS 9.2 "proc survey" and Stata 10 "svy" to account for the NHIS's multistage sampling design. The 1986–2002 set of linked NHIS-LMF data allow mortality to unfold across a subsequent period of up to 16 years. They are most appropriate for testing our hypotheses because they include both self-rated health and mortality, and the sheer size of the sample also allows us to examine separate models of cause-specific mortality in addition to all-cause mortality.

We restricted the original 1986–2002 NHIS-LMF sample to respondents age 25 and older (after most people have completed their education), to the representative

[1] Hypotheses derived from resource substitution on other disadvantaged statuses, such as race or parental education, are also somewhat inconclusive. In support of resource substitution, recent evidence shows that personal education has a larger influence on health among persons whose parents were poorly educated than among those from more advantaged family backgrounds (Ross and Mirowsky 2011), but, counter to resource substitution theory, that education has a smaller impact on health among blacks than whites (Williams 1997).

groups of whites, blacks, and Hispanics (eliminating the oversample of Hispanics in 1992), and to respondents with certain NHIS-LMF matches. The resulting sample size is 891,772. Table 1 presents descriptive statistics for men and women.

Measurement and Analytic Strategy

Self-reported Health

Self-reported health is measured in response to the question, "How good is your health: poor, fair, good, very good, or excellent?" We reverse-coded self-rated health to be consistent with mortality so that high scores indicate worse health. On a scale of 1–5, in which 5 is poor health, the overall mean score is 2.277. The mean is 2.203 for men, and 2.340 for women in the 1986–2002 NHIS-LMF sample, as shown in Table 1. Table 1 shows that larger proportions of women described their health as only "good," "fair," or "poor" compared with men, and a much larger proportion of the men rated their health as "excellent."

To determine whether education affects self-rated health differently for men and women, we predicted health from female gender (female = 1; male = 0), education, and their interaction. Our analysis uses ordered logistic regression.[2] We scored education in two ways: (1) in number of years of schooling completed, and (2) as a series of categories from less than 8th grade through a master's degree or higher (less than 8th grade, 8th grade to 12th grade, high school diploma, some college, bachelor's degree (reference category), and master's degree or higher, with each category dichotomized). The mean educational attainment in the sample is 12.476: 12.609 for men, and 12.361 for women. The left panel of Table 2 predicting poorer self-rated health shows years of schooling, and the right panel shows categorical schooling. Resource substitution predicts a negative interaction between female gender and education. The easiest way to see whether this hypothesis is supported is to look at a single interaction between years of schooling and gender. However, because the association between education and self-reported health may not be completely linear, we also show categorical education and its interactions with gender.

Model 1 adjusts for precursors or concomitants of education, including age (scored in number of years, with a mean of 48.5), cohort (scored as year of birth, ranging from 1880 to 1975, with a mean of 1944), race/ethnicity (which compares non-Hispanic blacks and Hispanics to the reference category of non-Hispanic white), and whether a proxy responded to the survey (proxy = 1; not a proxy = 0). Age, cohort, and years of education are centered on their means in the regression analyses. The interaction of age with female gender tests the idea that the gap in self-rated health between men and women diminishes with age. Model 2 adds further adjustments for potential socioeconomic mediators of education's conditional effect, including household income (less than $20,000; $20,000–$34,999; $35,000–$50,000; and more than

[2] Ordered logistic regression is a proportional-odds model, in that it assumes the effect of a predictor on the log odds of reporting a higher category over all lower categories is the same across all possible higher-lower comparisons. This assumption of "parallel regression" was tested for education's effect on self-rated health by running separate binary logistic regression models of all possible higher-lower categorical comparisons, and was found to be satisfactory.

Table 1 Descriptive statistics for men and women, NHIS-LMF 1986–2002

	Men		Women	
	Mean/Proportion	SD	Mean/Proportion	SD
Age	47.754	15.661	49.181	16.712
Year of Birth	1944.94	16.154	1943.46	17.197
Non-Hispanic Black	.109	.312	.136	.343
Non-Hispanic White	.784	.412	.758	.428
Hispanic	.107	.309	.105	.307
Self-reported Entirely	.397	.489	.588	.492
Self-reported Some	.065	.246	.040	.195
Proxy	.292	.455	.130	.337
Missing Reporting Status	.246	.431	.242	.428
Less Than $20,000	.212	.409	.279	.448
$20,000–$34,999	.221	.415	.207	.405
$35,000–$49,000	.177	.382	.154	.361
$50,000+	.233	.423	.196	.397
Missing Income	.157	.364	.165	.371
Employed	.743	.437	.553	.497
Unemployed	.028	.165	.025	.155
Not in Labor Force	.229	.420	.423	.494
Missing Employment Status	.194	.396	.343	.475
Married	.751	.433	.631	.483
Not Married	.248	.432	.367	.482
Missing Marital Status	.001	.038	.002	.040
Education				
Years of schooling	12.609	3.282	12.361	3.037
Less than 8th grade	.066	.248	.061	.239
8th grade to 12th grade	.155	.362	.164	.370
High school	.340	.474	.381	.486
Some college	.201	.401	.211	.408
Bachelor's degree	.155	.362	.130	.337
Master's degree +	.083	.276	.052	.223
Health				
Poorer health	2.203	1.125	2.340	1.124
Poor health	.040	.197	.042	.200
Fair health	.091	.287	.111	.315
Good health	.241	.428	.276	.447
Very good health	.288	.453	.287	.453
Excellent health	.340	.474	.284	.451
Mortality				
Deceased	.138	.345	.118	.323
Cancer (not lung)	.182	.386	.192	.394
Lung cancer	.093	.290	.062	.241

Table 1 (continued)

	Men		Women	
	Mean/Proportion	SD	Mean/Proportion	SD
Respiratory disease	.095	.293	.091	.287
Diabetes	.026	.158	.033	.178
Heart disease	.331	.471	.322	.467
Stroke	.054	.227	.082	.275
Liver disease	.013	.114	.008	.092
Infectious disease	.015	.121	.017	.092
Accident	.034	.181	.023	.149
Homicide	.005	.069	.002	.048
Suicide	.015	.121	.004	.066
Other	.138	.345	.164	.370
N	412,506		479,266	

Note: Specific causes of mortality reflect the proportion of death attributable to that cause ($N = 56{,}804$ for men, and $N = 56{,}567$ for women), not the proportion of the sample experiencing that specific cause of mortality.

$50,000 (the reference category)); employment status (which compares unemployed and not in the labor force (homemakers, retirees, and those unable to work because of illness or disability) to the reference category of employed); and marital status (married = 0; not married = 1). Missing data are assigned to the modal category, and a missing "flag" is included (missing = 1; not missing = 0), an approach that yields the same substantive results as alternative analyses using listwise deletion of missing data.

Mortality

To analyze whether education affects mortality differently for men and women, we used Cox regression models. We first analyzed all-cause mortality, and then we used competing events analyses to investigate 11 specific causes of death: lung cancer, other cancer, heart disease, respiratory disease, diabetes, stroke, liver disease, infectious diseases, accidents, homicide, and suicide, all of which are among the top 15 leading causes of death in the United States.

For all models, we rank ordered the timing of death or censorship by using the time survived since the survey date. Survival times were estimated from calculated age at the time of the survey and calculated age at death or censorship. Because the precision of age was estimated only at quarter-year, we did not have measures of true continuous survival times. As such, event ties were plentiful and were handled using the Efron technique of approximation.

Just as we did in our self-reported health models, we predicted the hazard of dying from female gender, education scored in two ways (as years of schooling, and as categories of schooling), and the interaction between education and female gender, adjusting for the precursors of age, cohort, race/ethnicity, and proxy reporting status

Table 2 Ordered log odds of poorer self-reported health, NHIS-LMF 1986–2000

	Years of Schooling		Categorical Education	
	1	2	1	2
Female	.142 (.004) ***	.039 (.006) ***	.091 (.011) ***	−.003 (.011)
Years of schooling	−.161 (.001) ***	−.122 (.001) ***		
Female × Years of schooling	−.011 (.001) ***	−.007 (.001) ***		
Education (BA/BS)				
Less than 8th grade			1.651 (.020) ***	1.274 (.019) ***
8th to 12th grade			1.288 (.013) ***	.985 (.013) ***
High school graduate			.743 (.010) ***	.586 (.010) ***
Some college			.430 (.010) ***	.349 (.010) ***
MA+			−.263 (.015) ***	−.186 (.015) ***
Female × Less than 8th grade			.137 (.020) ***	.118 (.020) ***
Female × 8th to 12th grade			.146 (.015) ***	.109 (.015) ***
Female × High school			.027 (.012) *	.019 (.012)
Female × Some college			.009 (.014)	.010 (.014)
Female × MA+			.111 (.020) ***	.126 (.020) ***
Controls				
Age	.047 (.001) ***	.048 (.001) ***	.048 (.001) ***	.048 (.001) ***
Cohort	.012 (.001) ***	.022 (.001) ***	.013 (.001) ***	.022 (.001) ***
Non-Hispanic black (non-Hispanic white)	.544 (.013) ***	.444 (.013) ***	.534 (.013) ***	.437 (.013) ***
Hispanic	.076 (.012) ***	.024 (.011)	.124 (.012) ***	.059 (.011) ***
Proxy (self-reported survey)	−.068 (.006) ***	.080 (.006) ***	−.062 (.006) ***	.083 (.006) ***
Self-reported some of survey	.026 (.010)	.116 (.010) ***	.032 (.010) ***	.119 (.011) ***
Missing reporting status	−.110 (.012) ***	−.045 (.012) *	−.087 (.012) ***	−.026 (.012) *
Female × Age	−.008 (.000) ***	−.009 (.000) ***	−.009 (.000) ***	−.009 (.000) ***

Table 2 (continued)

	Years of Schooling		Categorical Education	
	1	2	1	2
Mediators				
<$20 K ($50 K+)		.772 (.010) ***		.741 (.010) ***
$20–35 K		.404 (.009) ***		.379 (.009) ***
$35–50 K		.248 (.009) ***		.233 (.009) ***
Missing income		.373 (.011) ***		.354 (.011) ***
Unemployed (employed)		.532 (.018) ***		.517 (.018) ***
Not in labor force		.550 (.011) ***		.544 (.011) ***
Missing employment status		.049 (.012) *		.058 (.012) *
Not married (married)		.036 (.006) **		.043 (.006) **
Missing marital status		.048 (.062)		.051 (.062)
Intercept Five	−3.635 (.011)	−4.282 (.011)	−4.293 (.013)	−4.781 (.013)
Intercept Four	−2.157 (.008)	−2.777 (.009)	−2.823 (.011)	−3.281 (.012)
Intercept Three	−.554 (.007)	−1.126 (.009)	−1.218 (.010)	−1.629 (.011)
Intercept Two	.821 (.008)	.281 (.009)	.164 (.010)	−.218 (.011)
N	891,772	891,772	891,772	891,772

Notes: Age is calculated from reported birth date and recorded time of interview (centered on mean of 48.5). *Cohort* is centered on mean year of birth of 1944. *Years of schooling* is centered on mean of 12.476 years.

*$p < .05$; **$p < .01$; ***$p < .001$

in Model 1. Years of schooling is shown in the left panel of Table 3, and categorical education is presented on the right. The basic test of the hypothesis is shown in the left panel of Table 3. Model 2 adds potential mediators of household income, employment status, and marital status. The mortality analyses further specify self-rated health (Model 3) and the health by gender interactions (Model 4) as additional mediators of the effect of education on men's and women's mortality. This interaction tests the idea that self-rated health has a larger influence on men's mortality than on women's.

Separate competing-risk Cox regression models were then run for 11 underlying causes of death. Competing-risk models calculate type-specific hazards by stipulating that only one cause of death counts as a positive event outcome, while the occurrence of any other cause of death removes the respondent from risk. Consequently, for all competing-risk models, all survivors of the follow-up period and all respondents who died from causes other than the specific cause of interest were censored. We show only the model that includes education (scored two ways), female gender, and their interactions, adjusting for age and its interaction with gender, cohort, race/ethnicity, and proxy status. This is the equivalent to Model 1 in the all-cause mortality analysis. Table 4 presents the larger positive interactions, and Table 5 shows the smaller, null, or negative interactions.

Results

Poor Self-rated Health

Women report worse health than men, the well-educated report better health than the poorly educated, and the interaction between gender and education indicates that education has a significantly larger effect on women's health than on men's. To facilitate comparison with the mortality analysis, self-rated health is scored so that high scores indicate poor health. In the left panels of Table 2, years of education is centered on its mean, so the coefficient associated with gender can be interpreted as the effect at the mean level of education. There is a positive coefficient associated with being female, a negative coefficient associated with years of schooling, and a negative interaction between schooling and female gender, all of which are significant at the .001 level ($t > 3.29$).[3] Because education has a larger effect on women's self-reported health, the gender gap in poor health closes as education levels increase. Figure 1 illustrates this result. At eight or fewer years of schooling, women are 1.25 times more likely to report poorer health than men. At the college level, they are only 1.09 times more likely. At the college degree level, the gender gap in self-rated heath is vanishingly small. Education matters more for women, which supports resource substitution.

Results in Table 2 also show that the gender gap in poor health closes with age. Older people report worse health, females report worse health, and the interaction between age and female gender is negative. At older ages, women's reports of poor health converge with men's.

[3] All coefficients noted as significant at $p < .001$ ($t > 3.29$) in fact have t values greater than 3.7 $\sqrt{\ln(n)}$, which has been suggested as a conservative test of significance.

Table 3 Cox regression models of all-cause Mortality, NHIS-LMF 1986–2002

	Years of Schooling				Categorical Education			
	1	2	3	4	1	2	3	4
Female	−.487 ***	−.595 ***	−.593 ***	−.594 ***	−.418 ***	−.545 ***	−.550 ***	−.556 ***
	(.011)	(.011)	(.011)	(.011)	(.022)	(.022)	(.023)	(.023)
Years of schooling	−.047 ***	−.025 ***	−.007 ***	−.005 ***				
	(.001)	(.001)	(.001)	(.001)				
Female × Years of schooling	.011 ***	.005 **	.008 ***	.006 **				
	(.002)	(.002)	(.002)	(.002)				
Education (BA/BS)								
<8th grade					.556 ***	.333 ***	.100 ***	.090 ***
					(.021)	(.021)	(.021)	(.021)
8th to 12th grade					.525 ***	.340 ***	.183 ***	.176 ***
					(.017)	(.018)	(.018)	(.018)
High school graduate					.336 ***	.218 ***	.127 ***	.123 ***
					(.017)	(.017)	(.017)	(.017)
Some college					.245 ***	.177 ***	.124 ***	.122 ***
					(.018)	(.018)	(.018)	(.018)
MA+					−.126 ***	−.055 *	−.470 †	−.046 †
					(.024)	(.024)	(.024)	(.025)
Female × < 8th grade					−.135 ***	−.078 **	−.091 **	−.071 *
					(.029)	(.028)	(.029)	(.030)
Female × 8th to 12th grade					−.100 ***	−.066 **	−.068 **	−.054 *
					(.025)	(.025)	(.025)	(.025)
Female × High school graduate					−.096 ***	−.066 **	−.055 *	−.047 †
					(.024)	(.024)	(.025)	(.025)

Table 3 (continued)

	Years of Schooling				Categorical Education			
	1	2	3	4	1	2	3	4
Female × Some college					−.098 ***	−.077 **	−.062 *	−.058 *
					(.027)	(.027)	(.027)	(.027)
Female × MA+					.041	.024	.034	.031
					(.044)	(.044)	(.045)	(.045)
Controls								
Age	.083 ***	.075 ***	.072 ***	.072 ***	.083 ***	.075 **	.072 ***	.072 ***
	(.001)	(.001)	(.002)	(.002)	(.001)	(.001)	(.002)	(.002)
Cohort	.002	.005 **	.003	.003 †	.002	.004 **	.002 †	.003 †
	(.001)	(.001)	(.001)	(.014)	(.001)	(.001)	(.001)	(.001)
Non-Hispanic black (white)	.181 ***	.118 ***	.027 *	.027 *	.197 ***	.128 ***	.035 **	.036 **
	(.012)	(.012)	(.013)	(.013)	(.012)	(.012)	(.013) †	(.013)
Hispanic	−.144 ***	−.156 ***	−.167 ***	−.165 ***	−.096 ***	−.127 ***	−.146 ***	−.146 ***
	(.016)	(.015)	(.015)	(.015)	(.016)	(.012)	(.016)	(.016)
Proxy (self-reported survey)	−.121 ***	.024 *	−.008	−.001	−.116 ***	.025 *	−.003	−.002
	(.010)	(.010)	(.010)	(.010)	(.009)	(.010)	(.010)	(.010)
Self-reported some of survey	−.039 **	.053 ***	.023	.024 †	−.036 **	.053 ***	.022 †	.023 †
	(.013)	(.013)	(.013)	(.013)	(.013)	(.013)	(.013)	(.013)
Don't know reporting status	.010	−.048 *	−.048 *	−.047 *	.015	−.044 *	−.047 *	−.047 *
	(.016)	(.022)	(.023)	(.023)	(.016)	(.022)	(.023)	(.023)
Female × Age	.002 ***	.001 †	.001 *	.001 **	.001 **	.001	.001 †	.001 *
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)

Table 3 (continued)

	Years of Schooling				Categorical Education			
	1	2	3	4	1	2	3	4
Mediators								
<$20 K ($50 K+)		.427 ***	.287 ***	.281 ***		.385 ***	.245 ***	.244 ***
		(.015)	(.015)	(.015)		(.015)	(.015)	(.015)
$20–35 K		.275 ***	.208 ***	.203 ***		.241 ***	.172 ***	.172 ***
		(.014)	(.014)	(.014)		(.014)	(.014)	(.014)
$35–50 K		.160 ***	.120 ***	.118 ***		.139 ***	.098 ***	.098 ***
		(.016)	(.016)	(.016)		(.016)	(.016)	(.016)
Missing income		.272 ***	.170 ***	.166 ***		.239 ***	.137 ***	.136 ***
		(.015)	(.015)	(.015)		(.015)	(.015)	(.015)
Unemployed (employed)		.459 ***	.348 ***	.354 ***		.451 ***	.35 ***	.349 ***
		(.031)	(.031)	(.031)		(.031)	(.031)	(.031)
Not in labor force		.599 ***	.429 ***	.433 ***		.592 ***	.430 ***	.429 ***
		(.023)	(.024)	(.023)		(.023)	(.023)	(.023)
Missing employment		−.113 ***	−.108 ***	−.111 ***		−.111 ***	−.110 ***	−.110 ***
		(.022)	(.023)	(.023)		(.022)	(.022)	(.022)
Not married (married)		.219 ***	.240 ***	.242 ***		.224 ***	.245 ***	.245 ***
		(.008)	(.008)	(.008)		(.008)	(.008)	(.008)
Missing marital status		−.198	−.257	−.264 †		−.196	−.265 †	−.265 †
		(.125)	(.151)	(.151)		(.126)	(.153)	(.153)

Table 3 (continued)

	Years of Schooling				Categorical Education			
	1	2	3	4	1	2	3	4
Health (poor = 5)								
Poorer health			.319 ***	.334 ***			.322 ***	.332 ***
			(.004)	(.005)			(.004)	(.005)
Female × Poorer health				−.021 **				−.020 ***
				(.006)				(.006)
N	891,772	891,772	891,772	891,772	891,772	891,772	891,772	891,772

Notes: Age is calculated from reported birth date and recorded time of interview (centered on mean of 48.5). *Cohort* is centered on mean year of birth of 1944. *Years of schooling* is centered on a mean of 12.5 years, and *poorer health* is centered on a mean of 2.7. Model 1 includes gender, education, the two-way effect between education and gender, and basic controls. Model 2 includes the effects of income, employment, and marital status. Model 3 adds poor health, and Model 4 adds the two-way effect between poor health and gender.

$^{\dagger}p < .10$; $*p < .05$; $**p < .01$; $***p < .001$

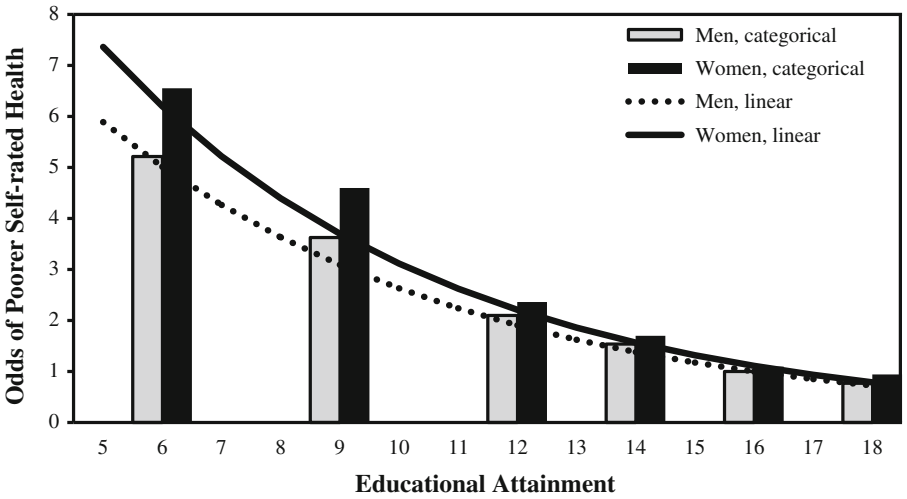

Fig. 1 Fitted poor self-reported health for men and women across education. Odds are derived from adjusted Model 1 estimates. All variables are centered on mean values except education and gender

Years of schooling has a negative association with poor health, and this association is significantly larger for women than for men. Is there a certain credential, or degree, that mostly accounts for these conditional associations? The right panels of Table 2 show categories of education. They show that every increment in schooling is associated with significantly better self-reported health. Compared with having a college degree (the comparison category), all other categories are associated with worse health except for those with a master's degree or higher, who report better health. The higher the degree, the more similar men's and women's reports of their health: the biggest improvement in health for women appears with the attainment of a high school diploma.[4]

Adjustment for socioeconomic mediators is shown in Model 2 of Table 2. The left panels show that years of education and its interaction with gender are reduced in size but remain significant, indicating that some (but not all) of the influence of education on men's and women's health is indirect, attributable to income, employment, and (to a lesser extent) marriage. The unemployed and people who are not in the labor force report significantly worse health than the employed; persons with low household incomes report significantly worse health than those with higher incomes; and married persons report somewhat better health than the nonmarried. The right panels of Table 2 again show that education and its interactions with gender are reduced

[4] The one exception is that compared with having a college degree, having a master's degree or more does not continue to close the gender gap but rather re-opens it somewhat. Master's degrees or higher do not benefit women's health very much. However, caution should be taken in interpreting this because the education measure is truncated at master's level and higher, and this category probably contains differences in the educational attainment of men and women, with the men more likely to have achieved an M.D., J.D., or Ph.D. and the women more likely to be in the master's category. Other research has shown a leveling off in the health benefits of a master's degree compared with a bachelor of arts degree, but a substantial health benefit to more advanced degrees (Ross and Mirowsky 1999), possibly because master's degree fields such as social work or nursing (typically attained by women) do not translate into high-status jobs that pay well. These data do not allow us to make the distinction between master's degrees and more-advanced degrees.

somewhat with adjustment for income, employment, and marital status, but remain significant. Interestingly, they also show that with adjustment for income, employment, and marital status, women with a college degree do not report significantly worse health than men. On a final note of interest, more recent cohorts report worse health than older cohorts.

All-Cause Mortality

Women have lower mortality than men, the well-educated have lower mortality than the poorly educated, and the interaction between gender and education indicates that education has a significantly larger effect on men's mortality than on women's. The coefficient associated with being female is negative, the coefficient associated with years of schooling is negative, and the interaction is positive. All are significant. Men's higher likelihood of dying compared with women decreases with education. This does not support the theory of resource substitution. Because education has a larger influence on men's mortality than women's, the gender gap in mortality is smallest at high levels of education.

The interaction between female gender and education shows opposite signs for self-rated health as for mortality. This translates into a narrowing gender gap at high levels of education for both health and mortality. The mortality results are illustrated in Fig. 2, based on a cumulative log-log, or "clog-log," model, which is most appropriate for graphing (Singer and Willett 2003).

Years of schooling reduces mortality, and this association is significantly smaller for women than for men. Is there a degree that mostly accounts for these conditional associations? The right panels of Table 3 show categories of education. They show that every increment in schooling is associated with significantly lower mortality. Compared with having a college degree, all other categories are associated with higher mortality (except for a master's degree or higher) in a fairly linear fashion. The biggest gain, especially for men, appears with the attainment of a college degree. Men with less than a college degree have much higher mortality than women, but men with a college degree do not. The higher the degree, the more similar men's and women's mortality are.

Model 2 adds potential socioeconomic mediators to the equation: household income, employment, and marital status. Their adjustment reduces the conditional influence of education on men's and women's mortality. Persons who are employed and have higher income have significantly lower mortality than the nonemployed and those with lower incomes. Nonmarried persons have higher mortality than the married.

Models 3 and 4 add poor health and its interaction with gender to the equation. Poor health is significantly associated with mortality, and because women report worse health than men, its addition to the equation actually slightly increases the gendered association of education with mortality. However, with the addition of the interaction between health and gender in Model 4, the interaction between education and gender closes a little. This is due to the fact that poor health has a larger association with mortality among men than among women, which is consistent with the view that women experience more nonfatal health problems (and men have more fatal problems).

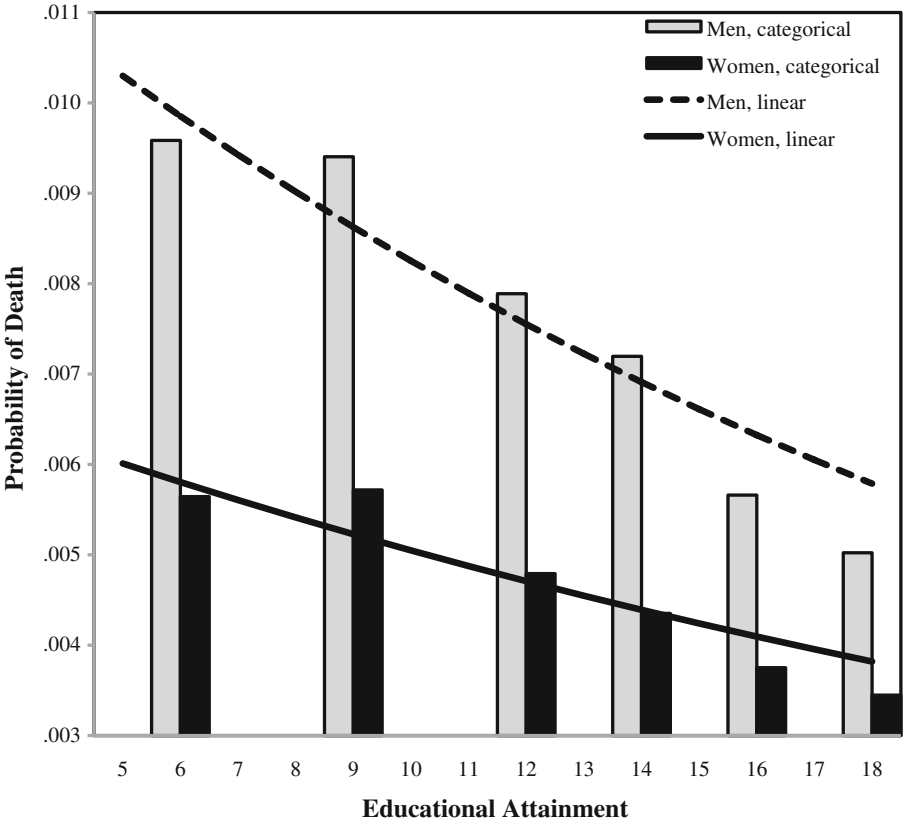

Fig. 2 Fitted all-cause mortality risk for men and women across education. Probability is derived from adjusted Model 1 estimates using clog-log discrete-time hazards. All variables are centered on mean values except education and gender

Cause-Specific Mortality

Because the overall mortality results do not support our hypothesis, we further examine deaths from 11 specific underlying causes. Tables 4 and 5 show summary results, equivalent to Model 1 in Table 3. Causes of death are ordered by the size of the interaction between gender and education. We tested the "size" of the gender by education interaction term as the percentage change in the gap between men's and women's mortality from the lowest education category (<8th grade) to the highest category (master's degree or higher). The largest interactions indicating a greater impact of education among men are, in order, as follows: lung cancer, respiratory disease (such as emphysema), stroke, suicide, homicide, and accidents. Assessing the size simply as the size of the interaction coefficient of female gender by years of schooling produces an order of suicide, homicide, lung cancer, respiratory disease, accidents, and stroke. Even though the size of the coefficients associated with the interaction terms for suicide and homicide are among the larger ones, the interactions are marginally significant for homicide (perhaps because there are only 404 homicide deaths), and suicide with 1,095 deaths. (In comparison, there are 37,003 heart disease

Table 4 Cox regression of cause-specific mortality with larger gender × education effects

	Lung Cancer		Respiratory Disease		Stroke		Suicide		Homicide		Accidents	
	Years	Categorical	Years	Categorical	Years	Categorical	Years	Categorical	Years	Categorical	Years	Categorical
Female	−.530 ***	−.395 ***	−.260 ***	−.121	−.266 ***	−.082	−1.487 ***	−1.619 ***	−.854 ***	−.745	−.800 ***	–0.504 ***
	(.030)	(.086)	(.044)	(.090)	(.052)	(.097)	(.085)	(.251)	(.137)	(.454)	(.048)	(.133)
Schooling (12.5)	−.077 ***		−.070 ***		−.039 ***		−.047***		–0.123 ***		−.076 ***	
	(.004)		(.004)		(.005)		(.012)		(.017)		(.007)	
Female × Schooling	.042 ***		.033 ***		.028 ***		.054 *		.051 †		.031 **	
	(.007)		(.006)		(.007)		(.027)		(.030)		(.011)	
Education (BA)												
<8th grade		.966 ***		.876 ***		.519 ***		.485 *		1.477 ***		.984 ***
		(.079)		(.073)		(.084)		(.192)		(.293)		(.117)
8th to 12th grade		.871 ***		.770 ***		.535 ***		.496 ***		1.198 ***		.795 ***
		(.066)		(.066)		(.076)		(.147)		(.252)		(.101)
High school graduate		.584 ***		.496 ***		.389 ***		.300 *		.611 *		.607 ***
		(.065)		(.063)		(.071)		(.133)		(.245)		(.093)
Some college		.401 ***		.368 ***		.180 *		.064		.331		.475 ***
		(.071)		(.073)		(.087)		(.142)		(.275)		(.103)
MA+		−.174 †		−.148 †		.034		−.046		−.319		−.169
		(.103)		(.101)		(.108)		(.202)		(.446)		(.144)
Female × <8 years		−.586 ***		−.378 ***		−.373 ***		−.488		−.644		−.452 *
		(.118)		(.106)		(.115)		(.497)		(.588)		(.181)
Female × 8th to 12th grade		−.268 **		−.267 **		−.274 **		−.354		−.285		−.295 †
		(.101)		(.099)		(.104)		(.348)		(.497)		(.158)
Female × High school graduate		−.133		−.139		−.259 *		.158		−.109		−.447 **
		(.096)		(.098)		(.103)		(.267)		(.460)		(.144)
Female × Some college		−.110		−.148		−.098		.527 *		.046		−.302 †
		(.105)		(.108)		(.112)		(.264)		(.526)		(.169)

Table 4 (continued)

	Lung Cancer		Respiratory Disease		Stroke		Suicide		Homicide		Accidents	
	Years	Categorical	Years	Categorical	Years	Categorical	Years	Categorical	Years	Categorical	Years	Categorical
Female × MA+		−.069		−.033		.000		.312		.053		.162
		(.188)		(.160)		(.163)		(.482)		(.947)		(.257)
Controls												
Age	.066 ***	.066 ***	.113 ***	.113 ***	.107 ***	.108 ***	.005	.005	−.093 ***	−.092 ***	.038 ***	.039 ***
	(.005)	(.005)	(.005)	(.005)	(.005)	(.005)	(.014)	(.014)	(.021)	(.021)	(.008)	(.008)
Cohort	−.003	−.003	.008 †	.008 †	.003	.003	−.005	−.005	−.062 **	−.060 **	.015 †	.015 †
	(.005)	(.005)	(.004)	(.004)	(.005)	(.005)	(.014)	(.014)	(.020)	(.020)	(.008)	(.008)
Black (white)	.060	.088 *	−.348 ***	−.315 ***	.210 ***	.227 ***	−.875 ***	−.876 ***	1.551 ***	1.520 ***	.114 †	.108 †
	(.041)	(.041)	(.040)	(.040)	(.038)	(.037)	(.135)	(.135)	(.123)	(.123)	(.065)	(.065)
Hispanic	−.747 ***	−.667 ***	−.473 ***	−.399 ***	−.057	−.016	−.438 **	−.409 **	1.113 ***	1.120 ***	.078	.111
	(.085)	(.085)	(.056)	(.056)	(.067)	(.068)	(.145)	(.146)	(.148)	(.152)	(.074)	(.074)
Proxy (self-report)	−.131 ***	−.127 ***	−.134 ***	−.126 ***	−.111 **	−.106 **	−.369 ***	−.374 ***	.083	.084	−.128 *	–0.124 *
	(.031)	(.031)	(.031)	(.031)	(.039)	(.039)	(.081)	(.081)	(.128)	(.128)	(.052)	(.052)
Self-report some	−.081 †	−.080 †	.030	.034	−.065	−.063	−.391 **	−.398 **	−.001	−.003	−.087	−.087
	(.048)	(.048)	(.048)	(.047)	(.056)	(.056)	(.131)	(.131)	(.226)	(.225)	(.078)	(.078)
D.K. reporting status	.006	.015	.001	.011	.106 †	.111 †	−.103	−.097	.547 *	.550 *	.002	.006
	(.041)	(.054)	(.050)	(.050)	(.057)	(.057)	(.145)	(.144)	(.210)	(.209)	(.088)	(.089)
Female × Age	−.013 ***	−.014 ***	−.011 ***	−.011 ***	.007 **	.006 **	−.017 **	−.016 **	.012	.011	.018 ***	.017 ***
	(.001)	(.001)	(.002)	(.002)	(.002)	(.002)	(.006)	(.006)	(.009)	(.009)	(.003)	(.003)
Deaths	8,765	8,765	10,512	10,512	7,727	7,727	1,095	1,095	404	404	3,216	3,216
N	891,772	891,772	891,772	891,772	891,772	891,772	891,772	891,772	891,772	891,772	891,772	891,772

Notes: Age is calculated from reported birth date and time of interview (centered on a mean of 48.5). Cohort is centered on mean year of birth of 1944, and education is centered on 12.5. Numbers in parentheses are standard errors.

†$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$

Table 5 Cox regression of cause-specific mortality with null or reversed gender × education effects

	Liver Disease		Infectious Disease		Cancer		Other		Heart Disease		Diabetes	
	Years	Categorical	Years	Categorical	Years	Categorical	Years	Categorical	Years	Categorical	Years	Categorical
Female	−.809 ***	−.819 ***	−.436 ***	−.369 †	−.011	.021	−.517 ***	−.457 ***	−.813 ***	−.831 ***	−.126 *	−.399 *
	(.070)	(.274)	(.076)	(.198)	(.020)	(.046)	(.032)	(.064)	(.023)	(.044)	(.056)	(.177)
Schooling (12.5)	−.056 ***		−.054 ***		−.023 ***		−.036 ***		−.044 ***		−.046 ***	
	(.010)		(.010)		(.003)		(.004)		(.002)		(.008)	
Female × Schooling	.018		.017		.007		.005		−.003		−.034 ***	
	(.017)		(.015)		(.004)		(.005)		(.003)		(.010)	
Education (BA)												
< 8 years		.687 ***		.612 ***		.291 ***		.424 ***		.488 ***		.583 ***
		(.196)		(.166)		(.047)		(.057)		(.036)		(.133)
8th to 12th grade		.895 ***		.515 ***		.306 ***		.384 ***		.473 ***		.650 ***
		(.172)		(.143)		(.041)		(.050)		(.032)		(.123)
High school graduate		.599 ***		.314 *		.234 ***		.234 ***		.279 ***		.465 ***
		(.166)		(.139)		(.040)		(.046)		(.030)		(.117)
Some college		.710 ***		.194		.181 ***		.257 ***		.159 ***		.410 **
		(.184)		(.144)		(.045)		(.051)		(.033)		(.123)
MA+		−.149		−.341		−.014		−.114		−.189 ***		−.130
		(.216)		(.224)		(.055)		(.067)		(.045)		(.182)
Female × < 8th grade		−.112		−.274		−.113 †		−.101		.067		.578 **
		(.344)		(.249)		(.069)		(.076)		(.051)		(.210)
Female × 8th to 12th grade		−.056		−.032		−.068		−.038		.042		.459 *
		(.305)		(.224)		(.056)		(.069)		(.047)		(.201)
Female × High school graduate		.013		−.067		−.020		−.063		−.028		.303
		(.296)		(.213)		(.053)		(.067)		(.046)		(.191)
Female × Some college		−.066		−.301		−.080		−.155 *		.004		−.052
		(.317)		(.257)		(.061)		(.077)		(.053)		(.201)

Table 5 (continued)

	Liver Disease		Infectious Disease		Cancer		Other		Heart Disease		Diabetes	
	Years	Categorical	Years	Categorical	Years	Categorical	Years	Categorical	Years	Categorical	Years	Categorical
Female × MA+		.238		.374		−.008		−.027		.094		.293
		(.430)		(.375)		(.093)		(.111)		(.080)		(.305)
Controls												
Age	.018	.019 †	.113 ***	.114 ***	.081 ***	.081 ***	.100 ***	.100 ***	.080 ***	.080 ***	.121 ***	.121 ***
	(.013)	(.013)	(.011)	(.011)	(.003)	(.003)	(.004)	(.004)	(.002)	(.002)	(.009)	(.009)
Cohort	−.013	−.013	.045 ***	.045 ***	.001	.001	.022 ***	.022 ***	−.013 ***	−.013 ***	.045 ***	.045 ***
	(.013)	(.013)	(.011)	(.011)	(.003)	(.003)	(.004)	(.004)	(.002)	(.002)	(.008)	(.009)
Black (white)	.111	.122	.653 ***	.663 ***	.193 ***	.205 ***	.369 ***	.382 ***	.162 ***	.182 ***	.666 ***	.685 ***
	(.110)	(.109)	(.067)	(.066)	(.023)	(.023)	(.028)	(.028)	(.020)	(.020)	(.052)	(.052)
Hispanic	.676 ***	.750 ***	.209 *	.259 *	−.112 ***	−.080 *	−.056	−.017	−.237 ***	−.179 ***	.536 ***	.617 ***
	(.084)	(.082)	(.105)	(.104)	(.031)	(.032)	(.035)	(.036)	(.031)	(.030)	(.079)	(.068)
Proxy (self-report)	−.296 **	−.286 **	−.140 †	−.134 †	−.051 **	−.050 **	−.115 ***	−.108 ***	−.146 ***	−.138 ***	−.119 *	−.108 †
	(.087)	(.086)	(.073)	(.073)	(.022)	(.022)	(.024)	(.024)	(.016)	(.016)	(.056)	(.056)
Self-report some	−.353 **	−.350 **	−.050	−.046	−.047	−.047	.011	.015	−.032	−.027	−.021	−.012
	(.132)	(.132)	(.114)	(.114)	(.030)	(.030)	(.036)	(.036)	(.025)	(.025)	(.078)	(.078)
D.K. reporting status	.036	.033	−.006	.003	−.003	.001	.050	.053	.009	.016	−.062	−.054
	(.138)	(.137)	(.109)	(.109)	(.034)	(.034)	(.039)	(.039)	(.028)	(.028)	(.092)	(.092)
Female × Age	.012 **	.011 **	.006 †	.006	−.020 ***	−.020 ***	.011 ***	.011 ***	.010 ***	.010 ***	−.010 ***	−.011 ***
	(.004)	(.004)	(.004)	(.004)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.002)	(.002)
Deaths	1,224	1,224	1,802	1,802	21,201	21,201	17,104	17,104	37,003	37,003	3,318	3,318
N	891,772	891,772	891,772	891,772	891,772	891,772	891,772	891,772	891,772	891,772	891,772	891,772

Notes: Age is calculated from reported birth date and time of interview (centered on a mean of 48.5). Cohort is centered on mean year of birth of 1944, and education is centered on 12.5. Numbers in parentheses are standard errors.

†$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$

deaths.) Interactions of education and gender are small and nonsignificant for liver disease, infectious disease, cancer (other than lung), and heart disease. There is essentially no gender difference in the effect of education on heart disease mortality. Interestingly, diabetes shows a moderately large, significant interaction in the other direction: education has a larger effect for women than men. Diabetes is the only cause of death among the top 15 for which women's risk approaches men's. Like self-rated health, and unlike most causes of death, education has a larger effect on women's deaths from diabetes than it does on men's.

Discussion

Education's beneficial influence on feeling healthy and on survival are conditional on gender, but in opposite ways. Education has a larger effect on women's self-rated health than on men's. Education has a larger effect on men's mortality than on women's. This conditional effect is largest for deaths from lung cancer, respiratory disease, stroke, homicide, suicide, and accidents. Even though the conditional association of education is opposite for health than it is for mortality, education closes the gender gap in both because women report worse health but men have higher mortality.

Significant But Meaningless?

Our results show that education matters more for women's health but more for men's mortality. These opposite conditional effects of education are statistically significant, but are they meaningful? With such a large sample size, effects could be significant but trivial. Age equivalents are one way to get a sense of the meaning of regression coefficients.[5] For women, finishing college as compared with finishing high school is equivalent to being 17.64 years younger in terms of self-rated health. For men, finishing college as compared with finishing high school is equivalent to being 13.70 years younger. Education has a substantial influence on subjective health, with a difference between men and women of 3.94 years. A difference of almost four years of age is not trivial. To put that number in relative terms, people who are employed report health levels that are the equivalent of being 11.46 years younger than people who are unemployed. People with household incomes greater than $50,000 report health levels that are the equivalent of being 16.08 years younger than people whose household incomes are less than $20,000 and 8.42 years younger than people whose incomes are between $20,000 and $35,000. Mortality age equivalents are smaller all around, possibly because another year of life is more extreme than another year of

[5] Age equivalents equal the coefficient of interest divided by the coefficient associated with age. To take an example from Table 2 in the prediction of poor self-rated health, the coefficient associated with each year of schooling is –0.161 for men and −0.172 for women (−0.161 − [−0.011]); the coefficient associated with each year of age is 0.047 for men and 0.039 for women (0.047 – 0.008). For women: –0.172 / 0.039 = –4.410, and for men: −0.161 / 0.047 = −3.425. Thus, the difference in age equivalents between 12 years and 16 years of schooling is 17.64 for women and 13.7 for men, a difference of 3.94 years. Age equivalents provide a standard of comparison in the study of health and mortality because age is consistently associated with declines in health and increases in mortality (Mirowsky 2005).

feeling in good health. In terms of mortality hazards, men who have finished college have a reduced hazard of dying that is the equivalent of being 2.264 years younger than men who have only finished high school. For women, the age equivalent is 1.694 years younger, a gender gap of 0.57 years. In comparison, people who are employed have a reduced hazard of dying equivalent to being 6.12 years younger than the unemployed. People with household incomes over $50,000 have a reduced mortality hazard equivalent to being 5.69 years younger than people with incomes under $20,000 and 3.67 years younger than those with incomes between $20,000 and $35,000.

Human Capital and Men's Dangerous Behaviors

According to the theory of resource substitution, education will be most important to the health and survival of those who are otherwise disadvantaged. This theory received support in the case of self-rated health but not overall mortality. Those disadvantaged in the unequal distribution of goods, resources, and opportunities usually evidence disadvantaged outcomes such as depression, anxiety, a sense of powerlessness, poor perceived health, worse physical functioning, and lower survival (Williams 1990; Link and Phelan 1995; Mirowsky et al. 2000). In general, poor health and death are imprints of structured inequality (Ross and Mirowsky 2002), but this is not the case for gender differences in mortality. Women are disadvantaged in the unequal distribution of valued goods and resources (such as employment opportunities; high-paying, fulfilling, autonomous jobs; power and authority at work; freedom from economic hardship; wealth; and high household income), and women report worse health than men; but women live longer. This paradox is reflected in the conditional effects in which education benefits women's self-rated health more than men's, but yet it benefits men's survival more than women's. Can a look at specific causes of death help explain the latter conditional effect?

We speculate that men's position may contribute to their high mortality if with their advantaged status comes the latitude to smoke, use illegal drugs, drive fast cars, engage in promiscuous sexual activity, buy and use guns, get in fights, go out to bars, drink heavily, or drink and drive. Women face more external constraints on their behavior than do men (Bird and Rieker 2008; Epstein 2007; Sen 1999). Men's status and power may mean that they don't face the external constraints that women do in regard to behaviors that are considered risky, in opposition to normative guidelines, dangerous, and destructive. For example, externally imposed normative constraints are the main reason that women have historically smoked less than men (Bird and Rieker 2008; Pampel 2002). If men engage in destructive and risky behavior more than do women in part because they face fewer external constraints, then education may have more of an effect on men's destructive behaviors than on women's. According to the human capital view of education and health, education is likely more important to the reduction of risky behaviors in the group that has more decision-making latitude because education generates self-regulation and self-direction (Mirowsky and Ross 2005). Education is part of the person, not externally imposed. For this reason, education might have a larger impact on men's mortality, especially mortality stemming largely from destructive behaviors, such as accidents (especially car accidents), homicide, suicide, cirrhosis of the liver, lung cancer, respiratory disease (such as emphysema), and liver disease. This is largely what we

find in the cause-specific mortality results. With the exception of liver disease, these causes of death show the largest conditional effects of education.[6]

Education closes the gender gaps in both health and mortality. If twentieth century trends in education continue well into the twenty-first century, our results suggest that the gender disparities in subjective health and mortality will attenuate over the next four or five decades. In 1940, among U.S. adults age 25 and older, about 5.4 % of men and 3.7 % of women had college degrees; as of this writing, about 28 % of men and 24 % of women have college degrees (U.S. Census Bureau 2002). Women now earn the majority of all bachelor's degrees. If a bachelor's degree were the average level of education, gender disparities in subjective health and mortality would be reduced.

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[6] This speculative explanation refers to dangerous behaviors, not all risk factors. Some risk factors, such as a sedentary lifestyle or a high-fat diet, are not thought of as dangerous and destructive. Although a sedentary lifestyle, excess calories, and being overweight are major risk factors for heart disease, diabetes, stroke, and other fatal health problems, they are common and normative. (And men are not even at higher risk, given that they exercise more than women). In fact, this has been called the "default" American lifestyle (Mirowsky and Ross 2010). Future research on these ideas requires data with measures of health lifestyle, including dangerous behaviors—and, ideally, enough cases to examine specific causes of death. According to Pampel (2002), smoking is the behavior most destructive to health, accounting for a significant portion of men's excess mortality and for the narrowing gender gap in mortality in recent years (as women's cigarette use approaches men's), so initial tests can be undertaken with recent years of the NHIS-LMF, which includes measures of smoking. However, we found conditional effects for homicide, suicide, and accidents, in addition to lung cancer and emphysema, which suggest that dangerous behaviors other than smoking may also be important. In fact, some of these dangerous behaviors influence mortality directly (from accidents, homicide, and to some extent suicide), not by way of poor health (Benjamins et al. 2004).

Most causes of death, like heart disease, are indirectly influenced by health and could have counteracting effects that cancel each other in the following way. Men's advantaged status may give them the latitude to engage in dangerous behaviors, but obviously men's position isn't all bad for health. Their better jobs and higher incomes, for example, benefit health. Thus, there could be counteracting effects of risky lifestyle and socioeconomic advantage, with interactions in opposite directions. When destructive lifestyle does not predominate, the counteracting interactions could balance, producing null or nonsignificant interactions of education and sex on mortality. While speculative, this is consistent with what we find for cancer (other than lung cancer), infectious disease, and, especially, heart disease.

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