

How to Measure “What People Do For a Living” in
Research on the Socioeconomic Correlates of Health

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Abstract

In this paper we ask two questions. First, is occupational standing associated with health outcomes when health-related criteria are used to establish the relative standing of occupations? This is especially interesting in light of recent evidence (Miech and Hauser 2000) that occupational standing is not independently associated with health outcomes when occupations are ranked using socioeconomic criteria. Second, are job characteristics more closely related to health outcomes than occupational characteristics? We use data from the Wisconsin Longitudinal Study, which includes a unique combination of occupational, job, and health measures. We find no independent relationship between occupational standing and health, using socioeconomic or health-related criteria. However, we do find a number of significant relationships between job characteristics and health outcomes. We are led to conclude that what people do for a living does matter for their health, above and beyond the effects of educational attainment, and that to assess the nature and magnitude of the effects of what people do for a living on their health we should measure the characteristics and requirements of their *jobs*, not of their *occupations*.

INTRODUCTION AND OBJECTIVES

Social and health scientists have long been concerned with the impact of socioeconomic circumstances on physical and mental health, and this interest seems to have grown markedly in recent years (Kaplan et al. 1997). Medical as well as social science journals now regularly feature research that considers the influence of education, occupation, income, and other variables on a variety of medical and public health problems. Our research is concerned with the *measurement* of socioeconomic factors – particularly occupational and job characteristics – in this area of study. In this paper we ask how conclusions about the health impacts of what people do for a living are affected by how occupational and job characteristics are measured and operationalized.

Occupations and Health

Innumerable observers have reported an inverse relationship between occupational standing (however measured) and mortality and morbidity rates (Marmot et al 1987; Kaplan and Keil 1993; Marmot et al. 1997; Gregario et al. 1997; Borooah 1999; Goodman 1999; Manor et al. 1999). For just two examples, Marmot, et al. (1997) showed that occupation affects self-reported health, rates of depression, and self-esteem in the United States and England and Kitagawa and Hauser (1973) demonstrated that occupation affects mortality in the United States. The fact that occupational standing and health outcomes are inversely related is not surprising in light of research showing that other indicators of socioeconomic standing – such as income, educational attainment, and wealth – are also negatively associated with these outcomes. Marks and Shinberg (1997), for example, showed that education, income, and occupation are all associated with the odds that a woman received a hysterectomy by age 52.

However, socioeconomic variables such as education and income are certainly correlated with occupational standing. Thus a logical question is whether occupation, *per se*, directly

matters for health or whether the apparent association between occupation and health is spurious owing to education, income, or other variables. Marks and Shinberg (1997) found that occupation does have independent effects on the odds of receiving a hysterectomy after controlling for education and income, but – using the same set of data in an examination of different outcomes – Miech and Hauser (2000) found that “associations of health outcomes with occupational standing net of educational attainment are mainly weak or non-existent.” As in most prior research, Miech and Hauser (2000) utilized a variety of socioeconomic and class-based measures of the relative standing of occupations in their analyses. A central question in our research is whether occupation matters for a variety of health outcomes when health-related – as opposed to strictly socioeconomic – criteria are used to establish the relative standing of occupations.

Selecting a Criterion for Ranking Occupations

Although any number of observers have reported an association between occupational standing and health outcomes, very few of their analyses are directly comparable because of vast differences in how occupation has been measured and operationalized. This overabundance of measures of occupational standing is understandable since the kind of work that a person does for a living can be (and has been) characterized in terms of a wide array of attributes of that social activity, any of which might matter for their health. Having a particular occupation – such as dishwasher, legal secretary, X-ray technician, or high school teacher – is associated with particular levels of financial remuneration; stress; social prestige; physical exertion; autonomy; non-monetary benefits; intellectual engagement; exposure to hazardous materials; scheduling flexibility; and so forth. These and other attributes of occupations are typically correlated – such that better paying occupations tend to be less physically demanding, less hazardous, and less stressful, for example – but these correlations are far from perfect.

Researchers who aim to assess the impact of occupation, broadly speaking, on health thus face the difficult task of measuring important aspects of occupation that might conceivably influence the health outcomes that interest them.

In their analyses, many researchers classify subjects' occupations as belonging to one of several nominal categories, such as "white collar" or "blue collar." Some of these categorization schemes are more theoretically grounded than others. The "white collar" vs. "blue collar" distinction, for example, seems to be based on simplicity or convenience, whereas Wright's (1996) class typology is solidly grounded in Marxist theory. Our comments on categorical schemes for expressing occupations apply equally well to both. Using the former operationalization, the effects of occupation on health are expressed as the conditional difference between "white collar" workers and "blue collar" workers. This technique adequately captures the full impact of what people do for a living on health outcomes if and only if all workers in a particular occupational category are exposed to the same occupational hazards, are equally well paid, have equal levels of autonomy and authority, and are equal with respect to every other job-related circumstance that might affect health. If workers within a particular occupational category are heterogeneous with respect to these job-related circumstances, then this operationalization likely leads to a biased assessment of the effects of occupation on health.

Some social scientists use more refined systems to classify subjects' occupations into one of several hundred categories that can be ranked hierarchically in terms of some objective criteria and treated as a continuous variable. For example, subjects' occupations might be classified as belonging to one of the 501 categories of the 1990 U.S. Census Occupational Classification. Several distinct characteristics of these 501 occupations – for example, how much they typically pay (occupational earnings), how prestigious they are considered to be (occupational prestige), how much education is

required (occupational education), and how frequently occupational incumbents are injured (occupational injury rates) – have been ascertained from various sources, and can be matched to the Census classification. The effects of occupation on health are then expressed as the conditional association between health and a continuous measure of occupational standing.

The first problem with this approach is that it is not obvious *which* objective criteria researchers should use to rank occupations. Unfortunately, the decision about which criteria to use tends to be based more on convenience and tradition and less on theoretically derived notions of which aspect of occupations might matter most for health outcomes. Most analysts express occupational standing in terms of just one continuous measure (or in terms of a weighted average of two continuous measures, such as Duncan's 1961 Socioeconomic Index or SEI). How do conclusions about the effects of occupation on health depend on which objective criteria is used to rank occupations? Miech and Hauser (2000) found few effects, net of educational attainment, of occupational education, occupational earnings, SEI, or prestige on a variety of health outcomes. We ask whether the use of health-relevant criteria for establishing the relative standing of occupations – specifically occupational injury rates – might reveal associations between occupation and health, even net of educational attainment.

The second potential problem with this approach is that if workers within a particular occupational category are heterogeneous with respect to important job-related circumstances or conditions, then this operationalization *also* leads to a biased assessment of the effects of occupation on health. Specific jobs within occupational categories may be quite diverse in terms of health-relevant variables.

These methodological issues surrounding the measurement of occupation are worth worrying about because there is evidence that they matter for substantive conclusions. For example, in the context of research on occupational stratification, Warren, Hauser, and Sheridan

(1998) showed that important substantive conclusions about gender differences in the process of occupational stratification were quite sensitive to which criteria was used to rank the 503 occupations in the 1980 U.S. Census classification. Their work follows on the heels of research showing that it matters (within the context of occupational stratification research) whether occupations are ranked on the basis of how prestigious they are or on the basis of SEI (Featherman and Hauser 1976; Featherman and Stevens 1982) and on whether occupations are ranked on the basis of the characteristics of their male incumbents, their female incumbents, or both (Boyd 1986; Nakao and Teas 1994).

There is also limited evidence that the way in which occupation is measured and expressed matters for substantive conclusions about the health consequences of occupational standing. For example, Miech and Hauser (2000) estimate the effects of occupation on a variety of health outcomes, and in so doing they compare the predictive validity of several measures of occupation: occupational prestige, SEI, occupational education, occupational earnings, Wright's (1997) social class typology, and Erikson and Goldthorpe's (1992) social class typology. Although those authors found few independent effects of any of their measures of occupational standing on several health outcomes, they did find some interesting variability in the predictive power of their measures. Most notably, occupational education had the greatest predictive validity for some outcomes, while Wright's and Erikson and Goldthorpe's social class typologies had the least predictive validity.

Job-Based Versus Occupation-Based Measures of “What People Do For a Living”

Jobs and occupations are not the same thing (Hauser and Carr 1995). A job is a specific bundle of activities, responsibilities, and behaviors that typically results in financial remuneration; there may be as many jobs as there are employed people. An occupation, on the

other hand, is a convenient aggregation of jobs that are similar in some respect. Regardless of how occupations are grouped or which criteria are used to rank them, within-occupation category heterogeneity in health-relevant aspects of jobs may bias the estimated effects of occupation on health outcomes. That is, to the extent that those aspects of jobs that affect health vary within occupational categories, our analyses of the effects of that aspect of jobs on health will likely be biased. While standard practice has been to ascertain respondents' occupations and then assign to each respondent the aggregate characteristics of people in that occupation, Hauser and Carr (1995: 40) note that "the best way to collect job information relevant to health and well-being may be to ask directly about the conditions of work." Thus a central question in our analysis is what difference it makes for research on the association between health and what people do for a living when the latter is expressed in terms of the characteristics of each respondent's working conditions instead of in terms of the conditions typical of people who do similar kinds of work.

We wonder whether job-based (as opposed to occupation-based) measures of what people do for a living might be more closely associated with health outcomes. Consider the findings of Link, Lennon, and Dohrenwend (1993), who conclude that occupational direction, control, and planning affect depression/distress; Link, Dohrenwend, and Skodol (1986), who show that noisome work conditions are important in the etiology of schizophrenia; and Karasek and colleagues (Karasek al. 1981; Karasek et al. 1988), who argue that high job demands and decision-making latitude affect coronary hear disease. In each case, it seems plausible that there is a great deal of variation in relevant job characteristics within each of the 500 or so U.S. Census occupational categories. By aggregating to the occupation level, prior research may be missing important information about the relationship between "what people do for a living" and health.

In our research we ask two specific questions. First, is occupational standing associated with a variety of health outcomes when health-related criteria – occupational injury rates – are used to establish the relative standing of occupations? Second, how might heterogeneity in what people do for a living within each of the hundreds of occupational categories influence conclusions about the association between what people do for a living and health? That is, might job characteristics be more closely related to health outcomes than occupational characteristics? Miech and Hauser (2000) concluded that when utilizing the socioeconomic criteria typically used to establish the relative standing of occupations – occupational education, occupational earnings, SEI, and prestige – there appear to be few and weak associations between occupation and health net of educational attainment. This implies that what people do for a living doesn't matter for their health once their education has been accounted for. We ask whether this finding persists when we use alternate criteria to rank occupations or when we use job-based characteristics of what people do for a living.

Data

We use data from the Wisconsin Longitudinal Study (WLS). The WLS has followed a cohort of 10,317 Wisconsin high school graduates from their senior year of high school in 1957 through the early 1990s (with a remarkably high rate of sample retention). The WLS data are especially useful for our purposes. Respondents' occupations at age 52-53 were coded to the standards of the 1990 Census, such that they can be mapped into occupation-based measures like those described above. In addition, the WLS questionnaire ascertained the details of respondents' job characteristics – like how often they get dirty, how much autonomy they have, how often they are exposed to hazardous materials, how they rate their jobs relative to an average job, and so forth. The 1993 mail survey of WLS respondents also contains rich information about a large selection of self-reported health outcomes and medical conditions at age 52 or so. Each of these occupation, job, and health measures are described below.

Care must be taken when generalizing from results derived from analyses of WLS data. Sample members are all 52-53 year old high school graduates and are almost universally White. About one in five is of farm origins, and about 70 percent still lived in Wisconsin 35 years after their graduation from high school. However, prior research has profitably used WLS data for research on socioeconomic gradients in health (Hauser and Carr 1995; Marmot et al 1997; Marks and Shinberg 1997; Miech and Hauser 2000) and the WLS's unique combination of occupational, job, and health measures make these data most suitable for our purposes.

In selecting our analysis sample, we began by determining the four most prevalent self-reported health problems and the five most prevalent self-reported medical conditions for both men and women. We then selected all cases with no missing data on these health outcome variables or on educational attainment, current or last occupation in 1992/3, or the job characteristic variables that we describe below. This sample selection scheme leaves us with 85% – 5,818 of 6,875 – of the respondents who participated in the 1993 WLS mail survey.

Measuring Occupational and Job Characteristics

Table 1 describes variables representing educational attainment and occupational standing, separately for men and women. Educational attainment is measured as years of school completed; by definition, all sample members have completed at least 12 years of schooling. We use four measures of the socioeconomic characteristics of occupations and six measures of the injury-related characteristics of occupations. Occupational prestige represents the relative desirability or goodness of an occupation, and is based on the subjective ranking of occupations by respondents to the 1989 General Social Survey (Nakao and Treas 1994). Prior work has established the invariability of these and other relative prestige ratings; regardless of sex, social class, industrialized country, or instructions about how to rank occupations, respondents tend to

agree about the relative prestige position of detailed occupational categories. Nakao-Treas prestige scores range from 0 to 100, where higher numbers represent more desirable occupations. Our measures of occupational education and occupational earnings were constructed by Hauser and Warren (1997) for use with the 1990 Census Occupational Classification. Occupational education is based on the proportion of incumbents in each occupation who completed one or more years of college. Occupational earnings is based on the proportion of incumbents in each occupation who earned more than \$25,000 in 1989. Each of these proportions was transformed into a standard logit of the form $\log[(p + .01)/(1 - p + .01)]$, where p is the proportion of the occupational incumbents above the threshold. This transformation reduces heteroscedasticity in the transformed variable without creating extreme outliers (Mosteller and Tukey 1977:109-115; Hauser and Warren 1997), and yields measures that range from about -4.5 to about 4.5 in our sample. Finally, we use a nominal categorization of occupations that further aggregates respondents' occupations into 17 major occupation groups such as "professional and technical specialty occupations" and "administrative support occupations." This measure corresponds to (frequently less detailed) nominal classifications often used in research in this area of research.

All injury-related occupational characteristics are derived from the Bureau of Labor Statistics' 1994 Survey of Occupational Injuries and Illnesses. These data report the occupation-specific number and cause of nonfatal occupational injuries and illnesses involving days away from work in 1993, the year that most WLS respondents reported the characteristics of their current or most recent jobs and occupations. For each occupation category we computed rates of occupational injuries by dividing the number of injuries in that occupation in 1993 by the total number of people who held that occupation according to data from the 1990 U.S. Census. The

“total occupational injury rate” simply reflects the number of occupational injuries per 10,000 occupational incumbents in 1993. The other five occupational injury rates are cause-specific. For example, the “slip or fall occupational injury rate” reflects the number of occupational injuries due to slipping or falling per 10,000 incumbents in 1993. Because of the skewed distributions of the occupational injury rate variables, we have transformed them by adding a small constant and taking their natural logarithm.

Although we wonder whether occupational injury rates might be more closely related to health outcomes than occupational socioeconomic characteristics, we acknowledge that these measures are not ideal. We would prefer to have measures of the extent to which occupational incumbents are exposed to dangerous conditions, do repetitive work, overexert themselves, and so forth. However, we are only able to use indirect indicators of these things. We are forced to assume that if injuries due to overexertion, for example, are high in a particular occupation, then people who hold that occupation are required to overexert themselves more often than people in other occupations.

Table 2 reports the correlations among these socioeconomic and injury-related occupational characteristics (with the exception of the Group II measure, which is a nominal variable). The top three rows of the table show that the socioeconomic occupational characteristics are highly inter-correlated; likewise, the rightmost 6 columns show that the occupational injury rate measures are highly inter-correlated. More interestingly, the remaining cells of the table indicate that the socioeconomic and injury-related characteristics of occupations are quite closely related. The correlations of occupational injury rates with occupational prestige and occupational education range between -0.55 and -0.66 ; their correlations with occupational earnings are more modest, ranging from -0.32 to -0.53 . Simply

put, occupations that enjoy higher social esteem, that require more educational credentials, and that tend to pay better are typically much safer occupations.

Table 3 describes variables that characterize respondents' jobs. Many of the job characteristic measures are loosely parallel to measures of occupational characteristics. For example, WLS respondents were asked how much education most people in jobs like their have (paralleling the occupational education measure), how many hours they spend on their jobs doing the same things over and over (paralleling the repetition occupational injury rate), and how often they are exposed to disease agents, dangerous equipment, or hazardous chemicals (paralleling the exposure occupational injury rate). Other measures indicate whether respondents' jobs require lots of physical effort, require intense concentration or attention, require working under the pressure of time, or involve getting dirty. Respondents were also asked how many hours they spend working with their hands, tools or equipment and how many hours they spend dealing with people about work. The WLS contains other measures of job characteristics, but we have selected a set of measures that might conceivably have implications for respondents' health. For example, respondents who work in jobs that require lots of physical effort, that involve getting dirty, that are repetitious, and/or that involve exposure to dangerous or hazardous conditions might quite reasonably have poorer health outcomes than respondents who work in other jobs. Likewise, jobs that involve stressors – such as intense concentration, time pressure, or dealing with people – might have different consequences for jobholders than less stressful jobs.

Measuring Health Problems and Medical Conditions

Table 4 describes variables pertaining to respondents' self-reported health problems and medical conditions. For both men and women we begin with self-reported overall health. Respondents were asked, "How would you rate your health at the present time?" Because of the

distribution of responses, we group respondents into those who said “good” or “excellent” and those who said “fair,” “poor,” or “very poor.” Interestingly, this self-reported overall health measure is closely related to clinically diagnosed health problems and is a better predictor of mortality than physician-assessed health (Mossey and Shapiro 1982).

WLS respondents were presented with a list of 24 health problems and asked whether they had experienced them in the past six months. They were then asked to report the frequency with which they experienced each problem and how much discomfort each problem had caused them in the past six months. For each self-reported health problem, we coded a respondent as having that problem if they reported experiencing it at least daily in the past six months and indicated that it caused them at least some discomfort. As noted earlier, our analyses consider only the four most frequently self-reported health problems for men and the four most frequently self-reported health problems for women. As it turns out, three of these health problems – back pain or strain, stiff or swollen joints, and aching muscles – are frequently experienced by both men and women. Male respondents also frequently report experiencing ringing in their ears and female respondents frequently report having trouble sleeping.

WLS respondents were also presented with a list of 17 medical conditions and asked whether a medical professional says they have that condition. Here we selected the five medical conditions most frequently reported by men and the five medical conditions most frequently reported by women. Four medical conditions – high blood pressure, arthritis or rheumatism, allergies, and serious back problems – are frequently experienced by both men and women. Men also frequently report experiencing heart problems and women frequently report circulation problems. Respondents were also asked how much each condition interferes with what they like to do, but we have not taken this information into account; high blood pressure, for example, is

still a serious medical condition even if it does not directly interfere with respondents' daily lives.

Results

We ask two central questions. First, net of educational attainment, is occupation associated with health outcomes when occupational injury rates are used to establish the relative standing of occupations? Second, are job characteristics more closely and independently associated with health outcomes than occupational characteristics? Following Miech and Hauser (2000), we begin by estimating the effect of educational attainment on an outcome, and then ask whether the addition of a given occupational or job characteristic variables adds to the fit of the model. Our decisions about improvement in model fit are initially based on standard χ^2 tests, but we temper our conclusions by using the Bayesian Information Criterion (BIC) as suggested by Raftery (1995). BIC provides a better-calibrated assessment of the evidence for a hypothesis than *P*-values in analyses of data from large samples. Our tests of statistical significance compare the fit of models that do not include job or occupational characteristics variables to those that do.

Table 5 reports the results of models predicting self-reported health problems and medical conditions for men, and Table 6 reports these results for women. The first row of each table suggests – with a few exceptions – that educational attainment has negative and statistically significant effects on these health outcomes. For men, educational attainment is significantly related to all 10 outcomes using conventional criteria for statistical significance and to 7 of these outcomes using the more conservative BIC. For women, conventional significance criteria show an effect of education in 8 of 10 cases, but BIC suggests that only four of these associations are very robust.

The next section of Tables 5 and 6 reports the improvement in model chi-square associated with adding measures of the socioeconomic characteristics of occupations. This section of our analysis loosely replicates part of the work of Miech and Hauser (2000), although they used the 1970 Census Occupational Classification and a slightly different subset of respondents. Our results, however, are quite similar. Using conventional standards of statistical significance, occupational prestige, occupational education, occupational earnings, and Group II occupation categories are associated with health outcomes about a quarter of the time for men (with those associations most frequently involving occupational education and occupational earnings) and almost never for women. In only one case for men and in no cases for women do any of these associations approach statistical significance using BIC. That is, like Miech and Hauser (2000), we find that significant associations between health outcomes and socioeconomic measures of occupational standing are very much the exception to the rule.

Injury-related measures of occupational standing seem to fare little better. The next section of Tables 5 and 6 reports the improvement in model chi-square associated with adding injury-related measures of occupations standing. For men, only twice does the addition of occupational injury rate information add to the fit of the model, and both associations are weak or non-existent using BIC. For women, occupational injury rates appear to be particularly associated with aching muscles and arthritis or rheumatism, and overall – again, using standard criteria for assessing statistical significance – about one in six null hypotheses are rejected. However, using BIC, only one of these associations appears to be robust.

The final section of Tables 5 and 6 reports the improvement in model chi-square associated with adding job characteristic variables. For men, at least one job characteristic affects 8 of 10 health outcomes using the conventional chi-squared criteria; indeed, we would

reject the null hypothesis of no association in 23 of these 110 models. For aching muscles and arthritis or rheumatism, 6 of the 11 measures have significant effects for men. In the models for women, at least one job characteristic affects 9 of 10 health outcomes, and – still using conventional criteria for hypothesis testing – we would reject the null model in 37 of 110 cases. For women, 7 of the 11 measures affect aching muscles, 5 of 11 affect arthritis or rheumatism, and 5 of 11 affect circulation problems. When we use BIC to assess statistical significance, we reject the null hypothesis in only 8 cases for men and 11 for women. That is, most of the associations which are significant by conventional standards are not significant using the better-calibrated BIC standards.

The associations that remain using the Bayesian Inference Criteria are interesting. Of the 8 significant effects of job characteristics for men, 4 affect aching muscles. The typical education level of jobholders, hours spent working with hands, repetitive work, and exposure to dangerous equipment all affect the odds that a man experienced discomfort from aching muscles at least daily in the past six months. Thus for men, dangerous, repetitive, hands-on work seems to be associated with aching muscles. Men whose jobs involve frequently repetitive work are also more likely to report discomfort from stiff or swollen joints, and those whose jobs involve frequent physical effort are more likely to experience arthritis or rheumatism. Finally, men who frequently deal with people and who are exposed to disease agents are more likely to suffer from allergies.

For women, frequent physical effort, frequent time pressure, and getting dirty all affect the odds of discomfort from aching muscles. Women whose jobs involve exposure to dangerous equipment are more likely to experience back pain or strain, and those whose jobs require frequent physical effort and time pressure are more likely to have been diagnosed with

serious back problems. Finally, women are more likely to suffer from circulation problems if their jobs require frequent physical effort or getting dirty.

From a public health point of view, we do not wish to make too much of the significant associations involving job characteristics shown in Tables 5 and 6. Many of the associations seem to have some face validity – it makes sense that men who do repetitive work have aching muscles and stiff or swollen joints, and that women whose jobs require frequent physical effort experience aching muscles and serious back problems – but our methods of selecting job characteristics and health outcomes were not designed to yield substantive findings about particular health problems. They were the data at our disposal. Tables 5 and 6 demonstrate that *some* job characteristics have independent effects on *some* health outcomes, whereas almost no occupational characteristics have any independent effects. For any particular health outcome, our 11 job characteristics are not necessarily the most pertinent or consequential aspect of what people do for a living. For the medical condition “serious back problem” we might like to know, for example, how often subjects lift objects and how heavy those objects are. Conversely, for any particular job characteristic, these health outcomes are not necessarily the health outcomes most likely to be affected. We might speculate, for instance, that the job characteristic “frequent intense concentration” might affect the odds of discomfort from eye strain.

Discussion

We began by asking two questions. First, we asked whether occupational standing is associated with health outcomes when health-related criteria – occupational injury rates – are used to establish the relative standing of occupations. From the work of Miech and Hauser (2000) we expected that socioeconomic characteristics of occupations (occupational prestige, occupational

education, and occupational earnings) would not be associated with these outcomes, but we wondered whether occupational standing might be associated with these outcomes when the criteria used to rank occupations is more proximally related to health. Our results conform to those of Miech and Hauser (2000), but the answer to our own question is clearly “no.”

Occupational injury rates are not associated with the health outcomes that we considered after controlling for educational attainment. As discussed above, however, occupational injury rates may not be ideal measures of occupational incumbents’ exposure to risk factors for various health problems or medical conditions. The strong associations between occupational injury rates and occupational socioeconomic characteristics suggest that such measures might be put to interesting use in research on occupational stratification, but their utility for research on health outcomes appears to be limited – at least for the outcomes we considered.

Second, we asked how heterogeneity in work experiences within occupational categories might influence conclusions about the relationships between what people do for a living and their health. To address this, we considered whether job – as opposed to occupational – characteristics are more closely related to health outcomes after controlling for educational attainment. Here, the answer is a qualified “yes.” Some job characteristics are independently related to some of the health outcomes that we considered, even using the more stringent BIC criteria for assessing statistical significance. The significant associations make intuitive sense, although not all of the intuitively sensible associations (e.g., between frequency of working with hands and arthritis or rheumatism) were significant. We are led to conclude that what people do for a living does matter for their health, above and beyond the effects of educational attainment, and that to assess the nature and magnitude of the effects of what people do for a living on their health we should measure the characteristics and requirements of their *jobs*, not of their *occupations*.

With that said, we are not willing to make any substantive conclusions about the relationships between any of the job characteristics that we used and any of the health outcomes that we considered. In order to do so, we would need to follow methods of selecting measures of job characteristics that are quite different from those employed in this research. If our goal were to assess the association between what people do for a living and their odds of developing a particular medical condition, we would begin by cataloging the risk factors for that medical condition. We would then collect information from respondents about the extent to which they are exposed to each of those risk factors on the job. Subjects may well be exposed to those same risk factors away from the job as well, so we would need to be careful to assess the added and unique exposure to those risk factors associated with on the job activities and conditions.

With information about all job characteristics relating to risk factors for a particular medical condition in hand, we would then be in a position to assess the association between what people do for a living and that particular medical condition. Of course different medical conditions have different risk factors, and so the information that we would want to gather about job characteristics might differ if our focus is on another medical condition. In the present study, we simply selected a set of 11 job characteristics that seemed like they might reasonably have mattered for people's health – whether they get dirty, how frequently they are exposed to dangerous chemicals, and so forth – but we had no *a priori* reason for expecting those specific job characteristics to matter for any particular health problem or medical condition.

The fact that some of them *did* matter should encourage researchers to collect and use information about what people do for a living in investigations of the relationship between socioeconomic status and health. What we are suggesting, of course, is that researchers who collect data for the purpose of assessing the association between socioeconomic status and health

should include specific, detailed, and health outcome-specific survey questions about job characteristics in their surveys. It may well be possible and desirable to develop a standard set of survey questions that captures everything we would want to know about people's jobs in research on socioeconomic differentials in particular health outcomes. It means, however, that we must first put some thought and effort into determining what we would want to know about people's jobs for research on any particular health problem or medical condition.

Beyond issues of measurement, we must also recognize that cross-sectional data are not perfectly suited to assessing the association between what people do for a living and their health. (Our data are, in fact, longitudinal, but measures of job characteristics and health outcomes are available only in the most recent wave of survey data.) People change jobs, and thus they change the extent to which they are exposed to health-relevant working conditions and the frequency with which they engage in health-relevant activities. It seems reasonable to suppose, furthermore, that people sometimes change jobs because of their health or because former jobs put their health at risk in some way. A more complete understanding of the impact of what people do for a living on health outcomes would need to focus longitudinally on the characteristics of prior jobs as well as those of the jobs that respondents hold at the time that their health outcomes are assessed.

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