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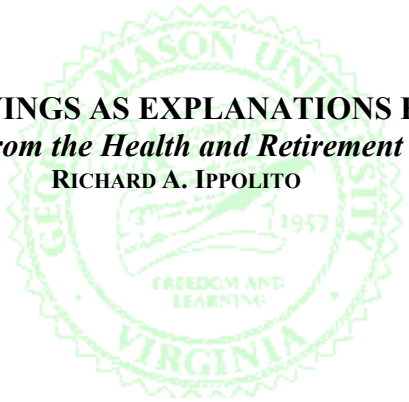

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Evidence from the Health and Retirement Survey
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EDUCATION VERSUS SAVINGS AS EXPLANATIONS FOR BETTER HEALTH

Evidence from the Health and Retirement Survey

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ABSTRACT

The paper reports on the results of a study of the health status of 4,917 middle age couples in the HRS. The main finding is that savings propensity appears to be a key component to health outcome. Savers make consumption choices that improve their health, accumulate fewer ailments and enjoy lower mortality rates. The results are consistent with either Becker-Mulligan who posit that education makes individuals more forward looking; or Fuchs who hypothesizes that individuals with lower rates of time preference select themselves into higher levels of education.

While education as such matters less after inclusion of savings and other variables, it still affects choices about consumption that affects health, though its effect is not explained by better information. It also affects the rate of ill health, holding constant consumption decisions and existing maladies.

If the family's investment behavior importantly influences health outcome, then longer long-term improvements in overall health may depend less on improved flows of health information, and more on a gradual spread of a longer-term outlook among larger portions of the population. Whether far-sighted behavior is learned in the family or through the education process is an important and open question.

EDUCATION VERSUS SAVINGS AS EXPLANATIONS FOR BETTER HEALTH

Evidence from the Health and Retirement Survey

If wealth is calculated broadly to include health human capital, then differences in risky consumption habits can perhaps explain as much inequality as differences in wages. Yet, while there is a vast literature addressing what might be called labor human capital, there is a much smaller literature regarding the economics of health. And, indeed, much of what has been written addresses the role of ill health in the form of foregone production of goods and services, either because unhealthy individuals have lower marginal productivity or retire prematurely from the labor force.[1]

In this paper, I look at health among couples in the Health and Retirement Survey (HRS). I pay attention to the mechanism by which education can affect outcome and to the potential bias that results from omission of important and sometimes ignored variables correlated with education. While the findings affirm an education effect, they point to a larger and perhaps more important influence of savings propensity. Savers enjoy better health and lower mortality rates than others, a result that is consistent with models that implicate time preference in health investment decision.

I. THEORIES OF EDUCATION AND HEALTH

Grossman (1972) develops the notion of health human capital. It is the dollar present value of the stream of incremental utility from remaining in good health over a lifetime. Factors that influence health can therefore perhaps play an important role in determining the distribution of total wealth. In Grossman's model, education plays a central role in the attainment of better health, thus, reenforcing its already important role in augmenting labor market income.

Few would argue that education is correlated with better health. For example, **Table 1** lists some simple averages of health indices from the HRS sample that I use below across three education categories. The categories are self explanatory (and each discussed more fully below). It is apparent that more

[1] A few examples include Bartel and Taubman (1979), Ettner, Frank and Kessler (1997), Kahn (1998), Mitchell and Burkhauser (1990), Sickles and Taubman (1986), and Parsons (1982). For a 'big picture' estimate, see Cutler and Richardson (1997), who attempt to value the improvements in health over time in the United States.

educated respondents generally evince better health. Many studies show that these patterns generally survive multiple regression estimates.[2]

There is less agreement about what explains the positive relation. Grossman posits that education increases the 'productive efficiency' of health inputs, meaning that given the onset of some malady, educated patients are more likely to spot early signs of illness, seek out professional input, and effectively follow corrective actions to remedy the problem. We might think of more educated people as better able to manage their ailments so as to produce less adverse consequences on health.

Shultz (1975) posits that education teaches individuals to deal with new and complex information. Thus, educated persons are more productive in processing new information about the health hazards of risky behavior like smoking, meaning that they process it faster and with less error. This avenue is sometimes referred to as the 'allocative efficiency' effect of education, though I refer it as the information effect. In this model, more educated individuals are less likely to accumulate maladies because they more effectively process information about behavior that affects health (like smoking and overeating).

Either theory has the same inference, namely, that the value added by education may exceed traditional measures of rates of return. It also follows that perhaps less formal education in the form of expenditures on public information about health hazards might substantially alter individuals' optimal behavior patterns, suggesting a substantial social return on these expenditures.

Fuchs (1982) disputes these inferences, arguing instead that education merely serves as a proxy for individuals who have lower personal discount rates. Low discounters have a longer view and therefore are more likely to invest in higher education, and to engage in health-promoting practices, like maintaining a diet high in fiber and low in saturated fats. High discounters attach less value to future consequences of current actions, and so optimally invest less in higher education, and engage in more risky behavior, like smoking.[3]

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[2] For example, see Berger and Leigh (1989), Clark and Etile (2002), Grossman and Kaestner (1997), Hersch (2000), Ippolito and Mathios (1990), and Kenkel (1991). Also, see Mullahy and Sindelar (1995).

[3] A close cousin to this idea is that some individuals who have more inherited longevity will optimally invest in a healthier lifestyle (P. Ippolito 1981; Adda and Lechene 2001).

One paper that supports this point is Farrell and Fuchs (1982) who find that eventual completed schooling predicts smoking just as well at age 17 as it does at age 24, suggesting that a college education, as such, does not explain less smoking among the better educated.[4] This result, it turns out, has been known for at least a century.[5] Several studies show that current or eventual smoking in high school and college is inversely correlated with student achievement scores and grade point averages in high school,[6]

In the context of a Fuchs model, the mechanism by which discount rates affect health is straightforward. Low discounters attach greater value to the consequences of risky consumption behavior, and therefore do less of it. They are rewarded later on in the form of a lower rate of ailments of all kinds and a lower rate of mortality.

Becker and Mulligan (1997) is a blend of the education and time preference ideas. They posit that education itself affects time preference rates; that higher education teaches individuals how to be more patient. While the model differs from Fuchs in the genesis of time preference rates, it has similar predictions for their impact on health later in life.[7]

The measurement of the impact of education on health is hampered by its correlated with unobserved variables (like time preference). Several studies deal with the omitted variables bias by trying to identify some exogenous factor that affects education that is arguably independent of a free choice to

[4] Horn et al. (1959) anticipated this result. Surveying high school students in Portland, Oregon in 1958, they found that students who took general mathematics, which is a marker for students not going to college, had smoking rates 60 percent (males) to 80 percent (females) higher than those who took algebra, which is a college preparatory course. Similarly, Behrman and Taubman (1989) find that genetic endowment explains a significant portion of education attainment.

[5] For example, Sandwick (1910) studied a sample of students in a Highland Park, Illinois high school. He found significantly lower grades for smokers compared to nonsmokers; and found that every student who quit school was a smoker. He remarked, "In the school of which the writer has supervision it has been noticed that the odor of tobacco often accompanies low marks" (p. 623). Clarke (1909) found that among 201 freshmen at Clark College, 68 percent of the nonsmokers were honors students, while only 18 percent of the smokers attained this distinction. Meylan (1910) found that among 223 college freshmen at Columbia University, nonsmokers had higher grades that smokers (69 average numerical grade versus 62), and had a likelihood of failing a course about 60 percent lower than smokers.

[6] The Child Health and Development Study administered standard intelligence tests to a sample of children aged 10 and 11 years old. A follow up showed that smoking rates at age 17 were inversely correlated with test scores (Seltzer and Oeschli 1985). Based on a sample of freshman at the University of Texas in 1963, Veldman and Bown (1969) found that smokers had lower SAT scores and lower high school rankings. Pumroy (1967) found that smoking freshman had lower GPAs in their first year of college, and a higher rate of subsequent drop out.

[7] The key difference is that Becker and Mulligan (1997) want to count some of the benefits affiliated with low preference as a return to schooling.

augment education, like variation in state requirements for compulsory education.[8] I take a more conventional identification strategy of including separate variables to directly account for confounding factors. For example, low discounters are more likely to be savers. Hence, various indices of savings can help identify the role of time preference directly. The HRS also is unusually rich in variables that describe household income and wealth, which are correlated with education and savings behavior.[9]

The HRS also is unusual in reporting data for husbands and wives. This characteristic of the survey allows estimates using a *de facto* fixed (household) effects model. This means for example that husband-wife differences in behavior can be studied holding constant observable and unobservable factors like wealth, geographical location, information set, and so on, that vary across household, which greatly diminishes the problems created by confounding variables in cross section studies of education and health. For this purpose, I limit the analysis to 4,377 couples with children in the data.[10] At least one spouse is working and between the ages of 51 and 61.

II. Initial Suspicions About Causality

One way in which to capture the essence of a Fuchs-like exercise is to consider the possibility that healthy kids are more likely to attain higher education. It is known that childhood characteristics are correlated with health problems later in life. A classic measure of a child's health prospects is birth weight. Low birth weight is tied to elevated rates of various maladies as adults including higher rates of cardiovascular disease and diabetes (Forsen et al. 1997; Rich-Edwards et al. 1999). A potential explanation

[8] These studies use a two-stage process whereby the education variable is identified by some exogenous factor. Adams (2002) and Arendt (2002) use compulsory schooling differences when individuals were of school age as a source of identification, while Arkes (2001) uses variation in unemployment rates during periods during periods in which individuals were school age. Other papers that use various identification strategies include Lleras-Muney (2001), Berger and Leigh (1989) and Currie and Morietti (2002). For an overview of the literature, see Grossman (2002) and Grossman and Kaestner (1997).

[9] One shortcoming of the HRS is that it excludes households where there are no working individuals; hence, it omits some households with perhaps serious health problems. For example, the omitted households may include those who have occupants who are disabled, widowed or unemployed. In this sense, the HRS is a survey tool to evaluate health conditions of the 'reasonably healthy' in households where the primary respondent is working and between the ages of 51 and 61 in 1992.

[10] Since marriage is correlated with better health (Grossman and Kaestner 1997), the restriction to married couples has the additional benefit of ridding the data of health-related conditions affiliated with never-married, divorced or widowed individuals.

is the known lifetime deficiency of pulmonary function, which is determinable at birth, and highly correlated with birth weight (Barker et al. 1991).[11]

The Retirement and Health Survey does not have variables like birth weight or lung function that might provide direct evidence of nutrition levels in utero or in early childhood, but it divulges a tell tail market of these valuables, namely, the respondent's own height. While there is a large literature relating parental education and child height, it mostly implies a causal relationship from parents' education to child's height.[12] The HRS data make it apparent that the causation goes both ways.

I use data from the first wave of the HRS in 1992 and restrict the observations to married couples with children.[13] I start by estimating a simple regression using respondents' heights to predict their attained years of education. I also include variables to control for years of parents' education, as well as the parents' ages at the time the respondent was born. **Table 2,** column 1, reports results when the dependent variable equals unity if the respondent attained a college degree, zero otherwise. I use ordinary least squares to make the estimates.

Parents' levels of attained education and ages at the birth of the respondent are all positively correlated with the likelihood that the respondent graduates from college. Holding constant these factors, however, the respondent's own height is predictive of attaining a college degree. Column 2 reports similar results follow using continuous years of attained education as the dependent variable.[14]

The results raise an obvious concern. Kids who benefit from good nutrition while in utero and in childhood are more likely to be healthy as adults. They also are more likely to attain higher levels of education independent of education levels attained by their parents. In this sense, the promise of good

[11] Low birth weight of child not only serves as a market for the child's future health but also of the *parents'* future health. Studies show that mothers and fathers of low-birth-weight babies are substantially more likely to have elevated coronary-heart-disease-related and all-cause mortality rates (Smith, Hart et al. 1997; and Smith, Harding et al. 2000).

[12] For example, see Duncan (1994) and cites therein, or Grossman and Kaestner (1997).

[13] I use the first wave conducted in 1992. The survey collected data from households with at least one person between ages 50 and 61 still in the workforce (the primary respondent), but collected information from other household members, if any, notably the spouse or 'partner'. For a discussion of health information in the HRS, see Wallace and Herzog (1995).

[14] I find similar results estimating these relationships for males only and females only.

health precedes the attainment of education, raising a suspicion that education as such is not the factor that is causing better health.

The correlation of course leaves open the avenue by which healthy kids happen to end up with more education. One possible explanation is that some omitted variable, like the family's propensity to invest, is the catalyst for both more education and better health. A family that is forward looking more likely invests early on in their children's long run health prospects, and also is more inclined to invest in their children's education. Both reflect an attitude towards investment philosophy, which indirectly reflects a relatively low rate of time preference, but only education is observed in most data bases, creating the omitted variables problem. The HRS offers some opportunity to pursue this idea because it includes variables that describe respondent's savings decisions.

III. DO HEALTH PERCEPTIONS VARY WITH EDUCATION?

I first address the information theory of education. Schultz (1975) predicts that more educated individuals learn about hazards sooner, and thus, adapt to healthier behavior sooner. After information is more broadly disseminated, less educated persons follow suit with some lag. Thus, the Schultz model might predict that more educated people responded to the 1964 Surgeon General's Report faster, but not that differences in information persisted in the HRS 1992 survey year, almost thirty years later. One could argue that less educated individuals in the HRS survey have noisier, but not biased, estimates of the ill effects of smoking.

If one is to posit an information-based theory of education that predicts systematically healthier behavior among the more educated then one either has to assume a long lag in the learning function of new hazards, or that information arrives in stages, meaning that the less education always lag behind the more educated in adjusting to the new behavior.[15] We might view the alternative as a dynamic interpretation of Schultz's basic idea.

[15] Grossman (1972) is relatively silent on the role of education on consumption habits, and instead emphasizes the notion that educated individuals are more efficient users of medical resources. In his model, educated people are more effective in mitigating the consequences of any ailment for long-term health, but not necessarily different in the rate at which they accumulate ailments.

A. Inferring the Self-Assessed Health Effects of Consumption Behavior

Do more educated people perceive the health effects of consumption habits differently than those with less education? The HRS does not include questions about respondents' perceptions of the effects of various behaviors. It does, however, indirectly divulge information about these estimates, because it inquires about respondents' own estimate of longevity. The respondent is asked to pick a number from one to ten, where ten denotes virtual certainty of attaining age 75, and zero denotes virtual zero chance. The mean response is 6.0.[16]

All else equal, if smokers are informed about the hazards of their habit, they will report a lower likelihood index of reaching age 75. Assuming that individuals who engage in risky consumption are less informed of its consequences, a cross section measure gives a lower bound for the population estimate. For current purposes, it is not so much important that the estimates could be biased downwards, as it is to learn whether smokers' estimates of the longevity effects of their habits differ by level of education.

The HRS contains information that permits us to look at three important consumption habits that affect health over the long term, smoking,[17] overeating,[18] and moderate drinking.[19] The first two are deleterious for health, while the third is beneficial. *Smoking at Age 50* is equal to unity if the HRS respondent either smoked at age 50, or quit within the last 5 years, zero otherwise.[20] *Obesity* equals unity if

[16] Others, have exploited this variable for example, to show that HRS smokers change their estimates upon the arrival of adverse information about their health (Smith et al. 2001).

[17] There is a large literature on the health effects from smoking. See, for example, Hammond et al. (1976) and Doll et al. (1994b). Overviews and extensive lists of citations are found in various reports issued by the National Institutes of Health; for example, U.S. Department of Health and Human Services 1997, 2001b, though some argue that these estimates may be biased high (Sterling and Weinkam 1990; Sterling et al. 1993).

[18] Excessive overweight is implicated in numerous health maladies, including diabetes, kidney ailments and heart disease (Field et al. 2001; Thompson et al. 1999; and National Research Council 1989).

[19] In contrast to either abstinence, or excessive drinking, moderate alcohol consumption has beneficial effects on the cardiovascular system (Rimm et al. 1999; Stamper et al. 2000; Doll et al. 1994a; and Thun 1997).

[20] About 11 percent of the spouses of nonrespondents were less than age 50 and so I omit criteria that they must be smoking at age 50; for this subsample, they are coded as smokers if they either are currently smoking or have quit within the past 5 years. If I redo all the estimates using this definition (that is, counting post-age 50 quitters as quits if they have quit for at least five years), the portion of the sample that smokes falls by about two percentage points, and all the results are not materially affected. The inclusion of recent quits as smokers is conventional. It ensures that those who quit recently, perhaps because of an ailment, are included in the smoking category. It is apparent that some

the respondent's Body Mass Index (BMI), which is a conventional measure of overweight, exceeds 30, a condition that characterizes 21 percent of the sample.[21] *Moderate drinker* equals unity if the respondent is not an abstainer, has no more than four drinks per day, and is not a problem drinker.[22] The latter group comprises 53 percent of the sample.[23]

Consider the following cross section regression:

(1) $L = a + {}_{i-1}\sum^{3} b_i C_i + cX + dY + eZ + \text{error},$

where L is the longevity index for some respondent, C_i is a measure of the *ith* consumption habit that affects health; X is a vector that includes dummy variables denoting individuals who quit smoking, so-called problem drinkers,[24] excessively thin individuals,[25] and moderately overweight respondents. This means that the omitted category is a never smoker of normal weight who abstains from alcohol consumption.

A coefficient on *Smoking at Age 50* gives us smokers' estimates of the impact of their habit on own longevity prospects. If this coefficient is zero then the finding is consistent with the hypothesis that smokers are oblivious to the health hazards of smoking, and similarly for the coefficients on moderate

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quitting behavior results form unfolding information about health (Smith, Taylor et al. 2001; and Clark and Etile 2002). Finally, I looked at a second smoking variable, namely, quit smoking (more than five years ago), and these results essentially mimicked those found for the smoking at age 50 variable.

[21] BMI equals the person's weight in kilograms divided by the square of height in meters. Alternatively, BMI = 703 x $W \div H^2$, where W is weight in pounds and H is height in inches. Thus, a 5' 6'' person who weights 150 pounds has a BMI of 24.2. A BMI in the range of 19 to 25 is considered healthy, or normal; one between 25 and 30 is overweight. While BMI is an imperfect measure of body weight, it is widespread, which facilitates comparisons across studies. In experiments I tried, I found qualitatively similar results using overweight measures from the Metropolitan Life Insurance tables.

[22] I define a problem drinker as one who admits either to having alcohol before noon or receiving complaints by others about his drinking.

[23] I looked at the relationship between alcohol consumption and heart disease, kidney ailments, diabetes, hospital stays, doctor visits, stair climbing, subjective health evaluation and death rates in the HRS and did not find evidence to set the moderate ('good') level of drinking lower than four drinks per day. This result is consistent with Doll et al. (1994a) who find that alcohol reduces risk of ischemic heart disease, largely irrespective of amount. Berger and Leigh (1988) find that more alcohol consumption is affiliated with higher wages, an effect that tails off only for workers who report drinking three or more times per day. The results do not change materially if define moderate drinking to three or fewer alcohol drinks per day. Also see Auld (2000) who reports a positive influence of moderate drinking on income and a negative influence of smoking.

[24] Problem drinkers either consume five or more drinks per day, or admit to sometimes drinking in the morning or have received complaints by others about their drinking habit.

[25] Very thin individuals are those with BMI lower than 19. They represent less than two percent of the sample. Many studies show that very thin individuals are more likely to die prematurely even accounting for existing health differences (Sidney et al. 1987; Hoffmans et al. 1989).

drinking and obesity. Since some consequences of these behaviors are reflected in current health status, I add a vector of dummy variables, Z, denoting the existence of ailments or ill health that presumably affect longevity expectations.[26] Thus, the coefficients on the consumption variables measures expectations on the margin, holding constant information that already is known about health.

Finally, Y is a vector of other variables denoting age, gender, race, income, education, savings propensity,[27] wealth,[28] and so on.[29] It includes a measure of analytical ability (*Hard-to-Read-A-Map* equals unity if the respondent reports that she either cannot read a map or can do so only with great difficulty). I use two measures of endowments.[30] One is the average of the respondent's parents' years of education.[31] The other is current age of same-sex parent and current age, if living, and age of death if deceased (and a similar variable for the opposite-sex parent).[32] Finally, I include a dummy variable equal to unity if the household is covered by an employer-provided health plan.[33]

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[26] Current health is measured by a series of dummy variables denoting the existence of a lung ailment, heart disease, kidney malfunction, diabetes, cancer episode, stroke, head injury or bone fractures, emotional illness, uncorrectable hearing or vision loss, arthritis, difficulty climbing stairs and self reported health 'poor',

[27] For these purposes, I set the savings variable equal to unity if either the pension variable or the IRA variable equaled unity, zero otherwise. I use the simple version for comparison to other results in the table.

[28] The HRS reports extensive data on various wealth holdings, as well as various sources of income, including wage income, pensions, transfers, and so on. Wealth is net of debt, and excludes the present value of social security and pensions. Some of the estimates in my study reveal statistically significant effects of income or wealth, but almost never are they quantitatively important. Smith (1999) notes that there it is possible that low levels of income and wealth are caused by poor health. While most studies find a negative correlation between health and income or wealth (for example, Marmot et al. 1991; Duleep 1986), Mellor and Milyo (2002) find contrary evidence.

[29] These include the respondent's age, age of parents, household wealth, household income, and dummy variables denoting gender, race, industry and occupation, number of children, military experience, household eligibility for Medicare, Medicaid and Foodstamps, education, savings propensity (equal to unity if the respondent either has or had a pension or has an IRA), exposure to particulates on the job, industry and job identifiers, self-described homemaker status in the household, attend religious services weekly, experience in the military, and other dummy variables denoting 'do not know' for a few key variables such as parents' education and parents' ages.

[30] The omitted group is comprised of those who reported either no difficulty reading a map or had 'some' difficulty. A few respondents reported that they had no need to read a map. I included these in the 'have-difficulty' category.

[31] I tried several variants of this measure but they did not materially affect the results.

[32] I tried more complex variations accounting for parents' ages if still living, but they did not add much value. Given the age of the respondents, parents who are still living are relatively aged, at least in their seventies, and usually older. For example, the average age of a living mother is 79.5 in my sample, with a standard deviation of 6.5. Thus, most respondents with living parents are well endowed with expected longevity. In contrast, deceased mothers died on average at 69.4, with a standard deviation of 14.8; hence, respondents with dead parents in most cases are informed of poor inheritance of expected longevity.

[33] The correlation between pensions and health insurance benefits is found in Gustman and Steinmeier (1994) and Karoly and Rogowski (1994).

B. Empirical Results

Table 3, column 1 reports the results for the full sample, while those in columns 2-4 show the results by education level (less than a high school diploma, high school graduates, and a college graduates).[34] Perceptions of the mortality consequences of consumption behaviors are about the same across education groups. Smokers in all three education groups have similar assessments of their habits compared to nonsmokers, and similarly for obese respondents. The only exceptional difference in assessments contradicts the education hypothesis: moderate drinkers that perceive the lowest benefits of their habit are in the *most* educated group.[35]

The results are inconsistent with the hypothesis that education affects consumption habits through a different information set, a result that I reaffirm with other tests below. This means that if education affects health, it must attributable to a Grossman effect (more educated individuals are more efficient users of medical resources) or to a Becker-Mulligan effect meaning that more educated individuals learn to be more forward looking, and thus, engage in healthier behavior (which implies fewer maladies at later ages).

I repeat the estimates separating the groups by saver status (columns 7 and 8). To keep the results to a manageable number, I use a simple index: A respondent is a saver if she either has a pension or has an IRA in the household; otherwise, she is a nonsaver. Moderate drinkers and the obese individuals in these two groups do not evince statistically meaningful differences in own estimates of longevity effects of their habits. While smokers among savers perceive similar risk of their habit to the overall sample, nonsavers who are smokers have essentially the same longevity expectation as nonsmokers. To the extent that savings decisions divulge information about time preference, this result is consistent with the hypothesis that either high discounters do not find it worthwhile to acquire information about future health effects, or individuals who are poor processors of information also have high discount rates.

[34] The high school group includes some respondents who attained some education beyond high school, but less than a college degree.

[35] I checked the possibility that consumption behavior might have different effects on actual death rates across education groups. The results of these regressions (not reported) are consistent with the hypothesis that the effects of the three consumption behaviors are comparable across the groups.

C. Actual Death Rates

To evaluate the reasonableness of the coefficients, I estimate a simple OLS regression where the dependent variable is unity if the respondent died within six years of the interview, zero otherwise. If respondents' information is unbiased hen the sign on the coefficients on consumption behaviors in the perceived longevity estimates ought to be consistent with their actual effects on mortality. The results are reported in columns 7 (no controls for existing health conditions) and 8 (with the controls). The results confirm that a) smoking adversely affects mortality; b) moderate drinking is beneficial, and c) obesity has no measurable negative effects (and indeed is positive after controlling for existing health ailments). The latter result is not novel; that is, while obesity clearly is implicated in higher rates of morbidity, there is some dispute whether it carries over to higher mortality rates.[36]

In general, respondents' perceptions of the health effects of consumption are consistent with their actual effects. The results are consistent with the hypothesis that respondents' estimates of the effects of consumption on own longevity accurately reflect effects on observed mortality.

IV. Impact of Education and Savings Propensity on Consumption Choices

In a Fuchs' theory of health, predictions about consumption habits are relatively straightforward. Owing to their long horizons, low discounters are more likely to invest in the discovery of heath information, and to act on it in favor consumption habits that promote good health. Consequently, they have fewer ailments at older ages. Operationally, the Becker-Mulligan model has similar predictions: A low discount rate acquired during schooling implies healthier habits and better health later on. Both

[36] Among individuals in their seventies, those overweight and obese enjoy longer life expectancy for individuals in their seventies (Graboski and Ellis 2001). Other researchers have reported a U-shaped relationship between mortality and obesity (Hoffmans et al. 1989). I tried a simple regression with only gender, race and weight variables. For the weight variables, if I include BMI and BMI^2 (with no other explanatory variables), I find highly-significant negative and positive coefficients, respectively, with t-values of 4.27 and 4.01. But if I eliminate the two percent of the sample that is very thin, the t-values on these coefficients fall to 1.57 and 1.70. I find similar results if I replace my weight dummy variables in table 8 by BMI and BMI^2 (keeping all of the other independent variables). Without very thin respondents in the data, the coefficients are not close to significance at conventional levels (though the interaction between smoking and BMI is negative and significant). One possibility is that differential mortality effects show up at later ages. Also, some research shows that the mortality effect of obesity is not directly tied to BMI, but rather to the particular distribution of fat, often captured by measures of circumference of waist and hip (Forsom et al. 1993)

theories view education as a marker for time preference not otherwise picked up by other proxies for savings behavior.

I select four variables that represent past decisions that might serve as reasonable stand-ins for a couple's propensity to save.[37] Two represent proxies for retirement savings: presence of an Individual Retirement Account (IRA) in the household; and pension participation in present or a past job.[38] Two measure a willingness to invest in their children: education level attained by the eldest child, and willingness to sacrifice some lifetime consumption in favor of leaving a bequest to children or grandchildren.[39] Unlike the other investment variables, the pension variable is specific to the individual rather than the household. The bequest index equals five if the respondent definitely plans on leaving a bequest and one if definitely not, with gradations in between.[40]

The impact of education on health-related consumption requires more consideration. It is intuitively appealing that educated individuals ought to be more informed about health hazards and therefore ought to be 'smarter' consumers. Table 3 show results, however, that are inconsistent with this hypothesis. I can check these results by exploiting the couple's data in the HRS.

That is to say, information flows freely between partners in marriage. If a more-educated partner comprehends the implications of smoking then presumably she will not keep this a secret from her husband, and likely will communicate this information repeatedly and perhaps forcefully over a period of time.[41] If her husband smokes anyway, it is not because he lacks information.

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[37] One obvious candidate is the answer to a question about the length of the respondent's horizon for financial planning purposes. But this variable is endogenous to health. If I find that planning horizon is negatively correlated to the probability of death then it is equally plausible that the planning horizon is affected by the prospects of death than the other way around. Another candidate is household wealth. While I control for wealth, it is a noisy measure of savings propensity, because is also is affected by inheritance, dissolution of prior marriages, portfolio composition, unusual loss events, and so on.

[38] I tried running separate dummy variables for pension types, notably defined contribution and defined benefit. The coefficients on these variables proved to be remarkably similar, and so to conserve space, I used a single pension variable.

[39] One answer characterizes the household.

[40] I tried a fifth variable denoting home ownership, which worked about as well as the four I use.

[41] Some information naturally reflects itself across partners owing to the mechanics of living together. If one spouse learns of the health-promoting effects of eating less saturated fat and more fruits and vegetables, then one could reasonably infer that this information would reveal itself in meal composition in the home. Not surprisingly, eating, sleeping, and exercise habits are correlated across spouses (Wickrama et al. 1999). Jones (1994) finds that the probability that a smoker quits is partly dependent on whether the spouse also quits.

One way to test this idea is to measure how much differences in education explain differences in consumption behavior between the husband and wife, and then compare these results to parallel estimates between randomly matched husband and wife pairings from different households.[42] If education measures an information effect then education differences within the household ought to matter less than education differences across randomly-paired males and females. If not, then one is left with the inference that education may matter in consumption choices, but not because of differences in information.

I estimate the following two regressions:

(2) $C_{Mj} - C_{Fj} = A_1(X_{Mj} - X_{Fj}) + \text{error}$

(3) $C_{Mj} - C_{Fi} = \alpha_1(X_{Mj} - X_{Fi}) + \alpha_2(Z_{Mj} - Z_{Fi}) + \text{error},$

where $C_{Mj} - C_{Fj}$ is the difference in consumption of C by the husband and wife in household j, and $X_{Mj} - X_{Fj}$ is a vector of differences in personal characteristics. This vector includes variables from table 2, except household characteristics.[43] Regression (2) is the equivalent of a fixed effects estimate that eliminates across household variation.

To determine if husband-wife behavior is meaningful, I estimate a control regression in (3) with randomly-assigned male-female pairs from households i and j ($i \neq j$). Thus, differences in the values of X have different household subscripts ($X_{Mj} - X_{Fi}$). I also control for household characteristics denoted by the vector of differences ($Z_{Mj} - Z_{Fi}$).[44] If husbands and wives share information then the coefficient on differences in their education should be (absolutely) smaller, as compared to differences in education levels of randomly-assigned males and females.

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[42] For replication purposes, I simply sort the households by household number for males and by reverse household number for females. I then resort both data sets with a counter and merge the data using this counter. I tried other estimates using true random selection of matched pairs, and found results similar to those I report.

[43] If the husband smokes but not his wife, then the dependent variable equals unity. If he does not smoke but she does, then the variable equals -1, and if either smoke or both do not smoke, the variable equals zero. If the husband graduated college (16 years of education) and the wife graduated high school (12 years) then the education variable is 4 years (and if she attained 18 years of education then the education variable is -2, and so on).

[44] For replication purposes, I simply sort the households by household number for males and by reverse household number for females. I then resort both data sets with a counter and merge the data using this counter. I tried other estimates using true random selection of matched pairs, and found results similar to those I report.

The control regression also serves to provide cross section information. Given the nature of the data, pooling husbands and wives in a single equation is problematic because presumably their behavior is not independent. In short, I have within-household and across household results.[45]

The first three columns of **table 4** report the results for within-household behavior. Columns 4-6 report the results for the randomly-assigned male-female pairs. The results in the first two columns for smoking and moderate drinking suggest that education differences still are important within the household. The more educated spouse is less likely to smoke and more likely to drink moderately. Similar results characterize the randomly-matched couples.

Education differences are much more important in explaining moderate drinking habits across strangers than across husbands and wives. While this result is consistent with the idea that education may embed an information effect, it does not extend to smoking or obesity. The coefficients on education in the smoking regressions are about the same whether comparing husbands and wives or randomly-paired couples. In the obesity regression, the results are perverse. Differences in the likelihood of overweight across strangers are not importantly affected by differences in education (column 6), but, within households, more the more educated spouse is *more* likely to be obese.

The savings variables are important determinants of smoking and moderate drinking.. Eight of the coefficients on the savings variables have the anticipated sign, and six are statistically different from zero at least at the 95 percent level of significance. The result broadly carries over to the within-household regression. Only the pension variable is individuals specific, which is why the coefficient on only one saver variable is reported in columns 1-3. The spouse with a pension is less likely to smoke and more likely to drink moderately than the spouse without coverage, where both variables are significantly different from zero. In short, the data support that hypothesis that savers pursue healthier consumption habits than nonsavers.

Obesity is not well predicted by either education or savings propensity. About one-in-five men and women are significantly overweight (obese) by the standard BMI measure, but they seem more or less

[45] I tried running cross section regressions for males only and females only, but the results are qualitatively similar to those generated by looking at matched male-female pairs, and so I economize by showing only these cross section results.

equally represented across education levels and saver status. We know that obesity is correlated with various maladies (see below), but not necessarily with higher mortality rates (table 3). These results are more consistent with a Grossman (1972) model in which education affects health not by altering consumption habits, but by improving the efficacy of medical intervention (which finds some direct support in the data below).

V. General Measures of Health

Variables describing smoking habit, alcohol consumption and overweight reflect important decisions that affect health over the long term. There are, however, many other unobserved opportunities for individuals to reduce the likelihood of the onset of ill health and premature death. For example, some individuals may have a more nutrient-rich diet, take a daily aspirin, engage in more exercise, and have less stress and so on. While direct observation of these practices is first best, we can make indirect inferences from observations that summarize the health status of the respondents.

A. Measures of Ill Health

I use three measures of health: A self response that is quasi objective (difficulty of climbing stairs), a subjective self response (respondent is in 'poor' health), and a direct measure of ailments as verified by the respondent's physician. *Difficulty Climbing Stairs* equals unity if the respondent answers in the affirmative to the question: "Do you have difficulty in climbing several flights of stairs without resting?"[46] *Subjective Health Poor* equals unity if the respondent answers 'poor' to the query: "Would you say that your health is excellent, good, very good, fair or poor?" The final measure depends on responses about existing ailments.

More particularly, the HRS reports many kinds of maladies, most of which rely on the respondent's affirmation that a physician has advised her that that such a condition exists. To save space, I create a simple ailments index of these ills by summing a series of dummy variables, each of which

[46] Specifically, the respondent is given six options, not at all difficult, a little difficult, somewhat difficult, very difficult or cannot do, and do not do (meaning that they do not have occasion to climb stairs). I counted the last three categories in the affirmative, which comprises about one fourth of the sample. My results are similar if I use only the last two categories.

indicates the presence of a particular ailment, including heart disease,[47] lung malfunction,[48] kidney disease, diabetes, hypertension, current or past cancer episode, mental illness[49] and ulcers. Some respondents have several ailments. Others have none. The mean value of the index is .75. While my ailments index is arbitrary, it gives qualitatively similar results to ones I obtain from estimating separate regressions for each malady.[50]

B. Empirical Results

I estimate the following regressions, which are similar to those in (2) and (3), except I add controls for consumption habits:

$$(4) \qquad H_{Mj} - H_{Fj} = B_1(X_{Mj} - X_{Fj}) + B_2(C_{Mj} - C_{Fj}) + \text{error}$$

$$(5) \qquad H_{Mj} - H_{Fi} = \beta_1(X_{Mj} - X_{Fi}) + \beta_2(Z_{Mj} - Z_{Fi}) + \beta_3(C_{Mj} - C_{Fi}) + \text{error},$$

where H is a measure of health. The estimated coefficients on the independent variables are marginal effects, controlling for consumption habits, which I already measured in the prior table. **Table 5** lists the results.

Education and better health are positively correlated, even holding constant observable consumption habits. Among married couples, the more educated partner is less likely to evince ill health in any of the measures compared to the less educated partner. With the exception of the coefficient on *Difficulty Climbing Stairs*, which is almost zero, the results for the random male-female pairs are similar, again suggesting that information flows within the marriage do not explain the impact of education on health.

Measures of savings propensity figure prominently in the results. In the cross section results (columns 4-6), the coefficients on all the savings variables evince the expected sign and nine of 12 are statistically different from zero at least at the 90 percent level of confidence. Even within families, the pension-covered spouse is far less likely to report ill health compared to her uncovered partner.

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[47] The heart disease dummy variable equals unity if a physician has told the respondent that she has suffered a heart attack, has angina, coronary hearty disease, congestive heart failure, or 'other' heart problems.

[48] The lung-problem dummy variable equals unity if a physician diagnoses either chronic bronchitis or emphysema.

[49] This variable equals unity if the respondents is either taking medication for emotional distress or receiving psychiatric treatment, zero otherwise.

It also is notable that while the ability measure is not particularly important as a determinant of consumption behavior (table 4), those with a positive value of *Hard to Read A Map* are more likely to evince ill health. These results are about the same whether comparing married couples or random pairings of males and females across households.

VI. MORTALITY EFFECTS

I now look at the mortality rate in the HRS, which in fact is an index of premature death, since the couples in the sample are mostly in their fifties in 1992.[51] Based on information from the National Death Index, the survey reports a six-year mortality rate following 1992 of about 5.5 percent for the couples in my sample of respondents.

Mortality data is useful to the study two reasons. Firstly, it gives an unambiguous measure of the tail of ill health, and thus, offers some additional information about health outcome. Secondly, it offers an opportunity to indirectly test the idea implied by Grossman, namely, that education does not so much affect the rate of ailments, as it does the efficiency with which individuals manage them. That is, given the onset of an ailment, like diabetes or hypertension, more educated individuals are more likely to recognize symptoms earlier, find higher quality medical help, and more effectively follow remedial measures, and thus, suffer less severe medical consequences.

On way to test this idea is to estimate a mortality regression using the same independent variables as in table 5 (recall that those estimates already control for consumption habits), and adding new controls for the three measures of health (stair climbing difficulty, subjective poor health and ailments index). Thus, I estimate the regressions:

$$(6) \qquad M_{Mj} - M_{Fj} = D_1(X_{Mj} - X_{Fj}) + D_2(C_{Mj} - C_{Fj}) + D_3(H_{Mj} - H_{Fj}) + \text{error}$$

$$(7) \qquad M_{Mj} - M_{Fi} = \gamma_1(X_{Mj} - X_{Fi}) + \gamma_2(Z_{Mj} - Z_{Fi}) + \gamma_3(C_{Mj} - C_{Fi}) + \gamma_4(H_{Mj} - H_{Fi}) + \text{error},$$

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[50] Individual regressions for each malady separately can be found in Ippolito (2002b).

[51] Presumably, some respondents died in accidents, which mostly are independent of existing health condition. To the extent that accidental deaths are in the data, they may bias some of the coefficients on consumption (like smoking) if they are correlated with other taking behavior; otherwise, they will mostly affect the noise term.

where M is a dummy variable equal to unity if death occurs, zero otherwise. If education affects health through better management of consumption habits[52] or better management of ailments then we expect a negative sign on the estimated coefficient on differences in education.

Table 6 reports the results of estimating (6) and (7) for couples (columns 1) and randomly paired males and females (column 4). The education coefficient is indistinguishable from zero in the couples reduced form regression. It is positive and statistically significant (and significant at the 90 percent level of confidence) in the randomly-paired male-female regression, which is opposite to the sign anticipated.

This is a strong test of the Grossman effect. Better management of health ailments can reduce the severity of health impact without necessarily affecting the mortality rate (at least over this range of ages). One way to test for the latter effect is to reestimate the two measures of overall health, difficulty in climbing stairs and subjective assessment of own health, but this time adding the ailments index as a control.[53] While these measures lack the objectivity of death rate, and thus, are noisier measures of ill health, they may provide a better index of health across the population than a mortality rate that represents the tail of ill health in the sample. The Grossman model predicts that the more educated partner is less likely to report ill health, holding constant accumulated ailments.

Columns 2 and 3 report the results for married couples, and columns 5 and 6 for randomly-pair partners. The coefficients on education differences are consistent with the management hypothesis. Three of the four coefficients on the differences in education variable are negative and statistically different from zero at least at the 90 percent level of confidence. If the benefits of education are transferable across couples then we might expect to see larger effects of education in the regressions comparing randomly-assigned pairs as compared to married couples, but we do not. The management effects of education seem to be individual specific.

Savings propensity also figures in lower mortality rates and lower rates of ill health, holding constant differences in consumption habits and existing health habits. The coefficients on 14 of 15 savings

[52] For example, more educated smokers might smoke each cigarette less intensely or smoke brands with less tar; or perhaps more educated individuals who are overweight have less saturated fat in their diet, or take in more antioxidants in the form of fruits and vegetables to reduce the production of cholesterol, and so forth.

[53] I obtain similar estimates if I include a vector of dummy variables, one for each ailment separately.

variables in the table are the anticipated signs and seven are statistically different from zero. The pension variable shows up as the strongest and most consistent savings variable in the table. Thus, the management hypothesis seems to show itself in the variables that proxy respondents' savings propensity.

The coefficients on the ability index also support the hypothesis indirectly. Though individuals who report difficulty in reading a map are less likely to die than their more able counterparts in the sample (columns 1 and 4), they are more likely to report ill health, given a set of ailments (columns 2-3 and columns 5-6).

VII. A LAST LOOK AT EDUCATION COEFFICIENTS

Table 1 suggests that in the context of simple mean values, education is importantly correlated with consumption habits and measures of ill health in middle age. The coefficients reported in subsequent tables show that an explanatory role for education persists, even after controlling for confounding factors, though the effects are not dominant in most cases. It is useful to illustrate the omitted variables bias on the education coefficients that result if 'other' variables are not available, as is often the case in empirical work that has access to less information than availed in the HRS.

Toward this end, I estimate a simple cross section regression including all 9,832 observations for the married couples in the data. This exercise biases the standard errors downward to the extent that within-household behavior is not independent, but it serves to illustrate the contribution of other variables to the explanation of differences in health across the database.[54]

Table 7 shows the results. Column 1 lists the estimated coefficient on years of education controlling only for typical demographic variables, including age, gender, race, number of children, household income and household wealth. Column 2 lists the same coefficients after adding variables that describe savings behavior, parent information, job information and so on, but not variables that reflect either consumption habits or existing ailments (that is, it includes the independent variable in table 3). Hence, the coefficients measure the reduced form impact of education on health.

[54] I reestimated all these regressions using only the randomly paired males and females in the data, thereby omitting the within-household variation. I get similar qualitative results.

The results support the contention that omitted variables bias can be important when education is not controlled confounding factors. The education coefficients are much smaller with the more parsimonious set of independent variables are used, even though they include household wealth and income. The controls clearly are important in disentangling the marginal influence of education on health. One result that stands out is the anemic effect of education on mortality, even when few competing independent variables are included. Perhaps education figures more prominently in death rates at older ages, but not for individuals in their fifties and early sixties.[55]

VIII. SUMMARY AND CONCLUSIONS

The paper reports on the results of a study of the health status of 4,917 middle age couples in the HRS. The main finding is that savings propensity appears to be a key component to health outcome. Savers make consumption choices that improve their health, accumulate fewer ailments and enjoy lower mortality rates.

The importance of the savings variables is consistent with either Becker-Mulligan who posit that education makes individuals more forward looking; or Fuchs who hypothesizes that individuals with lower rates of time preference select themselves into higher levels of education. Tests of these two models require data that describe individual behavior before and after they attain education, which are not availed in the HRS.

While education as such matters less after inclusion of savings and other variables, it still affects choices about consumption that affects health. The avenue by which this occurs is not clear. The data are inconsistent with the Schultz hypothesis that educated individuals have better information. Education also is correlated with better health, holding constant consumption decisions and existing maladies, a finding that is consistent with the Grossman hypothesis that that educated individuals better manage their ill health.

The HRS hints at a family factor that affects decisions that affect health. Respondents' heights, which are determined mostly at birth and early childhood, are correlated with their eventual educational attainment. They also are positively correlated with parents' education, and mother's age at birth. And

[55] This result is at odds with those reported in Lleras-Muney (2002) and cites therein.

indeed, the attained education of the respondent's oldest child is a good predictor of the respondent's own health in middle age. Parents' longevity and education also factor into many of the results. These findings are complementary with historical studies that find that smokers lower grades and aptitude scores in high school, are less likely to go to college and, if they do, more likely to perform poorly. The connection between education and poor health later on seems to form early in life.

These observations are suggestive of a broader family influence on savings behavior then education as such, though they do not preclude the existence of a pure effect of education. There are some subtle policy implications of the broader view. If the family's investment behavior importantly influences health outcome, then longer long-term improvements in overall health may depend less on improved flows of health information, and more on a gradual spread of a longer-term outlook among larger portions of the population. Whether discount rates are affected by the education process or by deeper family considerations is an important and open question.

Table 1: Simple Averages of Health Indices By Gender and Education

Categories	Less than High School Graduate (1)	High School Graduate (2)	College Graduate (3)
Proportion of sample who are:			
Smokers at age 50	.45	.38	.23
Moderate Drinkers	.37	.55	.70
Obese (BMI > 30)	.24	.21	.16
Proportion of sample who:			
Have difficulty climbing stairs	.37	.25	.13
Self report they are in Poor Health	.15	.05	.02
Ailments Index a/	.97	.71	.59
Index of Expected Longevity b/	5.2	6.2	6.7
Death Rate c/	.081	.054	.036
Number of observations	2,177	5,895	1,762

Source: Health and Retirement Survey, 1992, married couples with children.

a/ Equals the sum of dummy variables each equal to unity for a particular malady (heart disease, lung disease, kidney disease, hypertension, diabetes, current or past cancer episode, mental or emotional illness and ulcers.

b/ A number from zero to ten where zero denotes a respondent who views almost no chance of living to age 75 and ten denotes virtual certainty.

c/ Six year death rate, 1992-1998.

Table 2: Correlation of Own Education and Savings with Height

Independent variables	Mean	Attained a College Degree (1)	Years of Education (2)
Own Height *(feet)*	5.7	**.050****	**1.56****
		(0.02)	(0.12)
Mother's Education	9.3	**.019****	**.23****
		(0.001)	(0.01)
Father's Education	9.0	**.023****	**.19****
		(0.001)	(0.01)
Mother's Age at Birth	25.9	**.0021****	**.016****
		(0.001)	(0.005)
Father's Age at Birth	25.9	**.0015****	**.008****
		(0.001)	(0.004)
Female	0.3	**-.05****	**.56****
		(0.01)	(0.08)
Age	56.3	**.001**	**-.014****
		(0.001)	(0.005)
R-squared			.30
Intercept		-.59	-.32
Mean of dependent variable		.18	12.1
Number of observations		9,833	9,833

Dependent variable : in column 1 equals unity if the respondent earned a college degree, zero otherwise; and column 2 years of education attained by the respondent.

Estimates based on an ordinary least squares estimate. Numbers in parentheses are standard errors; * (**) denotes significance at the 90 (95) percent level, two tail test.

Source: Health and Retirement Survey, 1992, married couples with children.

Table 3: Perceived Effect of Consumption Habits on Longevity

SELECTED INDEPENDENT VARIABLES	REPORTED EFFECT ON LIVE-TO-AGE-75 INDEX [a/] *(0 means no chance and 10 virtual certainty of survival)*						PROBABILITY OF DEATH [c/]	
	FULL SAMPLE	EDUCATION LEVEL			SAVER STATUS [b/]		FULL SAMPLE	
		Did Not Graduate High School	High School Graduate, but No College Degree	College Graduate	Savers *Pension = 1 or IRA = 1*	NonSavers	Control for Ailments	
							NO	YES
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Smoke at age 50	**-.25***	**-.30***	**-.18***	**-.31**	**-.36***	**-.03**	**.054***	**.049***
	(0.070)	(0.150)	(0.090)	(0.160)	(0.080)	(0.130)	(0.005)	(0.005)
Moderate Drinker	**0.31***	**.19**	**.39***	**-.065**	**.33***	**.28***	**-.020***	**-.008**
	(0.070)	(0.160)	(0.090)	(0.160)	(0.080)	(0.130)	(0.005)	(0.005)
Obese (BMI > 30)	**0.14**	**.17**	**.22**	**.19**	**.19**	**.04**	**-.007**	**-.023***
	(0.090)	(0.180)	(0.120)	(0.190)	(0.110)	(0.160)	(0.006)	(0.006)
Other consumption variables d/	X	X	X	X	X	X	X	X
Dummy vars. existing health probs. e/	X	X	X	X	X	X		X
Other Variables f/	X	X	X	X	X	X	X	X
Mean Dependent Variable	6.0	5.2	6.2	6.6	6.3	5.5	.056	.056
Number of observations	9,834	2,997	5,373	1,761	6,539	3,293	9,834	9,834

The table reports the coefficients and standard errors (in parentheses) of coefficients on consumption variables, holding constant other demographic variables and indices of self reported maladies.
All estimates are made using OLS; numbers in parentheses are standard errors; * (**) denotes that the coefficient is different from zero at the 90 (95) percent level of confidence.

The dependent variable in the first column equals unity if the respondent dies within six years of the survey date, zero otherwise. In all other columns the dependent variable is the self reported index of survival.

a/ The respondent chooses a number denoting his or her own probability of survival to age 75, where zero is almost certain premature death, and ten is virtual certainty of survival.

b/ The variable savers equals unity if the individual either is or was covered by a pension at work or has an IRA in the household.

c/ The death rate covers six years from the time of the initial survey in 1992.

d/ Dummy variables are included denoting quitting over the ages 45-49, 37-44 and less than 37, as well as dummy variables for overweight but not obese, excessively thin, and problem drinking. Hence, the consumption variables are measured against never smoked, normal BMI category and abstinence from alcohol.

e/ Includes a series of dummy variables equal to unity if the respondent says that he has a lung problem, heart disease, kidney malfunction, diabetes, cancer episode, hypertension, difficulty climbing stairs and self reported health 'poor', as well as the number of days spent in the hospital and the number of doctor visits in the past year.

f/ Includes age and dummy variables denoting gender, race, industry and occupation, exposure to industrial hazards, number of children, military experience, age of parents (age of death if deceased), homemaker status, attend religious services weekly, health insurance coverage, household wealth, household income, household eligibility for Medicare, Medicaid and Foodstamps, and other dummy variables denoting 'do not know' for a few key variables such as parents' education and ages.

Table 4: Differences in Consumption Behavior

INDEPENDENT VARIABLES	HUSBAND-WIFE PAIRS			RANDOMLY-MATCHED MALE-FEMALE PAIRS		
	SMOKING AT AGE 50	MODERATE DRINKER	OVERWEIGHT BMI > 30	SMOKING AT AGE 50	MODERATE DRINKER	OVERWEIGHT BMI > 30
	(1)	(2)	(3)	(4)	(5)	(6)
Education						
Male's minus female's	**-.007****	**.006****	**.009****	**-.007****	**.014****	**-.001**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Parents (average years)	**-.001**	**-.004**	**-.007****	**0.002**	**.008****	**-.005****
	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)
Proxies for Investment Behavior						
Years of Education -- Eldest Child				**-.017****	**.011****	**-.007****
				(0.003)	(0.004)	(0.003)
Have an IRA in Household				**-.059****	**.091****	**-.015**
				(0.020)	(0.015)	(0.012)
Have or Had an employer pension	**-.053****	**.039****	**-.003**	**-.052****	**.073****	**.008**
	(0.015)	(0.015)	(0.014)	(0.017)	(0.017)	(0.014)
Will leave a bequest				**-.010**	**.010***	**-.010***
(index from 1 to 5 with 5 definitely yes)				(0.005)	(0.005)	(0.004)
Ability Proxy						
Hard to read a map	**.031**	**-.023**	**-.059***	**.043****	**-.025**	**-.000**
	(0.017)	(0.017)	(0.016)	(0.020)	(0.021)	(0.017)
Indices of Family Longevity						
Age of Respondent's Same-sex Parent	**-.0009****	**.0011****	**-.0010***	**-.0010***	**.0009**	**-.0011****
(age of death if deceased)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0004)
Age of Respondent's Opposite-sex Parent	**-.000**	**-.0004**	**-.0010***	**-.0000**	**-.0005**	**-.0010****
(age of death if deceased)	(0.0010)	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0004)
Other variables						
Employer-provided health insurance				**.00**	**.05****	**.03**
Household Wealth				**.054****	**.03****	**-.013**
Household Income				**-.19**	**.52****	**.00**
Age	**.001**	**-.000**	**-.005****	**.001**	**.002**	**-.002**
Nonwhite	**-.02**	**.02**	**-.04**	**.000**	**-.03**	**.045****
Nonwhite	**-.02**	**.02**	**-.04**	**.000**	**-.03**	**.045****
Other variables *a/*	X	X	X	X	X	X
Intercept	.06	-.03	.013	.02	.001	-.003
Mean of dependent variable	.095	.37	-.021	.096	.027	.022
Number of observations	4,917	4,917	4,917	4,917	4,917	4,917

Dependent variables in columns 1-3 are differences in the values of the dummy variables, $X_H - X_W$, where the former is the dummy variable pertains to the husband and the later to the wife. Thus, in column 1, the dependent variable equals unity if the husband smokes and not the wife, minus unity if the wife smokes but not the husband, and zero if they both smoke or both do not smoke. The variables are the same in columns 4-6 except the household subscripts are different to reflect random pairings.

Estimates are based on ordinary least squares; standard errors in parentheses; * (**) denotes significance at the 90 (95) percent level of confidence.

a/ See note f to table 3.

Table 5: Differences in Measures of Overall Fitness and Health

INDEPENDENT VARIABLES	HUSBAND-WIFE PAIRS			RANDOMLY MATCHED MALE-FEMALE PAIRS		
	Difficulty Climbing Stairs	Subjective Health Poor	Ailments Index	Difficulty Climbing Stairs	Subjective Health Poor	Ailments Index
	(1)	(2)	(3)	(4)	(5)	(3)
Education						
Male's minus female's (years)	**-.006****	**-.005****	**-.008**	**.001**	**-.007***	**-.008**
	(0.003)	(0.002)	(0.007)	(0.003)	(0.002)	(0.006)
Parents (average years)	**-.001**	**-.001**	**-.001**	**-.003**	**-.001**	**-.001**
	(0.002)	(0.003)	(0.005)	(0.002)	(0.001)	(0.005)
Proxies for Investment Behavior						
Years of Education -- Eldest Child				**-.012****	**-.003***	**-.009**
				(0.003)	(0.002)	(0.007)
Have an IRA in Household				**-.020**	**-.012**	**-.093****
				(0.013)	(0.008)	(0.018)
Have or Had an employer pension	**-.043***	**-.037***	**-.062****	**-.033****	**-.034****	**-.094****
	(0.014)	(0.015)	(0.032)	(0.014)	(0.008)	(0.010)
Will leave a bequest				**-.013****	**-.006****	**-.025****
(index from 1 to 5 with 5 definitely yes)				(0.005)	(0.003)	(0.009)
Ability Proxy						
Hard to read a map	**.09****	**.031****	**.17***	**.11***	**.06***	**.18****
	(0.017)	(0.010)	(0.036)	(0.017)	(0.010)	(0.040)
Indices of Family Longevity						
Age of Respondent's Same-sex Parent	**-.0002**	**-.000**	**-.0003**	**-.0008**	**.0001**	**-.0018***
(age of death if deceased)	(0.0004)	(0.0030)	(0.0009)	(0.0004)	(0.0004)	(0.0009)
Age of Respondent's Opposite-sex Parent	**-.0008****	**-.002**	**-.0026****	**-.0010****	**-.0002**	**-.0024****
(age of death if deceased)	(0.0004)	(0.0020)	(0.0009)	(0.0004)	(0.0004)	(0.0009)
Consumption variables a/						
Smoke at age 50	**.096****	**.002**	**.010****	**.087****	**.009**	**.067****
Moderate Drinker	**.14****	**.017****	**.27****	**-.065****	**-.049****	**-.193****
Obese BMI > 30	**-.015**	**-.040****	**-.13****	**.190***	**.005**	**.330****
Other variables						
Employer-provided health insurance				**-.03**	**-.029****	**-.002**
Household Wealth				**-.01**	**-.014***	**-.070****
Household Income				**-.29****	**-.11**	**.028**
Age	**.006****	**.001**	**.023****	**.007***	**.000**	**.019****
Nonwhite	**-.004**	**-.015**	**-.03**	**-.02**	**.002**	**.028**
Other variables b/	X	X	X	X	X	X
Intercept	-.04	-.03	-.025	-.07	.03	-.07
Mean of dependent variable	-.065	0.37	.034	-.066	.021'	.032
Number of observations	4,917	4,917	.034	4,917	4,917	4,916

Dependent variable: in columns 1-2 equals one if the husband has the malady and not his wife, minus one if the wife has the malady and not the husband, and zero if both are healthy or both unhealthy.
In column 3, it equals the ailments index for the husband minus the index for his wife. The same dependent variables are shown in columns 4-6 except that they compare randomly matched husbands and wives.

Estimates are based on ordinary least squares; standard errors in parentheses; * (**) denotes significance at the 90 (95) percent level.

a/ Dummy variables are included denoting quitting over the ages 45-49, 37-44 and less than 37, as well as dummy variables for overweight but not obese, excessively thin, and problem drinking. Hence, the consumption variables are measured against never smoked, normal BMI category and abstinence from alcohol.

b/ See note f in table 3.

Table 6: Health Repercussions of Consumption Habits and Existing Ailments

INDEPENDENT VARIABLES	HUSBAND-WIFE PAIRS			RANDOMLY-MATCHED MALE-FEMALE PAIRS		
	Six-year Death Rate	Subjective Health 'poor'	Hard Climbing Stairs	Six-year Death Rate	Subjective Health 'poor'	Hard Climbing Stairs
	(1)	(2)	(3)	(4)	(5)	(6)
Education						
Male's minus female's	**-.001**	**-.004****	**-.005***	**.003***	**-.006****	**.001**
	(0.002)	(0.002)	(0.003)	(0.0015)	(0.0015)	(0.0030)
Parents (average years)	**.001**	**-.001**	**-.00**	**.001**	**.000**	**-.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.020)
Proxies for Investment Behavior						
Years of education -- eldest child				**-.000**	**-.002**	**-.011****
				(0.002)	(0.008)	(0.003)
Have an IRA in the Household				**.008**	**-.004**	**-.011**
				(0.007)	(0.008)	(0.013)
Have or Had an employer pension	**-.021****	**-.033****	**-.037****	**-.025****	**-.026****	**-.023**
	(0.008)	(0.008)	(0.014)	(0.008)	(0.008)	(0.015)
Will leave a bequest *(index from 1 to 5 with 5 definitely yes)*				**-.003**	**-.004**	**-.011****
				(0.003)	(0.003)	(0.0050)
Ability Proxy						
Hard to read a map	**-.024****	**.017***	**.078****	**-.016**	**.047****	**.094****
	(0.010)	(0.009)	(0.017)	(0.010)	(0.011)	(0.018)
Indices of Family Longevity						
Age of Respondent's Same-sex Parent *(age of death if deceased)*	**-.0002**	**-.000**	**.000**	**-.0005***	**-.0001**	**-.0002**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0004)
Age of Respondent's Opposite-sex Parent *(age of death if deceased)*	**-.0002**	**-.000**	**-.0005**	**-.0004**	**.000**	**-.0008***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0004)
Consumption variables *a/*						
Smoke at Age 50	**.043****	**-.005**	**.078****	**.051****	**.003**	**.08****
Moderate Drinker	**-.008**	**-.028****	**-.003**	**-.006**	**-.022**	**-.045****
Obese BMI >	**-.037****	**-.004**	**.115****	**-.031****	**-.033****	**.15****
Indices of poor health						
Hard to climb stairs	**.028****			**.043****		
Subjective health 'poor'	**.114****			**.080****		
Ailments index	**.029****	**.076****	**.088****	**.020****	**.082****	**.10****
Other variables						
Employer-provided health insurance				**.003**	**-.029****	**-.026**
Household Wealth				**.003**	**-.0010**	**-.004**
Household Income				**-.13**	**-.13**	**-.30****
Age	**.0015**	**.001**	**.003****	**.003****	**-.012**	**.005****
Nonwhite	**-.010**	**-.01**	**.005**	**.010**	**.00**	**-.02**
Smoking, alcohol, BMI and hazards	X	X	X	X	X	X
Other variables *b/*	X	X	X	X	X	X
Intercept	.027	.03	-.053	.019	.034	-.078
Mean of dependent variable	.045	.021	-0.065	.043	.021	.067
Number of observations	4,916	4,916	4,916	4,916	4,916	4,916

Dependent variable: in column 1 equals unity if the husband died and not the wife, minus one if the wife died but not the husband, and zero otherwise. The results in columns 2-3 are the same as those reported in table 5, except that they hold constant differences in the ailments index. Results in columns 4-6 are the same except for differences in household subscripts.

a/ Dummy variables are included denoting quitting over the ages 45-49, 37-44 and less than 37, as well as dummy variables for overweight but not obese, excessively thin, and problem drinking. Hence, the consumption variables are measured against never smoked, normal BMI category and abstinence from alcohol.

b/ See note f in table 3.

Table 7: Summary of Education Coefficients Pooled Cross Section Estimates

Dependent variables	**Include common demographic variables a/** (1)	**Add savings and other variables b/** (2)
Consumption Habits		
Smoke at Age 50	-.013**	-.004*
Moderate drinker	.028**	.014*
Obese (BMI > 30)	-.004**	0.001
Indices of ill Health c/		
Hard to climb stairs	-.019**	-.004**
Poor health	-.013**	-.007**
Ailments index	-.022**	-0.004
Death	-.0016*	0.0006

The numbers in the table are coefficients on a continuous education variable in an OLS pooled regression with varying numbers of independent variables.

Numbers in parentheses are standard errors; an asterisk denotes that the coefficient is statistically different from zero at the 95 percent confidence level.

a/ The independent variables in column 1 include age, race, gender and children variables as well as household net worth and household income.

b/ The independent variables in column 3 add education of eldest child, IRA in household, pension participation and bequest motive. parents' education and ages, weekly religious attendance, homemaker, military service, employer insurance, Medicare, Medicaid and foodstamps eligibility, and dummy variables denoting occupation and industry of job.

c/ Do not include consumption variables and therefore reflect a reduced form estimate.

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