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ABSTRACT

Occupation is discussed as a social determinant of health. Occupation has received little attention in this light in the economics literature. We examine occupation in a life-course framework and use measures of first-occupation, initial health, and mother's education. We contend that first occupation is a choice made relatively early in life that affects health outcomes at later ages. We examine first-occupation for two reasons: 1) there is growing evidence that early determinants affect later health and occupation has received little attention in this regard and 2) first occupation is predetermined in analysis of later health, which helps to address the issue of potential simultaneity.

Using data from the Panel Study of Income Dynamics (PSID) we estimate the impact of initial occupation on two measures of health later in life: respondent-reported fair/poor health and ever suffering a heart attack. The PSID offers the opportunity to examine a lifecycle perspective as we can examine the impact of early occupation on later health while controlling for several predetermined conditions such as mother's education and health in youth. Estimates suggest that first-occupation has a durable impact on later health, ceteris paribus, but that the impact varies by health measure and the set of control variables in regression specifications.

Early choice of occupation could be a critical factor in successful aging and this information may pave the way to developing more effective workplace and public policies to improve health in older ages.

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Introduction

Much of life is spent working. Not only do individuals work many years over their life-time, they also work many hours per year. Based on the sheer volume of one's time spent working, many aspects of an individual's job have the potential to impact health. The impact of occupation might be most evident for older individuals, both because of the cumulative effect of an individual's occupational commitment over time and because the decline in health occurs largely at older ages. In an analogous way, education is determined early in life and has been shown to be a very significant social determinant of health. However, there is evidence that the impact of education, while still important for older individuals, diminishes over time (Cutler and Lleras-Muney 2006). This suggests the potential for an increasing role of additional social determinants of health, such as occupation, as people age.

We focus on occupation as a key dimension of work since it defines many aspects of work, and also focus on initial occupational choice as it helps to address issues of simultaneity between health and occupational choice. Since an individual's initial occupation is pre-determined in analysis of later health, the direction of causality is more clearly delineated. A focus on initial occupation is also warranted as there is increased interest in early determinants of later health. It is notable that occupation has received little attention in this regard, given that it is a choice made quite early in life and one with the potential for significant impact on lifetime health. First-occupation could set in motion a trajectory of interacting labor market and health outcomes over time that could affect health for years to come. If one's first occupation is as a laborer, this could result in accumulated physical deterioration at later ages even given the possibility for later changes in occupation. Also, initial job characteristics such as a lack of health insurance when young could have affects on health later. On the other hand, early occupation as a professional could encourage protective health habits through the influence of peers in the occupation and might be associated with more generous health insurance coverage. Even considering the possibility of occupational mobility over time, first occupation may establish a trajectory that affects health in older ages.

Using a sample from the Panel Study of Income Dynamics (PSID) we estimate the impact of broad categories of occupation on two measures of health: reported fair/poor health and ever suffering a heart attack. The first is a more comprehensive measure while the second is a more specific, less subjective measure. The two complement each other. We analyze the impact of initial occupation on health at older ages while controlling for early conditions.

Our findings suggest that first-occupation may be an important determinant of later health, yet one that has received less attention than other socioeconomic measures such as education and income. The impact of first-occupation varies depending on the health measure and the covariates used in the specification. Occupation may be a useful construct to examine as a social determinant of health as it may lead to effective and feasible policy interventions.

Related Literature

Our study draws on and adds to two lines of research. The first is a growing literature that traces how conditions early in life affect future health and the other focuses on the role of social determinants of health. With regard to the first, for instance, the fetal origins literature posits that fetal conditions can affect the propensity for future health conditions such as heart disease and diabetes (Barker 1990). Another interesting study of fetal conditions uses the 1918 influenza pandemic as a natural experiment. Those who were in utero during the epidemic had lower educational attainment, income, and SES and higher rates of physical disability compared to others (Almond 2006). Moving past fetal origins, other research suggests a relationship between poor childhood conditions and later health (Wadsworth and Kuh 1997; Currie and Stabile 2003; Almond 2006).

The second related literature focuses on the role of social determinants of health such as education and income, whether determined at birth or otherwise. Economists have explored education as a key contributor in the production of health since the seminal work by Grossman (Grossman 1972). A substantial body of research documents a theoretical and empirical relationship between higher educational attainment and better health (for example, (Grossman 1972; Elo and Preston 1996; Grossman 2005; Lleras-Muney 2005; Cutler and Lleras-Muney 2006; MacInnis 2006). Mechanisms for this effect would be that higher education is correlated with better health habits (Kenkel 1991), and other production factors. Education is typically determined relatively early in life, yet has a long-term impact on health. However, as noted earlier, while the importance of education is durable, its effects diminish for older adults (Smith 1999; Cutler and Lleras-Muney 2006). Other social determinants may play an increasingly important role as the impact of education declines. We suggest that occupation may be a determinant whose impact increases over the life span due to its cumulative impact.

Many studies have also demonstrated a strong positive association between income and health. A line of study examines the cumulative stress (allostatic load) of low income among other factors and its impact on health (Seeman, McEwen et al. 2001; Seeman, Singer et al. 2002). Economists are increasingly interested not only the duration over which income affects health, but also in whether health affects income, or both (Smith 1999; Cutler and Lleras-Muney 2006). In addition, lower socioeconomic status, generally measured as a composite of income and education, has also been found to result in lower health (Kitagawa and Hauser 1973; Williams 1998; Rogers, Hummer et al. 2000; Ferrie 2003). Some of the effect of income and education has been found to occur through their impact on worse health habits, greater stress and less ability to handle stress (Lantz, House et al. 1998; Gallo, Bradley et al. 2004; Lantz, House et al. 2005).

Within the economics field, studies focusing on the role of education and/or income on health have often ignored occupation or have sometimes controlled for occupation in regressions of health, but do not study occupation per se.[1] One notable exception is a study by Case and Deaton which finds that people in manual occupations have lower self reported health status and a greater rate of decline in health status over time (Case and Deaton 2003). Another article using historical data from the mid-nineteenth century, in contrast, finds a limited effect using broad occupational characteristics (Ferrie 2001).

Outside of the economics literature, an influential set of longitudinal studies of British civil servants examine how occupation affects health (Marmot 1983; Marmot and Smith 1997; Marmot and Bobak 2000; Marmot 2001). The key finding is that lower occupational status is associated with worse health, controlling demographics, health habits and income among other factors. These papers focus on social position, occupational stress, and job control as mechanisms for this relationship. This set of studies examines various dimensions of health, including coronary heart disease, self-reported health, morbidity and health related behaviors (Bosma, Marmot et al. 1997; Kubzansky, Kawachi et al. 1997; Marmot, Bosma et al. 1997; Stansfeld, Fuhrer et al. 2002; Ferrie, Martikainen et al. 2005). These conclusions were confirmed in studies of French as well as Japanese government workers (Morikawa, Martikainen et al. 2004; Sekine, Chandola et al. 2006). This research was conducted primarily in countries with universal health insurance, thus demonstrating that occupation matters for

[1] For example, in their examination of the relationship between education and health, Cutler and Lleras-Muney control for occupation in one specification, but do not show the occupation coefficients.

reasons beyond health insurance. That a gradient would be found even among a set of British (or other) government workers with relatively secure jobs, health insurance coverage and a relatively narrow set of job types is perhaps surprising, yet reinforces the value of using occupation as an informative determinant of health.

A series of studies use PSID data on United States workers and their jobs from 1968 to 1991 to examine the role of job stress and control on subsequent mortality. They find that cumulative exposure to low control jobs and passive work significantly increases mortality. These studies extend previous analysis by examining cumulative exposure to job characteristics and they point to the importance of considering health determinants from a life span approach (Karasek, Theorell et al. 1988; Amick and Celentano 1991; Karasek 1996; Theorell and Karasek 1996; Amick, Kawachi et al. 1998).

This study adds to the literature by focusing on occupation as a social determinant of health and by focusing on initial occupation. Initial occupation is conceptualized as a choice or condition that can establish a health trajectory. We take several approaches that begin to address occupation from a life-span perspective. These include not only focus on first-occupation, but also controlling for mother's education and own health status in youth. In addition, focusing on first-occupation helps to alleviate concerns about the potential for reverse causality of current health affecting current occupation in older ages.

Conceptual Framework

Occupation defines much of work. It sums up a variety of characteristics that could affect health. Direct effects may occur through job characteristics like physical nature of the job (e.g. manual labor) or adverse physical conditions such as heat and noise. A large literature in occupational medicine has examined the effects of specific conditions (Rosenstock and Cullen 2005). Similarly, job stress and control may vary systematically with occupation and have been found to affect health (Amick and Celentano 1991). Occupation may affect health indirectly through factors such as wages, (which ultimately will be translated into income) that are correlated with occupation. The existence and generosity of health insurance coverage associated with the occupation may also affect health. One's occupation may also define a set of peers; individuals are often affiliated with other members of their occupation (e.g. through professional associations or unions), and the health habits and other health related behavior of

peers might affect ones own health habits. Poor health habits, such as smoking, drinking alcohol, over eating/consumption of high fat and calorie foods, and lack of exercise may be initiated or exacerbated due to peers' influence in the occupation. Health habits have important impacts on health. In addition, occupation confers prestige and relates to socioeconomic status, which is thought to affect health e.g. (Marmot, Bosma et al. 1997).

While there are many reasons to believe that occupation may affect health, there may be a spurious correlation between health and occupation and/or reverse causality. Occupation and health may both be explained by other factors. For instance, own education, mother's education and health while young may all affect both health and occupational choice. Other factors such as gender and race may also affect both health and occupation. Alternatively, health may affect occupation and there may be an ongoing feedback mechanism between health and occupational mobility.

A life-course perspective on the relationship between occupation and health is useful in addressing causality. As there are typically fewer health problems for younger adults who are initially entering the labor force, there may be relatively few cases in which poor health affects initial occupational choice. Controlling for health before entering the labor market can help address the potential for reverse causality. As individuals age and their health deteriorates, they may respond to worsening health by changing jobs or occupations, or by full or partial withdrawal from the labor market. Health is most likely to affect job selection, occupation and labor supply in older ages when declines in health may limit abilities and productivity on the job.

We conceptualize initial occupation as a choice or condition can establish a health trajectory rather early in adulthood yet is relatively free from the impact of health on occupation. Further, our interest is in the extent to which first occupation has an impact later in life when allowing later changes to be fully absorbed by first occupation. That is, we are less concerned with the array of factors that may have been caused by first occupation and are focused instead on the cumulative impact on future health.

Data and Methods

PSID. We use data from the Panel Study of Income Dynamics (PSID), which is a longitudinal study of a representative sample of U.S. individuals and their families. The PSID

emphasizes the dynamic aspects of economic and demographic behavior, and it contains a wide range of information, including occupation and health.[2]

Starting with a national sample of approximately 4,800 U.S. households in 1968, the PSID re-interviewed individuals from these households every year until 1997, and every other year since that time. New households were added as the children of the panel families grew older and formed their own family units. At the conclusion of the 2001 data collection, the PSID had collected information spanning as many as 34 years of the lives of some observations. While the initial response rate in 1968 was somewhat low (76 percent), annual response rates for follow-up were exceedingly high. These ranged from 88.5 percent in 1969 to between 96.9 and 98.5 percent following. Given the cumulative effect of even small yearly dropout rates, attention to potential selection bias is always warranted. However, a National Science Foundation commissioned study found that only a negligible portion of attrition in the PSID is explained by systematic attrition.

Sample. Of the 11,481 individuals who were either a head of household or a wife of a head of household in 2001, we restrict the sample to those who had valid responses to the health-related questions in 2001, yielding 11,321 individuals. The respondent answered questions for him/herself and the spouse, and so we control for whether or not the individual answered the questionnaire. Then, since our focus in on health outcomes that occur after initial occupation selection, we drop individuals younger than 30 years old, leaving 9,389 observations. Valid racial information is missing for 500 individuals and valid information for first occupation is missing for 700 individuals, leaving approximately 8,000 observations available for analysis.

Variables Table 1 lists the dependent and independent variables that we use in our analyses. The definitions and derivations of key variables are described below. More explanation is provided for those variables that are unique to this study and less to the standard socioeconomic and demographic measures.

Insert Table 1

[2] The PSID is conducted by the Survey Research Center, Institute for Social Research at the University of Michigan, and has been primarily funded by the National Science Foundation and the National Institute on Aging.

Health measures. We use two health measures that complement each other so that we can assess whether the results are robust across different kinds of measures. Poor or fair self-reported health status (a binary outcome) in 2001 is the primary health outcome. Self-rated health is frequently used in population based studies and has been found to be a valid indicator of overall health (Idler and Benyamini 1997; Idler, Russell et al. 2000). Although it is a subjective measure, it is considered to be quite comprehensive, encompassing multiple domains of health. Approximately 16% of the analytic sample reported their health to be fair or poor on a standard five-category scale.

The second health measure used is ever having a heart attack, (as reported by individuals in 2001). Heart attacks are likely to have been confirmed by a physician and are serious events, so the issue of recall is not likely to be problematic. Only 4% of the sample reports ever having a heart attack. This more specific measure contrasts to the broader indicator of self-rated overall health.

First-occupation. We take advantage of the longitudinal nature of the PSID data on occupation in determining whether early occupation affects later health. In 2001, respondents answered the question, "Thinking of your first full-time regular job, what kind of work did you do?" The responses by individuals to this question were categorized into the 1970 Census 3-digit occupational codes. Partly in order to have a sufficient number of sampled individuals within each occupational category to perform statistical analysis, we aggregate the occupational codes into nine broad categories and homemaker. These are listed and explained in Tables 1-3.[3] Those who reported their occupation as homemaker were categorized as such. Those who reported that they were never employed were eliminated from the sample. These ten broad occupational categories, including homemaker, are chosen to correspond with basic occupational categories of interest and to correspond to the categories often found in the labor literature. Note that in all the regressions, professional is the omitted (referent) occupational category.

We calculated a measure of occupational mobility because it is of interest on its own and to control for the effect of changes in occupation over time. The occupations are listed in Table 1 in order of 'prestige' from higher to lower occupational status based on average educational

[3] An appendix table provides further description and examples of occupations within our broad categories.

attainment in the occupation for our sample. In Table 2 we provide information on average educational attainment by occupation and ranking of occupations based on this measure of education. The ranking is used in the analysis in calculating occupational mobility. The ranking is also used in to assess the degree to which there is a health gradient by occupational ranking. However, we provide the coefficients on occupation so that the reader can use alternative orderings of occupation in the interpretation. To provide input into alternative rankings, we provide information on the ranking of occupations by average income of the occupation and a ranking with income and education equally weighted (both income and education are used in standard SES measures). The rank of the top five occupations to not change across alternative ranking criteria and there are only small variations in the rest of the occupations. We calculated a measure of occupational mobility by comparing the occupational ranking of an individual's first job with the occupational ranking of the individual's last job. Specifically, we calculate the linear difference between the ranking of an individual's first occupation and the individual's last occupation. If people move down the occupational rankings over time, their mobility measure would be negative. No-change is the omitted category.

Insert Table 2

Control variables. Controls for key socioeconomic and demographic variables as well as, importantly, health early in life and mother's education are included in the regressions. The standard demographic variables that we control for are educational attainment, race, marital status (unmarried), age, age squared, gender, and household size. Indicators regarding whether the individual is a household head and separately the respondent (as opposed to having the spouse answer for the individual) are included as well.

We are able to control for self-reported health before age 16 for each individual ('initial health') as well as mother's education; these are predetermined from the temporal perspective of current health. Controlling for initial health allows us to control to some extent for the potential selection into first occupation by health status. In contrast, examination of current health and current occupation could be simultaneously determined. Similarly use of mother's educational attainment helps to control for early conditions.

Also included are some control variables that can be considered to be determined in part by occupational characteristics. Health insurance coverage, for instance, can be provided as a

fringe benefit to employees and as such is a job characteristic. The provision and generosity of health insurance coverage may vary systematically by occupation. But it is also determined in part by the employee choices regarding uptake and plan selection[4]. Income can be considered a job characteristic to some degree. Instead of using a single year measure of income, we take an average of reported income between 1991 and 1999 to further minimize potential feedback from health to income. Occupational mobility might also be part job characteristic and part personal choices and abilities. We also control for smoking, drinking and BMI (the result of eating and exercise) which have been found to be key determinants of health. These may be determined in part by occupational characteristics, e.g. habits of peers or working conditions such as outside or inside work affecting smoking and sedentary or physical work affecting BMI.

Empirical occupational differences

Occupations differ with respect to health, as can be seen in Table 3. The percentage of the occupational category in fair/poor health is lowest in those occupations with higher education. There appears to be evidence of an educational gradient by SES for self-rated health; lower education is associated with lower self-rated health. The only exception to the ranking is that those in the services have a slightly higher percentage in poor health (19) as compared to laborers (17). There are relatively large percentage (but small absolute) differences in the percentage of individuals within an occupation that have ever had a heart attack. These range from a low of 2 for professional to a high of 6 for laborers operatives and farmers.

These comparisons in health measures across occupation are based on means from raw data. As such, it would be misleading to attribute all the difference to occupation. As can be seen in Table 3, there are differences by first-occupation in socioeconomic and demographic variables as well. For example, only 15% of clerical workers are male, while 88% and 78% of farmers and laborers are male. Income and education obviously vary by occupation. While the mean age for the sample is almost 49 years old, average for farmers is 57 and it is 59 for homemakers. The systematic differences by occupation in these measures demonstrate the need to control for a variety of characteristics in regressions in order to obtain a cleaner estimate of the impact of occupation on health.

[4] A worker may decide to get insurance on his spouse's employer's plan instead of his own.

Insert Table 3

Estimation Method

In order to examine the long-term association between first occupation and health at older ages, we specify the following regression.

$$health_{it} = \beta X_i + \phi Y_{i0} + \theta Z_{it} + \sum_{k=1}^{K} \delta_k Occ_{i0} + \varepsilon_{it} \quad (1)$$

where *health* of individual *i* at time *t* is assumed to be a function of a vector of individual time invariant characteristics (X) such as race, gender and age and early conditions (*Y*) which are predetermined at later ages. The latter include education attainment, mother's education and early health endowment of person which is measured as the self-reported health status from birth to age 16. Z_{it} represents those characteristics that are determined in part by occupation and in part by personal behavior and can vary over time, e.g. income, health insurance, health habits and occupational mobility. The set of dummy variables indicating each individual's first occupation (occupation at time zero- Occ_{i0}) are the focus of this study[5].

As indicated above, the two health outcomes, both binary, are: an indicator of fair or poor reported health status and a variable indicating whether an individual has ever had a heart attack. Because our outcome variables are binary, we use logistic regression analysis. Logit regression odds ratios are presented. We use robust standard errors clustered at the household level as we have observations of husband/wife pairs from the same household. This allows the errors to be arbitrarily correlated within households.

Results

Regression results

Results from regressions are reported separately for each fair/poor health and heart attack. Our approach for each set of regressions is to first display the results including only a set of

[5] As noted above, the occupational categories are created by aggregating 1970 Census 3-digit occupational codes into ten (nine occupations plus homemaker) mutually exclusive and exhaustive categories.

basic socio-economic and demographic variables (Column 1). The following specification, (Column 2), adds mother's education and early health in order to isolate their impact on first occupation. Although it is more typically used in studies of children's health, mother's education has been shown to have an important impact on children in a number of ways (Case, Lubotsky et al. 2002), many of which may also affect future health. Initial health is entered with mother's education as another key measure of childhood (predetermined) conditions. Column 2 is our preferred specification.

In the third column, results are displayed for regressions including time-varying measures representing factors that may be related to job characteristics. This specification controls for some key current characteristics that may link to health. However, it may over control since it is first occupation that sets in motion a set of future outcomes and choices. Our intent is to capture the cumulative impact of initial occupation. Income, health insurance and occupational mobility are plausibly determined in part by occupation. Health habits may be determined in part by peers in the occupation as well as by job conditions, (e.g. physical work and BMI or smoking and outdoor work). Examination of the coefficients on first occupation across specifications indicates how sensitive the coefficients on occupation are to inclusion of covariates, some of which represent factors that are in part determined by occupation. Of particular interest is the second column is it provides an estimate of the full impact of occupation (direct and indirect) when controlling for key predetermined and exogenous variables.

Fair/poor self-rated health

In the basic regressions that include only dummies on first occupation and demographic controls, all of the occupational dummies are significant at the 1% level or higher with the exception of managerial which is significant at the 10% level. (See Table 4 column 1). All of the occupations are significantly more likely to be in fair/poor health than the professional category, the omitted category. There is some evidence of an occupation gradient, with lower average educational attainment occupations being more likely to be in poor/fair health. Homemakers are the exception; their health is better than would be expected by the average education of the occupation. The coefficients on the occupational dummies range from 1.57 for managers to 3.46 for farmers when controlling for basic demographics, but not education. The signs of the coefficients on age, age squared, white and unmarried are significant and of the expected sign. Somewhat surprisingly, male is not significant. Head of household and household size are also insignificant. Whether health is reported by the respondent or by the spouse is significant with

interviewees having somewhat worse health. Note the coefficients and levels of significance of these control variables are fairly stable across the three specifications for these variables.

The inclusion of own education, mother's education and initial health reduces the magnitude of the occupation coefficients as well as the significance levels (Table 4, column 2). The coefficients on all of the white-collar (manager, sales, clerical) jobs become insignificant. Craft, service, laborer, operative and farmer remain significant (but a few are reduced in significance level) with the magnitude of the coefficients reduced in size. Own education, mother's education and initial health are all highly significant and of the expected sign. This suggests that part of the differences in health across occupations, especially for white-collar jobs, are explained by systematic differences in own education and initial conditions (mother's education and initial health) by occupation. This specification is the focus of this paper as it controls for relevant time-invariant factors and produces an estimate of the full effect of first occupation on later health.

Insert Table 4

We control for additional time-varying factors that could affect health. These are included as an alternative specification, to contrast with the cumulative impact estimated in the second specification. When variables that are in part job conditions (e.g. income, health insurance) and also health habits are included in regressions, only laborer, operative and farmer have significant coefficients. The magnitude and the significance of both of these are reduced in this third specification (column 3). There is little evidence in this specification of an education/health gradient. Income, mobility, and heath habits of those in the occupation are all significant covariates. Health insurance coverage is not significant nor are the two mobility measures. The variable that indicates that the last occupation is unknown is significant and is associated with an increase in the likelihood of being in poor health.[6] Health habits are all significant and of the predicted direction.

Heart attacks.

[6] It may be that those for whom we cannot identify last occupation may be more likely to have health problems and disabilities that have drawn them out of the labor force for a long time, but we cannot determine the cause of this significant effect.

Occupation displays a somewhat different pattern in its impact on ever having a heart attack as compared to self-rated overall health. In regressions of heart attacks, fewer occupations are significant in the basic specification. In column 1 of Table 5, five occupations are significantly different from professional (sales, clerical, crafts, service, laborer and operatives). The coefficients on these variables do not line up in support of a gradient. In column 2, the magnitude and significance of the coefficients on the five occupations decline and only services, laborer and operatives are significant at standard levels and there is no evidence of a gradient. In the last column including the full set of controls, only service remains significantly different from professional in the impact of first occupation on heart attack.

Insert Table 5

There are some differences in the significance and magnitude of control variables in the regressions of heart attacks as compared to the self-rated health results. In estimates with heart attack as the outcome, male gender and being a family head are significant but were insignificant in self-rated health. White and 'respondent' are not significant as they were in self-rated health fair/poor health. Perhaps surprisingly, mother's education and initial health are also not significantly associated with heart attacks, although they are all significant predictors of fair/poor reported health. Also, the magnitude of the coefficient on age is larger in heart attack regressions. Health insurance is significant and appears to increase the risk of heart attack. It may be more likely that those who have suffered a heart attack in the past have then signed up for health insurance coverage, suggesting why column 2 is our preferred specification.

Because heart attacks tend to occur at older ages, we conduct sensitivity analyses and estimate the same set of regressions using heart attack as the dependent variable but use the sample of those over 50 years old. This reduces the sample size to 3,120 observations. Results are almost the same across the two samples and almost the only difference is that now all of the occupational coefficients that were significant in column 2 retain their significance at standard levels in column 3 as well, but at lower levels as compared to column 2. The magnitudes of the coefficients on the occupational dummies are similar across the two age samples.

Insert Table 6

Strengths and Limitations

The life course perspective on occupation and health is the strength of this paper. We approach occupation as an early choice that sets in motion a trajectory that affects later health. Focusing on initial occupation allows us to estimate the significance of this decision for later health. Also, we control for initial health, an important factor rarely available in data sets for older workers. Inclusion of mother's education also helps to control for childhood socioeconomic status. Importantly, we are able to address the problems that would be associated with estimating the impact of occupation on health had both occupation and health been measured concurrently.

As in any study, there are, however, limitations. One issue is the choice of occupational categories. The set of occupations used in our analyses corresponds to the basic categories in government documents, extant literature, and common usage. A rather small set of occupations is needed for practical purposes and conforms to our broad conceptualization of occupation. However, there is likely heterogeneity within occupation. The optimal number and size of the categories to assess the relationship between occupation and health have not been established. Self-selection into occupation and the simultaneous determination of health and occupation could also be of potential concern. However, we have been able to at least partially address this by focusing on first occupation and later health and by controlling for childhood health. By controlling for childhood health, we are able to account for health status at the time individuals make initial occupational decisions.

There are also a number of limitations that are typical in estimating health production functions using a large population based data set. These include the potential for omitted variables and concerns about the use of self-reported health data. However, we include a rich set of covariates including information on childhood conditions as well as characteristics in adulthood that help to address concern about omitted variables. With regard to self-rated health, it has been shown to be a reliable, valid measure of health that has been associated with both functional decline and mortality (Idler and Benyamini 1997; Idler, Russell et al. 2000). The seriousness of heart attacks is further insurance against biased reporting. Furthermore, the PSID is a highly regarded for the quality of its data collection effort.

Discussion

We find that first-occupation has a significant impact on health later in life. This holds for both health measures studied, although to varying degrees. The finding and focus on the durable impact of first-occupation on health in older ages is the first that we know of in the literature. While the impact of first-occupation is reduced in magnitude and significance when controlling for a variety of factors, a number of occupations remain significantly associated with the two health measures even after including controls demographic and potential occupation related factors. This lasting impact is in consort with a growing body of literature documenting the importance of early conditions and choices on health later in life. Initial health and mother's education are also significant in self-rated health suggesting that these childhood circumstances too have a durable impact on health. It is worth noting however, that these two variables are insignificant in estimates of heart attack.

This study contributes evidence to the literature on an education and SES (education and income) gradient in health. Use of first-occupation extends the concept of a gradient to the influence of early outcomes or choices on later health. When examining fair/poor health, we find this gradient using raw means, indicating that occupations with the lowest average educational attainment have the worst health. However, when controlling for other factors, the gradient becomes less obvious and devolves to more of a white-collar jobs versus blue-collar distinction as most white-collar jobs are insignificantly different from the category of professional. There is less (little to modest) evidence of such a gradient for heart attacks and first–occupation, although a greater risk of heart attack occurs among several blue collar occupations (service, laborer operative) as compared to professionals, especially when using the full set of controls.

That early occupation affects later health suggests that the roots of successful aging might rest in part in a good first occupation. This information may pave the way to developing more effective workplace and public policies to improve health. The advice to simply select a good job is neither helpful nor realistic (although it is a good idea). Government currently subsidizes higher education and this is one route to improving occupational outcomes. Investment in education would be warranted not only due to the direct improvement in health and occupation, but also through its indirect effect on health via initial occupation. Government could develop other mechanisms based on the importance of early occupation, e.g. provide data on health aspects of occupations. Such information could help young people who may be

setting on a path of health as well as an income trajectory by choosing the amount of education they pursue and their first occupation. Information on income differences are wide-spread while in contrast, there is little to no information on the impact of one's first job on future health. Information on the intertwining dynamics of occupation and health over the life span could be generated and disseminated. This information could also be useful to employers, unions and professional organizations interested in designing programs to improve the health of their long-term workers or members. Occupations, or firms, that score well on health impact might seek to provide this information as a method of attracting workers interested in maintaining their own health. Those that do not score well could seek ways to improve.

Occupation may be a useful construct as a determinant of health and the workplace might be a powerful instrument for change as most individuals work. Remediation may be pertinent to particular occupations and occupational associations e.g., unions and professional organizations, and thus may serve as a vehicle for promoting or improving health. Occupational affinity could be used to increase good health habits of peers in occupations. Many firms and unions currently initiate these activities, e.g., EAPs are designed to improve health and health habits and the National Business Group on Health shares wellness information and implementation strategies to employers (Center for Prevention and Health Services, (http://www.businessgrouphealth.org/services/4_Part_Guide.pdf). Policies implemented in the workplace may also have reflection effects on non-workers (e.g. spouses and children of workers), and establish standards of behavior that influence other workers (Falba and Sindelar 2007).

In summary, early choice of occupation could be a critical factor in successful aging and this information may pave the way to developing more effective workplace and public policies to improve health in older ages. We focus on occupation in a life-course framework and use measures of first-occupation, initial health, mother's education and occupational mobility from first to last occupation to help to specify aspects of life course determinants of health. Our life-cycle view of occupation gives a different perspective on the importance of occupation as a determinate of health. This focus paves the way for further scrutiny of occupation and health over the life-course and also for innovative policies to improve health later in life.

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Table 1: Means, standard deviations and range of dependent and independent variables

Variable	Obs	Mean	Std. Dev	Min	Max
Independent variables					
Heart Attack (Ever) (0/1)	7990	0.04	0.20	0	1
Fair/Poor Health Status (0/1)	7990	0.16	0.36	0	1
Dependent variables					
Professional (First Occupation)	7990	0.14	0.35	0	1
Manager (First Occupation)	7990	0.03	0.17	0	1
Sales (First Occupation)	7990	0.06	0.25	0	1
Clerical (First Occupation)	7990	0.21	0.41	0	1
Craftsman (First Occupation)	7990	0.10	0.30	0	1
Services (First Occupation)	7990	0.17	0.38	0	1
Laborer (First Occupation)	7990	0.08	0.27	0	1
Operative (First Occupation)	7990	0.16	0.37	0	1
Farmer (First Occupation)	7990	0.03	0.18	0	1
Homemaker (First Occupation)	7990	0.01	0.10	0	1
Missing Parental Information	7990	0.13	0.34	0	1
Missing Education	7990	0.08	0.28	0	1
Income ($10,000s- ave. of 5 waves)	7990	5.08	4.24	0	67
Health Insurance (0/1)	7990	0.95	0.22	0	1
Upward Mobility	7990	0.42	0.49	0	1
Downward Mobility	7990	0.19	0.39	0	1
Last occupation unknown	7990	0.09	0.29	0	1
Smoke Now	7990	0.21	0.41	0	1
Ever Smoke	7990	0.26	0.44	0	1
Drink Alcohol	7990	0.58	0.49	0	1
Obese	7990	0.24	0.42	0	1

Table 2: Occupations ranked by mean education of each occupation *

	Education	Rank	Income	Rank	Combined Rank
Professional	15.71	1	7.66	1	1
Manager	14.31	2	7.04	2	2
Sales	13.83	3	5.93	3	3
Clerical	13.45	4	5.31	4	4
Craftsman	13.03	5	5.07	5	5
Service	12.68	6	3.91	9	7.5
Laborer	12.64	7	4.50	6	6.5
Operative	12.22	8	3.98	9	8.5
Farmer	11.36	9	4.12	7	8
Homemaker	10.50	10	2.06	10	10

* For comparison, alternative rankings provided by income (averaged over five waves) and by income and education equally weighted.

Table 3: Means by occupation and for all

Variable	All	Profes-sional	Manager	Sales	Clerical	Crafts	Service	Labor	Operative	Farmer	Home-maker
Poor Health (%)	0.16	0.08	0.10	0.10	0.14	0.14	0.19	0.17	0.22	0.29	0.33
Heart Attack (%)	0.04	0.02	0.03	0.03	0.03	0.05	0.04	0.06	0.06	0.06	0.05
Males (%)	0.48	0.43	0.61	0.44	0.15	0.91	0.32	0.90	0.58	0.80	0.05
Age (yrs.)	48.81	49.47	47.08	47.10	48.92	49.10	46.27	47.34	50.18	57.18	59.02
White (%)	0.70	0.86	0.85	0.79	0.71	0.77	0.54	0.69	0.62	0.67	0.35
Non-Whites (%)	0.30	0.14	0.15	0.21	0.29	0.23	0.46	0.31	0.38	0.33	0.65
Unmarried (%)	0.29	0.20	0.22	0.24	0.34	0.19	0.38	0.25	0.31	0.28	0.66
Household Size	2.91	2.91	3.10	2.86	2.84	2.92	3.04	2.97	2.87	2.68	2.60
Head of Household (%)	0.64	0.62	0.58	0.63	0.69	0.58	0.71	0.59	0.64	0.58	0.80
Education (yrs.)	13.27	15.71	14.34	13.83	13.44	13.00	12.66	12.62	12.18	11.37	10.64
Initial Health Status	4.25	4.41	4.46	4.34	4.27	4.32	4.11	4.25	4.16	4.22	3.97
Maternal Education	11.77	12.91	12.56	12.27	11.91	11.67	11.47	11.58	11.02	10.61	10.37
Missing Parental Information	0.13	0.13	0.06	0.10	0.10	0.13	0.13	0.13	0.15	0.19	0.28
Missing Education	0.08	0.05	0.09	0.05	0.05	0.07	0.07	0.07	0.07	0.04	0.01
Income ($1,000s)	5.08	7.58	7.08	5.90	5.28	5.03	3.87	4.46	3.92	4.07	2.13
Health Insurance	0.95	0.99	0.98	0.97	0.97	0.94	0.92	0.93	0.93	0.94	0.84
Upward	0.42	0.00	0.15	0.40	0.36	0.40	0.47	0.64	0.57	0.59	0.47
Downward	0.19	0.33	0.35	0.34	0.16	0.21	0.13	0.18	0.02	0.01	0.00
Last occupation unknown	0.09	0.13	0.14	0.12	0.17	0.11	0.16	0.12	0.19	0.26	0.49
Smoke (%)	0.21	0.09	0.15	0.17	0.19	0.24	0.26	0.31	0.25	0.20	0.18
Ever Smoked (%)	0.26	0.24	0.24	0.28	0.23	0.31	0.25	0.28	0.29	0.30	0.22
Drink (%)	0.58	0.68	0.67	0.63	0.56	0.67	0.52	0.62	0.52	0.47	0.24
Obese	0.24	0.13	0.13	0.21	0.22	0.26	0.30	0.26	0.31	0.28	0.41

Table 4: Odds ratios from Logit regressions of fair/poor health on occupation and control variables

Outcome	Poor Health	Poor Health	Poor Health
Method	***Logit***	***Logit***	***Logit***
Sample	***Age>30***	***Age>30***	***Age>30***
Manager	1.566*	1.250	1.253
	(0.380)	(0.298)	(0.306)
Sales	1.619***	1.125	1.003
	(0.298)	(0.211)	(0.190)
Clerical	1.698***	1.193	1.128
	(0.240)	(0.171)	(0.166)
Crafts	2.325***	1.358*	1.198
	(0.366)	(0.224)	(0.207)
Service	2.672***	1.480***	1.268
	(0.375)	(0.215)	(0.194)
Laborer	2.949***	1.605***	1.356*
	(0.521)	(0.276)	(0.249)
Operatives	3.250***	1.683***	1.438**
	(0.492)	(0.257)	(0.235)
Farmer	3.461***	1.618**	1.591**
	(0.693)	(0.331)	(0.342)
Homemaker	2.436***	1.078	0.871
	(0.764)	(0.347)	(0.284)
Male	0.883	0.985	1.056
	(0.115)	(0.123)	(0.131)
Age	1.090***	1.090***	1.111***
	(0.018)	(0.019)	(0.021)
Age Squared	1.000**	1.000**	0.999***
	(0.000)	(0.000)	(0.000)
White	0.475***	0.580***	0.689***
	(0.038)	(0.048)	(0.059)
Unmarried	1.295**	1.246*	1.066
	(0.163)	(0.157)	(0.137)
Household Size	0.962	0.972	0.958
	(0.031)	(0.033)	(0.032)
Head of Household	0.829	0.842	0.794*
	(0.115)	(0.117)	(0.111)
Interview Respondent	0.875**	0.944	0.876*
	(0.055)	(0.063)	(0.061)
Education Level		0.869***	0.934***
		(0.018)	(0.019)
Maternal Education		0.940***	0.957***
		(0.014)	(0.015)
Initial Health Level		0.666***	0.686***
		(0.030)	(0.035)
Missing Parent Information		1.255**	1.269**
		(0.118)	(0.119)

Outcome	Poor Health	Poor Health	Poor Health
Missing Education		1.343**	1.250*
		(0.157)	(0.148)
Income Level			0.912***
			(0.019)
Health Insurance			1.125
			(0.183)
Upward Mobility			1.024
			(0.098)
Downward Mobility			1.165
			(0.123)
Last occupation unknown			2.019***
			(0.240)
Smoke Now			1.811***
			(0.170)
Ever Smoke			1.638***
			(0.134)
Drink			0.647***
			(0.051)
Obese			2.193***
			(0.184)
Observations	7990	7990	7990

Robust p values in parentheses

* significant at 10%

** significant at 5%

*** significant at 1%

Table 5: Odds ratios from Logit regressions of ever have a heart attack on occupation and control variables

Outcome	Heart Attack	Heart Attack	Heart Attack
Method	***Logit***	***Logit***	***Logit***
Sample	***Age>30***	***Age>30***	***Age>30***
Manager	1.507	1.371	1.412
	(0.681)	(0.619)	(0.672)
Sales	1.868*	1.517	1.354
	(0.643)	(0.540)	(0.497)
Clerical	1.888**	1.551	1.433
	(0.546)	(0.461)	(0.443)
Crafts	2.068**	1.534	1.410
	(0.588)	(0.460)	(0.440)
Service	3.143***	2.266***	1.989**
	(0.860)	(0.649)	(0.612)
Laborer	2.810***	1.949**	1.696
	(0.840)	(0.620)	(0.593)
Operatives	2.882***	1.949**	1.690
	(0.790)	(0.584)	(0.562)
Farmer	1.495	0.944	0.894
	(0.586)	(0.394)	(0.412)
Homemaker	1.562	1.006	0.904
	(0.927)	(0.607)	(0.548)
Male	1.916***	2.028***	2.010***
	(0.438)	(0.464)	(0.440)
Age	1.405***	1.394***	1.384***
	(0.064)	(0.063)	(0.064)
Age Squared	0.998***	0.998***	0.998***
	(0.000)	(0.000)	(0.000)
White	0.964	1.089	1.146
	(0.138)	(0.167)	(0.174)
Unmarried	0.963	0.928	0.885
	(0.179)	(0.173)	(0.167)
Household Size	1.091*	1.094*	1.090*
	(0.054)	(0.055)	(0.055)
Head of Household	1.553	1.575	1.553
	(0.456)	(0.463)	(0.451)
Interview Respondent	1.129	1.177	1.136
	(0.145)	(0.153)	(0.150)
Education Level		0.925***	0.948*
		(0.025)	(0.027)
Maternal Education		0.958	0.966
		(0.025)	(0.025)
Initial Health Level		0.918	0.937
		(0.065)	(0.066)
Missing Parent Information		1.040	1.054
		(0.181)	(0.186)

Outcome	Heart Attack	Heart Attack	Heart Attack
Missing Education		0.791	0.754
		(0.216)	(0.213)
Income Level			0.991
			(0.026)
Health Insurance			2.014*
			(0.775)
Upward Mobility			1.210
			(0.219)
Downward Mobility			1.212
			(0.239)
Last occupation unknown			1.776***
			(0.357)
Smoke Now			1.649***
			(0.299)
Ever Smoke			1.459***
			(0.203)
Drink			0.784*
			(0.101)
Obese			1.725***
			(0.227)
Observations	7990	7990	7990

Robust p values in parentheses

* significant at 10%

** significant at 5%

*** significant at 1%

Table 6: Odds ratios from Logit regressions of ever have a heart attack on occupation and control variables for the sample over 50 years old and older (odds ratios and t statistics)

Outcome	Heart Attack	Heart Attack	Heart Attack
Method	*Logit*	*Logit*	*Logit*
Sample	*Age>50*	*Age>50*	*Age>50*
Manager	1.547	1.451	1.524
	(0.761)	(0.715)	(0.787)
Sales	1.926*	1.580	1.456
	(0.721)	(0.611)	(0.577)
Clerical	1.961**	1.640	1.560
	(0.599)	(0.517)	(0.507)
Crafts	1.834*	1.406	1.334
	(0.581)	(0.472)	(0.463)
Service	3.099***	2.304***	2.095**
	(0.930)	(0.721)	(0.695)
Laborer	3.068***	2.192**	1.987*
	(1.016)	(0.775)	(0.766)
Operatives	2.855***	1.998**	1.816*
	(0.858)	(0.659)	(0.650)
Farmer	1.485	0.977	0.981
	(0.621)	(0.440)	(0.482)
Homemaker	1.270	0.853	0.774
	(0.847)	(0.570)	(0.526)
Male	2.192***	2.303***	2.290***
	(0.502)	(0.529)	(0.520)
Age	1.517***	1.478***	1.482***
	(0.130)	(0.127)	(0.130)
Age Squared	0.997***	0.998***	0.997***
	(0.001)	(0.001)	(0.001)
White	1.021	1.133	1.180
	(0.166)	(0.195)	(0.201)
Unmarried	1.051	1.011	0.948
	(0.202)	(0.196)	(0.187)
Household Size	1.052	1.053	1.048
	(0.066)	(0.067)	(0.068)
Head of Household	1.475	1.491	1.479
	(0.445)	(0.454)	(0.452)
Interview Respondent	1.129	1.175	1.156
	(0.158)	(0.166)	(0.166)
Education Level		0.931**	0.956
		(0.027)	(0.029)
Maternal Education		0.965	0.974
		(0.028)	(0.028)
Initial Health Level		0.939	0.962
		(0.075)	(0.075)
Missing Parent Information		0.994	0.997
		(0.186)	(0.190)

Outcome	Heart Attack	Heart Attack	Heart Attack
Missing Education		0.752	0.703
		(0.234)	(0.230)
Income Level			1.001
			(0.024)
Health Insurance			1.575
			(0.684)
Upward Mobility			1.201
			(0.246)
Downward Mobility			1.270
			(0.290)
Last Occupation Unknown			1.767***
			(0.370)
Smoke Now			1.891***
			(0.375)
Ever Smoke			1.377**
			(0.205)
Drink			0.703**
			(0.098)
Obese			1.612***
			(0.243)
Observations	3120	3120	3120

Robust p values in parentheses

* significant at 10%
** significant at 5%
*** significant at 1%