

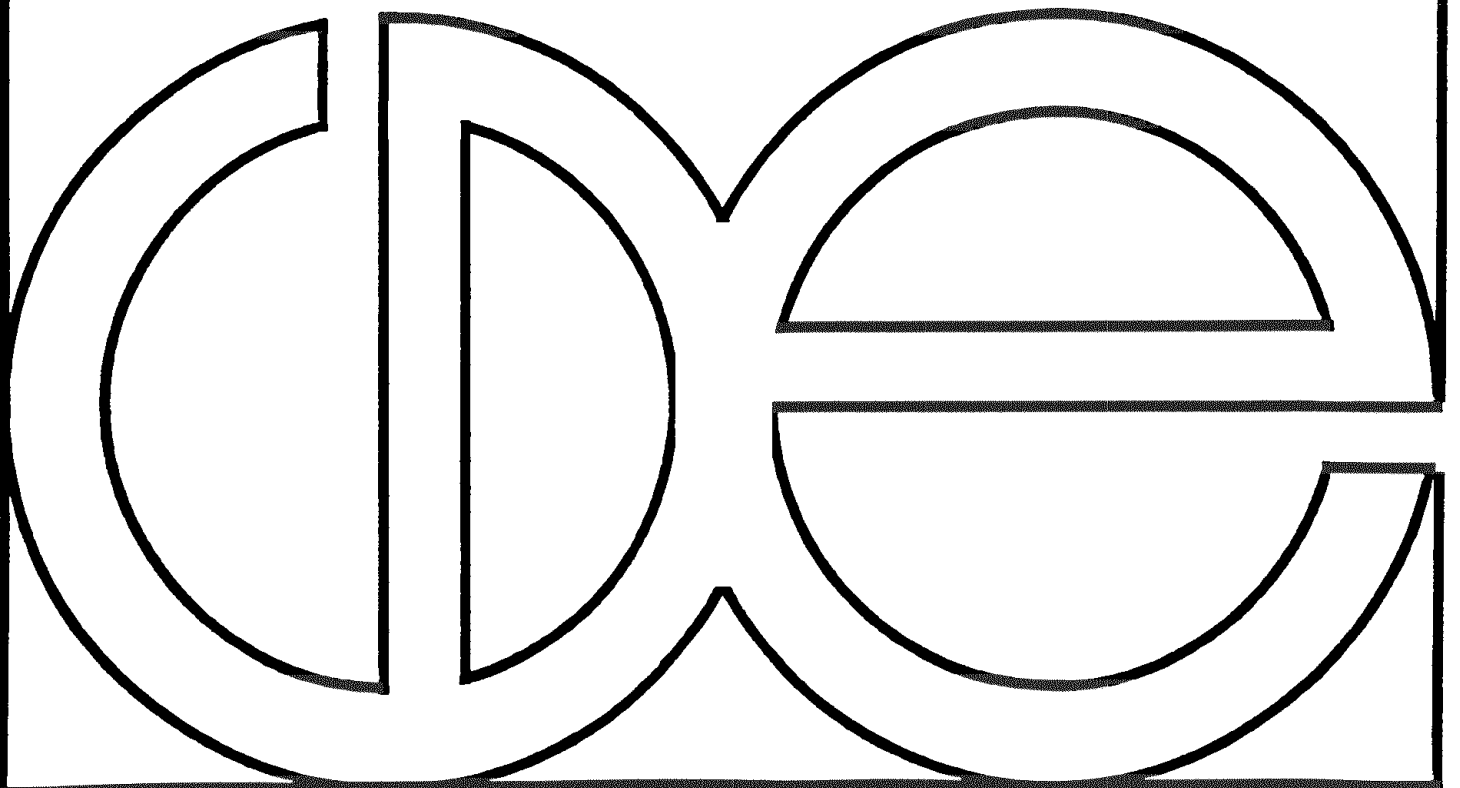
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University of Wisconsin-Madison

**Measuring Poverty and Socioeconomic Status
in Studies of Health and Well-Being**

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Abstract

The current, lively interest in social and economic gradients in mortality, morbidity, physical and mental health, and well-being has refocused attention on the measurement of social and economic standing. In this paper, we review the measurement of social and economic standing. First, we discuss poverty, both as a concept and in relation to its current official measure in the United States. Second, we discuss socioeconomic status as a global construct pertaining to persons, families, or areas. Third, we discuss the measurement of education, occupation, and income, focusing most closely on socioeconomic status as a characteristic of occupational roles. While its theoretical basis is arguably weak, the well developed methodology for measuring the socioeconomic status of occupations has several practical advantages.

The current, lively interest in social and economic gradients in mortality, morbidity, physical and mental health, and well-being has refocused attention on the measurement of social and economic standing. This interest has been spurred by studies in Great Britain (Marmot, et al. 1991; Marmot, et al. 1994) and in the United States (Adler et al. 1994; Pappas, et al. 1993; Marks 1994; Preston and Taubman 1994), which show pervasive effects on health of position in social and economic hierarchies. When we talk of "the socioeconomic gradient" in health, do we really have only one source of the gradient in mind, or are there multiple sources? What are the sources? Are some more important than others? And how best can we measure them?²

These are not idle questions. For example, there is little commonality among the measurements of socioeconomic status in the six important studies that we have just cited. Marmot et al. (1991) rely mainly on the grade of their subjects in the British civil service (Whitehall), a unitary hierarchy that unavoidably confounds educational qualifications, position in an administrative hierarchy, graded ratings of activities on the job, and levels of remuneration. One could not conceivably differentiate the socioeconomic bases of the overall ranking within the Whitehall II sample. Pappas et al. (1993) use educational attainment, family income, and race to measure changes in differential mortality in the U.S. from the 1960s to the 1980s. Marks (1994) looks at the long term, combined effects of educational attainment, occupational status, and household income among a sample of Wisconsin high school

² Liberatos, Link, and Kelsey (1988) provide a useful review of socioeconomic measures and their use in studies of health and well-being through the middle 1980s. We have not tried to emulate their comprehensive coverage of issues and measures. We would note, however, that there are serious weaknesses in their discussions of the properties of occupational prestige.

graduates who were followed from age 36 to age 54. Leaving aside the fact that the health outcomes considered by these studies are also diverse, can we say that the several investigations are addressing the same cause or set of causes? In what ways, if any, is their work comparable or cumulative? How could we improve the use of socioeconomic variables and constructs, and how could we facilitate the cumulation of comparable findings?

We shall not attempt to answer all of these questions, but we will review several ideas about the measurement of social and economic standing and describe advantages and disadvantages of some well-known concepts and measures. We have not – until recently – become students of health – so you will have to bear with a set of observations whose main intellectual roots lie elsewhere.

First, we discuss poverty, both as a concept and in relation to its current official measure in the United States. Second, we discuss socioeconomic status as a global construct pertaining to persons, families, or areas. Third, we discuss the measurement of education, occupation, and income, focusing most closely on socioeconomic status as a characteristic of occupational roles.

Our main arguments can be stated simply: (1) Despite its importance in the policy arena, poverty has little or no value as a theoretical or scientific construct by comparison to more general measures of positional inequality. Neither does the current, official poverty concept or measure have much heuristic value: It is conceptually and operationally defective and obsolete. If we did have a valid, standard measure of income poverty, it would share some of the conceptual defects

of the global construct of socioeconomic status. (2) Socioeconomic status is used in three ways: (a) as a shorthand label for any of several variables like education, occupation, income – or even social class; (b) as a global construct, either formed or indicated by other variables; and (c) as a characteristic ranking of occupations. The first of these usages is commonplace, sloppy and, probably, unavoidable. The validity of the second usage is an empirical matter, and the evidence is mixed. Finally, while its theoretical basis is arguably weak, the well developed methodology for measuring the socioeconomic status of occupations has several practical advantages.

Poverty

Most definitions of poverty have their root in the notion of a level of deprivation that ought not, in someone's view, be tolerated in the society where it occurs. Thus, poverty has both a normative and a contextual basis: normative because it is viewed (by someone) as unacceptable and contextual because acceptability varies from time to time and place to place.³ Some have sought to attach the poverty label to combinations of multiple forms of deprivation, e.g., to those deprived of schooling, medical services, adequate housing, job skills, and other desirable life circumstances. The consequences of such definitions range from constructs so vague and inclusive that they leave nothing to explain them – one

³ To be sure, some might reject any and all forms of inequality on normative grounds, but the concept of poverty is defined in part by failure to meet an acceptable standard, and that does not hold for most other expressions of social and economic inequality.

example is "the culture of poverty" (Lewis 1966) – to a well-defined variable like Haveman and Buron's (1993) measure of earnings capacity, which might be described as a composite measure of socioeconomic status.

Limiting our attention to purely economic notions of deprivation does not narrow the field a great deal. Is poverty to be defined absolutely or relatively? By expert standards of what people need? By lay standards of what people need – which we experts refer to as "subjective" standards? Over what units – persons, families, households, neighborhoods? Should a poverty standard vary among persons by age, sex, family or household composition or place of residence?⁴ Over what time period – weeks? months? years? By income or by consumption? And covering which sources of income or which forms of consumption?⁵ How can the line be updated from time to time without jeopardizing comparability?

Finally, while science may provide some guidance about the cogency, coherence, and practicality of alternative answers to these questions, in the end a line must be drawn to distinguish the poor from the non-poor. That is ultimately a matter of judgment, of values, or of politics, and in those areas science can provide no help other than, possibly, to narrow the range of plausible alternatives. Thus,

⁴ Lack of time is a recurrent theme in discussions of poverty among single-parent families (Vickery 1977). Several bills now before the Congress would mandate interstate variation in the poverty standard – and statistical systems to develop and update such standards and measure their consequences.

⁵ Moon (1993) has proposed a two-index system for measuring poverty – one index for health care poverty and the other for all other forms of economic deprivation.

researchers who use the poverty construct must always ask themselves whether a somewhat arbitrary line drawn by others is suitable for their purposes.⁶

In our opinion, the official poverty standard in the U.S. was created for political reasons -- to highlight the existence of the poor in the early 1960s and to provide an indicator of progress in "the war against poverty." Thus, it serves as a signal of success and failure in social welfare policy, much as the unemployment rate serves as a signal of success and failure in economic policy. The choice of a poverty standard, originally \$3000 for a family of two adults and two children, arose from the conjunction of recommendations by the Council of Economic Advisors and of a set of statistical standards developed by Mollie Orshansky (1963; Orshansky 1965) at the Social Security Administration. According to Denton Vaughn (1993), it is probably not coincidental that the \$3000 standard also coincided with his estimate of the public perception of the poverty line in the middle 1960s. Our failure to update the poverty standard in any significant way for the past 30 years suggests that consensus of that earlier time may have been ephemeral; that is, although several efforts have been made to address known defects in the poverty standard, none has been implemented in the official standard.⁷

⁶ A saving grace here is that many analyses are robust with respect to the location of the poverty line or its manner of construction. For example, it is well established that variations in the definition of income change rates of poverty in the U.S. without substantially effecting the temporal pattern of those rates. However, it remains necessary to establish the robustness of the measure in each separate line of research.

⁷ However, the Bureau of the Census does publish several alternate series of poverty statistics, in addition to those based on the official definition.

The measurement of poverty has two components, a poverty threshold or standard and a stream of income that can be compared to the standard. We have consistently used a yearly accounting period and applied the standards to families, not to households. Thus, roommates or unmarried partners living together – an increasingly common living arrangement – are not one economic unit for purposes of poverty measurement.

While the official definition of poverty has evolved over the past 30 years, changes in the thresholds and in the measurement of income relative to the thresholds have been minor. The official poverty standard was based on a low cost diet developed by the Department of Agriculture in 1955 for families that varied in size and in age composition (Fisher 1992). U.S. families spent about three times as much in total as on food, so the standard was defined as three times the low cost food budget for each family type.⁸ Adults over 65 required less food – and, hence, less income – than younger adults. Variation of the standard by number of children within families follows a nonlinear pattern that does not – on its face – appear to be a credible reflection of economies of scale.⁹ The standard does not allow for the

⁸ Note that the multiplier pertained to all families, not to the ratio of all expenditures to food expenditures among low-income families.

⁹ For example, according to the 1992 thresholds, the cost of going from one to two adults is \$1623 in a family with no child, \$2924 in a family with two children, and \$2466 in a family with three children. It falls to \$2260 in a family with four children, then increases again to \$2914 in a family with six children. Obversely, in a family with one adult under 65 years old, the cost of a first child is \$2371, and the cost of a second child is \$1634. But in a family with two adults, the cost of a first child is \$1898, and the cost of a second child is \$2924 (U.S. Bureau of the Census 1993a:vii).

possibility that economies of scale in food budgets may not apply to other commodities, or that supposed lower nutritional needs of the elderly may not be matched by lesser needs for other commodities. With minor exceptions, the poverty threshold has been updated for the past thirty years only by adjusting for changes in the overall cost of living. Over this period, there has been a dramatic decline in the cost of food relative to that of housing, another very large component of a low-income budget. If one were now to develop the kind of multiplier used in the official standard, it would probably be a factor of five or six times the cost of food, rather than three times the cost of food.

Poverty status is determined by a comparison between the threshold and family income. The original poverty standard referred to post-tax income, but the official poverty measurements compare the standard to pre-tax income (U.S. Bureau of the Census 1993a). That is, the official measure does not eliminate income taxes or other taxes – which are not measured in the March Current Population Survey. This was not a problem in the 1960s, when tax rates were extremely low among the poor, but it is now a serious matter. On the other hand, the income measure used in poverty measurement excludes non-cash benefits such as food stamps, Medicaid, or employer-provided health benefits – which are in some sense equivalent to cash.¹⁰ Just as taxes have become increasingly important as an expenditure, non-cash benefits have grown relative to earnings as a source of income. The income measure does not

¹⁰ This is not to say that it is easy to establish the equivalency between such benefits and cash. Food stamps are "near cash," but sell at a discount on the street. The valuation of medical benefits is an extremely difficult matter.

impute an income stream to asset holdings; most notably, it ignores the current value of home ownership. The income measure does not exclude the costs of child care and of transportation to work, which one might view as necessary conditions of work in much of the population.

For these reasons and others, in our opinion, the current poverty standard and the income concepts used as a poverty test are obsolete. Moreover, as the official definition of poverty has persisted and become reified in statistical practice and public opinion, it has driven perceptions of who the poor are and how the poor behave. Ruggles (1990) has shown that the poor, as defined by the official standard, have become less likely to work in part because the poverty standard has not kept up with real changes in the cost of a minimal family budget.¹¹ She recommends periodic updating of the poverty standard, both to reflect changes in the cost of a minimal living standard and changes in public perceptions of minimal standards. The National Research Council has commissioned a panel study of statistical issues in poverty measurement, whose report should appear early in 1995.

Yet another way of reckoning the obsolescence of the poverty standard is to observe its uses in public policy. First, the U.S. Bureau of the Census (1993b) now publishes an array of alternative, unofficial poverty estimates that compensate for some of the defects in the official measure. Second, in administration of the AFDC program (Aid to Families with Dependent Children), states are required to declare

¹¹ That is, the threshold would be much higher if Orshansky's methodology were applied anew today.

both a standard of need, which is often, but not always the official poverty threshold and to declare the percentage of the standard that they will meet. Both these standards vary widely across states.¹² Third, the poverty threshold is used as a standard in the administration of a great many federal programs, but the standards are typically stated in terms of multiples of the poverty line, and the multipliers vary widely across programs and agencies. That is, the poverty line has become a *de facto* unit of measure, rather than a threshold of need.

We also strongly urge investigators to avoid another commonly used measure of economic deprivation, namely, whether a child participates in a free school lunch program. First, take-up-rates for these programs are low and variable; participation declines sharply with grade level. Second, very crude measurements of income and family size are used to determine eligibility for school lunch programs; the reason is that the costs of the programs, and hence of errors of classification, are rather low. Third, if the other measurement problems did not exist, participation in school lunch programs would, perforce, measure the difference between the effect of poverty status, that is, of eligibility for the program, and the (presumably positive) effect of the program itself.

Even if there were no technical problems with the current poverty measure, if there were broad agreement on where the line should be drawn, or if we adopted a

¹² Presumably, the state standards vary both as a function of cost of living (relative to the national standards, which incorporate no adjustments for regional or size-of-place differentials in the cost of a minimal living standard) and as a function of a state's ability and willingness to subsidize the poor.

new and improved measure that repaired the defects in the current measure, we have serious reservations about the value of a poverty measure in analytic studies of health and well-being. That is, a poverty measure can be most useful in aggregate, official reports that are intended to inform the general public, identify trends or differentials, and thus help guide public policy. Poverty is much less useful as a scientific construct.

First, as Adler et al. (1994) observe, the poverty line pertains to a single threshold, presumably at the low end of the distribution of economic (or other) resources. Thus, analyses using the poverty line alone as an indicator can tell us nothing about differentials above (or below) that line. Some analysts attempt to overcome this problem using multiples of the poverty line, that is, by adopting the line as a unit of measure, rather than as a threshold. This obviously provides more information, but one might ask in that case whether it would not make more sense merely to look at variation in outcomes across the whole range of family incomes.¹³ Second, even with some revision, a poverty threshold is likely to be a composite – perhaps a nonlinear composite – of several variables. Under the present definition, the poverty threshold is a complicated function of the number and ages of adults and children in a family. Once one admits of interests beyond the effect of the threshold

¹³ Another, highly similar variation in the use of the poverty threshold is the specification of a period of years during which a family's income has fallen below the line. One might think that the effects of such a variable would reflect both the depth of poverty – families whose incomes fall further below the line are likely to remain there longer and, perforce, be more deprived – and the reliability of measurement of the components of income and family composition.

itself, and if one has one or more outcome measures in mind, e.g., various aspects of health, morbidity, mortality, or well-being, it would be a natural step to decompose the poverty concept and look at the effects of the ages and numbers of adults and children in the family, along with those of the several components of family income. Of course, it could happen that the effects of the components of family income, along with those of the number and ages of adults and children in a family, exactly follow the functional form with exactly the weights that they carry in the poverty construct. This is a testable empirical proposition, and one that ought to be tested to prove the utility of the poverty construct in scientific research: That is, does poverty status, or do multiples of the poverty line explain health outcomes as well as do the family income and the ages and numbers of family members?¹⁴

Beyond its usefulness in public accounting and in advocacy, we can see little use either for the current poverty concept or an improved poverty measure in studies of health and well-being. In the not very distant past, one might have argued the value of such a multivariate construct for two reasons. First, we lacked the computing power to carry out multivariate tabulations and analyses and, second, it is far easier to communicate the effect of a unitary construct to the public at large. Now, only the latter rationale remains. On the other hand, to the degree that differentials in health outcomes by poverty status reflect an overall socioeconomic

¹⁴ Methodologically, this is the same issue debated by Wright (1985; Wright 1993) with Halaby and Weakliem (1993; Halaby 1993) with respect to the use of Wright's social class concept and its variable components in the explanation of earnings.

gradient, use of a poverty standard may mislead the public with respect to the etiology of health and disease.

Socioeconomic Status

Socioeconomic status is typically used as a shorthand expression for any or many variables that may characterize the placement of persons, families, households, census tracts, or other aggregates with respect to the ability to create or consume goods that are valued in our society. Thus, socioeconomic status may be indicated by educational attainment, by occupational standing, by social class, by income (or poverty), by wealth, by tangible possessions -- such as home appliances or libraries, houses, cars, boats, or by degrees from elite colleges and universities. At some times, it has been taken to include measures of participation in social, cultural, or political life. It is an empirical, rather than a conceptual or theoretical question whether one should take socioeconomic status as a convenient shorthand expression for variables like these, or whether the variables, taken collectively, behave as if they were a unitary construct. There is a long standing and well-developed methodology for measuring one aspect of socioeconomic status using characteristics of occupations or of their incumbents. This has practical advantages, chiefly, that its measurement places a greater intellectual burden on investigators than on respondents.

What should we measure when we want to measure socioeconomic status, and how should we measure it? We think there are strong arguments in favor of measuring the social and economic characteristics of multiple (adult) household or family members, where "household or family" may refer either to the current

residence of a reference person (subject) or to that person's residence at some other times, e.g., childhood. The social and economic characteristics that we have in mind would include educational attainment, job characteristics (occupation, social class, and perhaps other variables), and income by source, as well as the number and composition of family or household members by age, sex, and relationship to the reference person (and to one another).¹⁵

Why take such extensive measurements? Would not income (or education, or occupation) be enough? We cannot speak from much experience in the analysis of health outcomes, but from many studies of educational, occupational, and economic outcomes, we believe the answer is negative. First, we have never come across an effect of social and economic standing whose determination is dominated by just one dimension of social or economic standing. In many studies, we and our colleagues have found effects of the education, occupational status, and income of the family of orientation on the educational attainments of children (Sewell and Hauser 1975; Sewell, Hauser, and Wolf 1980; Hauser 1993; Hauser and Phang 1993). To be sure, there is some evidence of specificity in the influence of social background characteristics: Parental educational attainment has a relatively larger effect on the education of children than on their occupational status; parental occupational status has a relatively larger effect on the occupational statuses of (adult) children than on their educational attainments (Hauser, Tsai, and Sewell 1983). Still, the main finding

¹⁵ One great failure in this respect was the Census Bureau's elimination of measures of the social and economic background of adult respondents to the Survey of Income and Program Participation after 1988.

is that every dimension of social and economic standing of the family of orientation contributes to unequal outcomes among children.

Second, more measures yield more reliable measurement of overall status, even if they may not be precise when taken individually. Survey measurements of educational attainment and occupational status typically yield reliabilities of 0.8 to 0.9 (Bielby, Hauser, and Featherman 1977), but these may vary as a function of the characteristics of respondents and subjects and of the heterogeneity of the study population (Looker 1989).¹⁶ It is sometimes possible to obtain repeated measurements of the same variables on different occasions, including the selection of subsamples of the target sample for a reinterview (Allison and Hauser 1991), or the use of multiple informants (Hauser and Mossel 1985; Hauser et al. 1992; Mare and Hauser 1992). To some degree, asking about more individuals on a single occasion, e.g., the occupation of a respondent and her spouse, may substitute for repeated, independent measurement of the characteristics of the subject of the study. However, in the absence of knowledge about measurement error, this may be a dangerous course. For example, Adler et al. (1994:17) observe that the health of one household member is affected by the socioeconomic standing of other household members. This may well be true and, if so, it provides interesting clues about the etiology of the socioeconomic gradient in health and disease. On the other hand, the appearance of

¹⁶ Some years ago, a well-known social statistician would not believe that Bielby, Hauser, and Featherman (1977) could have found reliabilities of proxy reports of father's educational attainment that exceeded the reliability of the son's own report of his educational attainment. Yet the finding was an obvious consequence of the much greater heterogeneity of (true) educational attainment in the father's generation.

such "contextual" effects, just as in the case of putative effects of neighborhood characteristics, may be sensitive to measurement error in the characteristics of a reference person and others in her household.

Third, by obtaining measurements of social and economic standing for multiple individuals, as well as multiple health outcomes (possibly for multiple individuals), we can test the idea that there is, or might be, a general effect of socioeconomic status. Suppose, for example, that we have a vector of socioeconomic characteristics, x_1, \dots, x_p , and a vector of health outcomes, y_1, \dots, y_q , each pertaining to the same individual. Ignoring issues of levels of measurement and functional form, and suppressing notation for individuals, we can write the q regressions of the y on the x :¹⁷

$$y_j = \alpha_j + \beta_{ji}x_i + \varepsilon_j. \quad (1)$$

Ignoring the intercepts, these regressions have $p \times q$ parameters. Alternatively, we might write a restricted model with $q + 1$ equations:

$$\begin{aligned} \eta &= \sum_i \gamma_i x_i + \zeta \\ y_j &= \alpha_j + \lambda_j \eta + \varepsilon_j. \end{aligned} \quad (2)$$

The model of equation 2 requires one normalizing restriction, e.g., $\lambda_1 = 1$; ignoring intercepts, it has only $p + (q - 1)$ distinct parameters. Thus, in the reduced form, the

¹⁷ For present purposes, we assume that the regressions are linear and that the disturbances, ε_j , are identically, independently, and normally distributed across individuals with $E[\varepsilon_j] = 0$ and $\text{Var}[\varepsilon_j] = \sigma_j^2$ for all j , but that there are free covariances among the disturbances, that is, $E[\varepsilon_p, \varepsilon_j] \neq 0$.

latter model imposes proportionality restrictions on the effects of the x_i , that is,

$$y_j = \alpha_j + \sum_i \gamma_i \lambda_{ij} x_i + \epsilon'_j, \quad (3)$$

so,

$$\beta_{ji} = \gamma_i \lambda_{ij}. \quad (4)$$

Equations 2 specify the well-known MIMIC (multiple indicator, multiple cause) model (Hauser and Goldberger 1971; Joreskog and Goldberger 1975). In one version of this model, we specify that $\text{Var}[\zeta] = \psi = 0$, so the covariances of the disturbances of the y remain unrestricted, that is, $E[\epsilon_j, \epsilon_{j'}] = \theta_{jj}^e \neq 0$, as in equations 1. An even more restrictive version of the model leaves ψ unrestricted, but specifies $\theta_{jj'}^e = 0$ for all j and j' . That is, the model says that the stochastic disturbance in η , along with the observable x_i , account for the covariation among the y_j .

These three specifications of the effects of the x_i on the y_j are shown schematically as path diagrams in Figure 1. What has this to do with the concept of socioeconomic status? If the data are consistent either with the specification of model 2 or that of model 3, then it is reasonable to talk of a global socioeconomic status construct: The x_i affect the y_j as if they combined to form a unitary construct. To the degree those restrictions break down, i.e., requiring one to draw paths between individual x_i and y_j , then one can no longer talk of socioeconomic status as a construct, but only as a collection of variables with disparate effects. To be sure, this is not an all-or-nothing matter, though we have depicted it as such in the contrast between the unrestricted regressions in model 1 and the fully restricted models 2 and

3. For example, in general, high status leads to positive health behaviors, but there is some evidence that, among women, high household income increases smoking, whereas high education reduces smoking (Marks 1994). Would such findings invalidate socioeconomic status as a global construct? In the strict sense of models 2 and 3, they would do so, and it would be interesting to know how many and how strong a set of exceptions it would take to convince the research community to abandon the global socioeconomic status construct. Obversely, had we aggregated several status variables *a priori*, without testing the validity of models 2 or 3, we would never know whether the socioeconomic status construct were valid, and we would miss provocative findings like those pertaining to smoking among high status women.¹⁸

The contrast between models 2 and 3 rests on the question whether the socioeconomic factor, composed of observable variables (x_i) and, perhaps, unobservables (ζ) can account for the covariances among the y_i . There is no right answer to the question whether that restriction will or should be met. In the limiting condition of model 3, one could say that the common factor, η , not only affects the health outcomes, but explains them, in the sense that it tells us why they covary. At the same time, model 3 suggests a new question, "What is ζ ?" One might think that it pertains to socioeconomic variables that were left out of the model, but if the variance in ζ is large, or if the set of x_i appears to be exhaustive, one might be

¹⁸ At least one such arbitrarily weighted status construct, Hollingshead's two-factor index of social position, is still used in health research. For a number of reasons, we recommend that it be abandoned.

prompted to look for other common causes of the outcomes than socioeconomic status. In the case of model 2, we may need to find other explanations for the covariation among the y_j . For example, they may have common causes other than socioeconomic status, or there may be causal relationships among the outcomes. Only in the case where $\psi = 0$ (in model 3) or, equivalently, where $\theta_{y_j}^x = 0$ for all j and j' (in model 2), could we conclude that a global socioeconomic status construct, by itself, accounts for the covariation among the outcomes.

So far, we have discussed these models as if the x_i and y_j pertained to socioeconomic characteristics and health outcomes for a single member of a family or household. If we permit the x_i and the y_j to include characteristics of other household members, then we are in a position to test suggestions, like that of Adler et al. (1994) with respect to inter-personal effects of the socioeconomic characteristics of household members. For example, do spouses' socioeconomic characteristics affect each other's health outcomes as if they combined to form a unitary socioeconomic factor, or are there specific aspects of each spouse's social and economic standing that do (or do not) affect their own or their spouse's health outcomes?

There is yet a fourth reason to ascertain socioeconomic and health characteristics of multiple members of the same household. Just as the measurement of socioeconomic variables and health outcomes for individuals poses an analytic challenge, namely, to find intervening variables that account for the socioeconomic effects, the linkage of health and socioeconomic characteristics among multiple family or household members poses the challenge of explaining family (or household)

resemblance in the outcomes.¹⁹ A first useful question, given such linked data, might be to ask to what degree socioeconomic status accounts for family (or household) resemblance in the outcomes.

For example, Kuo and Hauser (1994) have looked at the effects of a vector of social background characteristics on the educational attainments of several cohorts of black and white U.S. men and their brothers.²⁰ Their model resembles model 3 in figure 1, where the x_i include household head's educational attainment, mother's educational attainment, household head's occupational status, farm origin, intact family, number of siblings, and Southern birth, and the y_j are educational attainments of a man and his oldest and youngest brothers. Kuo and Hauser find that the MIMIC specification fits; that is, measured social background variables affect brothers' educational attainments proportionately. The effects of social background variables on older brothers uniformly exceed those on younger brothers. The combination of measured and unmeasured common family factors accounts fully for

¹⁹ A full exposition of these issues is beyond the scope of this paper. For one analysis focusing on models of social stratification, see Hauser and Sewell (1986). Mare and Palloni (1988) have used a similar conceptual scheme to analyze socioeconomic effects on the joint survivorship of spouses. Analyses of relationships among health outcomes of co-resident individuals should be feasible using data resources that cover all members of a household, for example, the National Health Interview Survey or the Survey of Income and Program Participation. Along with several colleagues, we have recently finished collecting data from a large, longitudinal sample of Wisconsin high school graduates and their siblings that will permit us to analyze similarities and differences in a wide range of health outcomes among adult brothers and sisters (Hauser et al. 1992; Hauser et al. 1994).

²⁰ The data are from the 1973 Occupational Changes in a Generation Survey, a supplement to the March 1973 Current Population Survey (Featherman and Hauser 1978).

the resemblance of brothers in educational attainment. Finally, while the findings vary to some degree by cohort and birth order, about half the variance in schooling occurs between families. Of the between-family variance, about one half is explained by measured social background, while the remaining half is explained by common family factors that are unrelated to measured social background. Such findings should give pause to anyone who might imagine that measured social and economic variables are adequate proxies for the effects of families on children.

A second use for socioeconomic and health data linked across household members is to improve the specification of socioeconomic effects by purging data of common family or household influences. In labor economics, where this is increasingly popular, the design is termed a fixed-effect model. If we think, for example, that educational attainment and income affect smoking behavior, we can estimate the regression of inter-sibling (or inter-spouse) differences in smoking behavior on inter-sibling (or inter-spouse) differences in educational attainment and income.²¹ By construction, the design eliminates common family (or household) sources of covariation between smoking behavior and educational attainment or income. But the design does have weaknesses. While it eliminates extraneous variables that are common to siblings (or spouses), it does not eliminate all sources of omitted variable bias. For example, if we regress differences between sisters'

²¹ Of course, this design presumes that the variables do not merely work through a common family factor, such as we have specified in figure 1. For simple examples applied to the stratification of educational attainment, occupational status, and earnings, see Hauser and Mossel (1985), Hauser and Sewell (1986), Hauser and Wong (1989).

earnings on differences between their educational attainments, the estimated coefficient of schooling will not control effects of individual differences between them in ability and work experience. The fixed-effect model also is more vulnerable than a naive regression model to effects of random measurement error in the regressors. Random measurement errors may be large relative to true, within-family (or household) variation in the characteristics of siblings (or spouses), while the effects of measurement error on estimated slopes vary with the ratio of true to total variance. Thus, to avoid type II errors, it is most important to correct for measurement error in fixed-effect models (Hauser and Mossel 1987).

As noted by Adler et al. (1994), there are intriguing findings about effects on mortality or health behaviors and outcomes of living in poor areas (Haan, Kaplan, and Camacho 1987; Krieger 1992). These may or may not be valid. Figure 2, showing two path models for variables in standard form, provides a simple example. Let X = observed, individual economic status, ξ_1 = true individual socioeconomic status, ξ_2 = true status in the area, and Y = an observed health outcome.²² In the true model, Y depends only on the true, individual status variable; the observable status measure, X , depends on its true value, plus a random error term, δ . Finally, the true status scores at the individual and aggregate levels, ξ_1 and ξ_2 , are merely correlated, indicating that levels of X cluster by area. There is no effect of the aggregate status variable, ξ_2 , on the health outcome, Y . For convenience, we assume that the variables

²² While it is conceptually sloppy to do so, we think that it is not of much empirical consequence that we have elided the distinction between observed and true levels of socioeconomic status at the aggregate level.

are expressed in standard form. Thus, the important parameters of the model are the correlations, ρ_{X1} , ρ_{Y1} , and ρ_{12} , from which other correlations among variables may readily be calculated, given the structure of the model, that is,

$$\begin{aligned} r_{XY} &= \rho_{X1}\rho_{Y1} \\ r_{Y2} &= \rho_{Y1}\rho_{12} \\ r_{X2} &= \rho_{X1}\rho_{12}. \end{aligned} \quad (5)$$

Suppose we observe the three correlations in equations 5 and regress Y on X and ξ_2 .

Solving the usual normal equations, we obtain

$$\begin{aligned} p_{YX} &= \frac{r_{XY} - r_{Y2}r_{X2}}{1 - r_{X2}^2} = \frac{(\rho_{X1}\rho_{Y1}) - (\rho_{Y1}\rho_{12})(\rho_{X1}\rho_{12})}{1 - (\rho_{X1}\rho_{12})^2} \\ &= \frac{\rho_{X1}\rho_{Y1}(1 - \rho_{12}^2)}{1 - \rho_{X1}^2\rho_{12}^2} \end{aligned} \quad (6)$$

and

$$\begin{aligned} p_{Y2} &= \frac{r_{Y2} - r_{XY}r_{X2}}{1 - r_{X2}^2} = \frac{(\rho_{Y1}\rho_{12}) - (\rho_{X1}\rho_{Y1})(\rho_{X1}\rho_{12})}{1 - (\rho_{X1}\rho_{12})^2} \\ &= \frac{\rho_{Y1}\rho_{12}(1 - \rho_{X1}^2)}{1 - \rho_{X1}^2\rho_{12}^2}. \end{aligned} \quad (7)$$

What would this mean in practice? For example, suppose $\rho_{X1} = 0.9$, $\rho_{12} = 0.8$, and $\rho_{Y1} = 0.5$, so the reliability of X is 0.81, and 64 percent of the variance in X occurs between areas, while the effect of the true individual status variable is 0.5. If we naively regress Y on X and ξ_2 , we obtain $p_{YX} = 0.34$ and $p_{Y2} = 0.16$. This would be a most misleading finding, given what we know about the true model, in which the

status of the area has no effect whatever. In our opinion, this numerical illustration is not misleading with respect to likely values of reliability and clustering, determined by ρ_{x1} and ρ_{12} , respectively. They determine the ratio of the effects of X and ξ_2 , p_{YX} and p_{Y2} , while ρ_{Y1} determines the overall level of the two coefficients. That is, from equations 6 and 7,

$$\frac{p_{YX}}{p_{Y2}} = \frac{p_{x1}(1 - p_{12}^2)}{p_{12}(1 - p_{x1}^2)}. \quad (8)$$

If clustering and reliability effects were equal, so would be the effects of the individual and aggregate status measures in the naive regression, even when the aggregate variable actually had no effect. Thus, we recommend healthy skepticism toward findings of the genre, "residing in a neighborhood that was federally designated a poverty area ... was a risk factor for subsequent mortality above and beyond the characteristics of the individual" (Adler et al. 1994:21), when they are based on regression (or similar) analyses that fail to correct for measurement error in individual regressors.

Of course, the clustering of observations within small areas presents opportunities, as well as pitfalls. These parallel the analytic opportunities in observations that are linked within families or households.²³ We are not limited to uses of small area data in which, as in the preceding illustration, we have only a

²³ Obversely, we might have placed the preceding, negative example in the context of an analysis of family or household effects, rather than of neighborhood effects.

combination of micro-level data for one person, family, or household in an area, together with a few macro-level variables from census or administrative record data. For example, if there are identifiable clusters of survey observations by area, there are opportunities to specify fixed-effect models for within-area differences, just as we can write them for within-family or within-household differences.²⁴

Measuring Socioeconomic Variables

There would be little warrant for a review of standard measures of education, occupation, and income, if there were not a good deal of evidence that such measurements are often obtained badly, or not used well in studies of health and well-being. For example, Adler et al. (1994:15) begin their stimulating review with the observation that "SES has been almost universally relegated to the status of a control variable and has not been systematically studied as an important etiologic factor in its own right." Obversely, to conclude that social and economic status are used well, one would have to believe that such variables are measured perfectly, that they are so highly intercorrelated that one such measure is as good as any or all others, and that three or four broad categories of such a variable hold as much information as its full range.

The concept of a "control variable" lies outside our experience as social scientists. Some variables belong in a model of a social process, while others do not. Thus, we can only regard the terminology as a symbolic declaration of second-class

²⁴ Such designs are now the standard in research on school effectiveness, but we are ignorant of their application in studies of socioeconomic effects on health. We should be pleased to learn of good examples.

citizenship, that "control variables" are somehow less interesting or important than "non-control variables."²⁵ This is another case where usage follows symbolism. We attempted to review the use of socioeconomic variables in 37 empirical papers published between 1985 and 1993 in the *Journal of Health and Social Behavior*. Most were studies of psychological well-being, rather than physical health or mortality.²⁶ While there were notable, positive exceptions, not only was the use of social and economic status measures largely scanty and symbolic, but the use of such variables was often so poorly documented that we could not prepare a detailed or comprehensive summary or critique of it.

Our impressionistic review of this literature, for whatever it may be worth, is as follows. First, there is a hierarchy in the use of socioeconomic control variables. Education was used frequently, in 30 of the 37 studies. Some income-related variable – earnings, income, per capita income, poverty status, or a report of income adequacy – was used in 26 of the studies with varying nominal precision. Employment status was used in 17 studies, but occupation-based measures were used in only nine of the studies. Second, occupation-based measures tended to be used in studies that also used at least one other status measure. In four studies, an occupational measure was used in combination with education and income, and in

²⁵ It is almost Orwellian: "All variables are equal, but some are more equal than others."

²⁶ We chose these studies because the outcome variables were the same or similar to those covered in the Wisconsin Longitudinal Study (Hauser et al. 1992). A list of the studies is appended.

four studies, an occupational measure was used in conjunction with education alone. Third, income measures were in almost all cases based on a single report of annual earnings or family income. Fourth, there was almost no overlap among the studies in the use of occupation-based measures. Two studies used crude occupational groups, and two used detailed job characteristics, e.g., from the *Dictionary of Occupational Titles*. Five studies used occupation-based "scales," and no two of these were the same.²⁷ Fifth, not one of these studies either corrects effects of socioeconomic variables for unreliability or invalidity or reports any information about their reliability or validity. The findings suggest that there is ample room to improve socioeconomic measurement in studies of health and well-being.

Educational Attainment

In the U.S., if not elsewhere, it used to be easy to ascertain educational attainment. For many years, it was sufficient to ask, "What was the highest grade of school that ... completed?" and provide numeric categories ranging from zero to 17 or more. In the Current Population Survey (CPS), a most useful distinction was added (Kominski and Adams 1994): "What is the highest grade or year of regular school ... has ever attended? Did ... complete that grade (year)?" This two-part question made it clearer that the question was about regular (academic) schooling. It was possible in principle to measure school dropout among those who had attended, but not

²⁷ The reported occupational grading schemes were eight prestige groups, a seven-category Hollingshead scale, a six point scale, the Nam-Powers SES scale, and an unspecified measure of occupational status.

completed a grade. Over the years, the upper range of responses was expanded, and by 1991, the CPS recorded as many as 26 years of college.

Following a similar change in the 1990 Census, the CPS introduced a new, single educational question early in 1992: "What is the highest level of school ... has completed or the highest degree ... has received?" The 16 CPS codes and response categories for the new item are displayed in Figure 3 (Kominski and Adams 1994: XIII).²⁸ The new CPS educational attainment question and its responses differ in several ways from the old item and its response categories. First, it eliminates the probe distinguishing between the highest grade attended and the completion of that grade. Second, responses below the level of secondary school have been grouped. Third, a new category, "12th grade, No Diploma" has been added. Fourth, the category for completion of high school now specifically identifies both high school graduation and obtaining a high school equivalent, such as the GED. Fifth, major changes have been introduced in the classification of schooling beyond high school completion. These are now based on credentials, rather than on the completion of numbers of years of schooling. Among those with less than a college degree, the new system makes three distinctions: Some college but no degree, Associate degree in a technical/vocational program, and Associate degree in an academic program. Of these, the former is described by the Census Bureau as "a residual category." Finally,

²⁸ We have deliberately included the new numeric codes as well as the descriptions of each category to take note of the Bureau's reason for introducing the new codes, namely, to prevent interviewers from erroneous entries using the previous system of recording highest grade or year.

the new system distinguishes among holders of Bachelor's, Master's, Professional, and Doctoral degrees.

The Bureau of the Census offers four explanations for its construction of the new educational attainment item (Kominski and Adams 1994:XIII-XIV). First, partly because of the increased time from college entry to completion, the presumed equivalency between 16 years of schooling and holding a Bachelor's degree has become invalid. The Bureau reports that in the middle 1980s, the traditional equivalency between 16 years of schooling and a Bachelor's degree would overestimate the number of degree-holders by more than one million persons. Second, no specific degrees were identified in the old item. This was a problem, not only because 16 years of school was not equivalent to a Bachelor's degree, but because of the increasing importance and prevalence of Associate degrees and post-college degrees. Third, the old system led to uncertainty in the classification of high school graduates because persons who had equivalent credentials were supposed to be counted as completing 12 years of school, but often were not so classified. This has become an increasingly important matter because some localities require a final graduation test or certification; thus, it is possible to complete 12 years of regular schooling without earning a diploma. Fourth, the Census Bureau reports that the old items did not meet specific programmatic needs of federal agencies, especially to ascertain degrees. Because of "a serious space constraint in the decennial instrument," and because "detailed attainment information was not legislatively required (or generally needed) below the fifth grade level," an interagency working

group advised the Bureau to collapse categories from the 1st to 4th and 5th to 8th grades (Kominski and Adams 1994: XIV). The latter category was subsequently disaggregated to 5th-6th and 7th-8th at the suggestion of the Bureau of Labor Statistics when the new item was added to the Current Population Survey.

In its discussion of comparability and uses of the old and new CPS education items, the Bureau of the Census discusses three issues (Kominski and Adams 1994: XV). First, there obviously is a break in continuity with the past – a break in previous time series – and this is an unavoidable consequence of change. Second, it is no longer possible to use years of schooling as a continuous variable in regression analyses. This is probably just as well, since the effects of schooling (as measured the old way) are often nonlinear, and many analyses are carried out using categorical representations of schooling. The Bureau's discussion does not mention the use of schooling as a dependent variable, where the analysis of ordered categorical variables is more complex. Finally, the Bureau notes that it is necessary to abandon some older summary measures of the level of schooling, such as the median or mean, which have no meaning within the new system. This is no great loss, for such measures were already rendered uninformative by the shape of the educational distribution, which is heavily clustered at or near the completion of high school.

One might expect that, over time, the new CPS educational attainment item will supplant older items in other surveys, including, but not limited to those carried out by the Bureau of the Census, such as the major health interview surveys. We hope that this will not happen. In our opinion, it was clearly desirable to change to a

system in which post-secondary credentials were measured explicitly, but the new CPS item is poorly constructed and fails to obtain important information, including some that was obtained by the old item.

(1) The collapse of several grade levels below high school has made it impossible to follow age-grade progression at younger ages.²⁹ Neither can we examine school completion closely among recent immigrant populations or among populations with learning disabilities. In populations with low levels of schooling, the collapse will remain problematic, for example, at older ages or when it is necessary to ascertain educational attainments in past generations.³⁰

(2) The failure to distinguish grades attended from grades completed has eliminated our ability to examine a key educational transition, namely, that between college entry and completion of the first year of college. Formerly, persons who had attended, but not completed grade 13 could be classified as early college dropouts. A large number of

²⁹ This problem was exacerbated in the 1990 Census because there was no separate question on the grade level of persons currently enrolled in school. That is, grade level had to be inferred from educational attainment. Because the educational attainment question grouped some levels of schooling and elided the distinction between attending and completing a grade, it was not a suitable tool for the analysis of age-grade progression.

³⁰ In our study of Wisconsin high school graduates of 1957, the modal schooling level of parents was eight years. What is it among the parents of today's new immigrants from Asia, Mexico, or Latin America? We think that it may be particularly important to distinguish between the seventh and eighth grades because the latter denotes completion of elementary school.

persons who have ever entered college fall into this category, yet it cannot be measured using the new CPS question. A cross-tabulation of educational attainment under the new and old systems, which was carried out as part of the February 1990 Current Population Survey, shows that seven million people, more than 20 percent of those classified as having completed "some college, but no degree" under the new system, reported having completed no more than 12 years of school under the old system. Those persons comprise nearly 10 percent of all persons classified as high school graduates by the old item (Kominski and Adams 1994: XVI). This suggests that many individuals who dropped out of college during their first year are now classified as having "completed some college." In other words, the failure of the new item to distinguish sharply between attending and completing a grade has serious consequences.

(3) Similar observations apply to entry into and completion of the 12th grade, though we know of no major uses of the distinction between grade attendance and completion in high school. One might suspect that elimination of the "completion" probe accounts in part for the nearly four million individuals who are classified by the new item as nominally having "completed" twelve years of school without a high

school diploma or its equivalent.³¹ This is most problematic, for we do not know whether this category is an artifact of survey methodology or an indication of the application of new standards of academic achievement. Indeed, there are disagreements about how persons with "12th grade no diploma" should be classified. As we understand it, the Census Bureau classifies such persons as non-graduates. In a match between old and new attainment items in the Current Population Survey samples of March 1991 and March 1992,³² an economic demographer found that 55 percent of persons who reported "12th grade no diploma" in 1992 had reported completing 12 years of school in 1991. Thus, Jaeger (1993) recommends combining the new "12th grade no diploma" and "high school graduate" categories into a single category of 12 years of schooling. Taking a statistical compromise, Mare's (1995) analysis of educational trends from 1980 to 1990 allocates the "12th grade no diploma" responses to dropout and completer categories in proportion to their shares in a cross-classification of the two items obtained in the February 1990 Current Population Survey. Use of the new definition of high school graduation has led to a major

³¹ A cross-classification of the two items by age might be instructive. That is, if the Bureau's understanding of the sources of the non-certified 12th grade completers is correct, non-certification should occur much more often among younger than older persons.

³² There is 50 percent overlap, year-to-year, in CPS samples for the same month.

break in the semi-official series of rates of high school dropout; at the 12th grade level, the new definition has massively increased the dropout rate (McMillen, Kaufman, and Whitener 1994:13).

(4) The nominal collapse of grades 13 to 15 into "some college no degree" has created a large and extremely heterogenous category, which includes about half as many persons as those classified under either the new or old systems as having completed 12 years of school. The "some college no degree" category contains many more people, 33.2 million, than the 4.3 million in each of the Associate degree categories. That category cannot be compared ordinally to those of persons who completed either a vocational or an academic Associate degree; some completed more and some less post-secondary schooling than the two years usually required for an Associate degree. Not only does the "some college" category contain significant numbers of persons who were classified as obtaining no college education under the old system, but it also contains a modest number of individuals who completed four or more years of college education. In fact, each of four grade levels (in the old system) within the "some college no degree" category contains more persons than either of the new Associate degree categories: 12 years (7.0 million), 13 years (11.5 million), 14 years (9.5 million), and 15 years (4.2 million). This heterogeneity is far greater – and affects many more persons – than the heterogeneity in attainment (under the new

system) among persons who were classified as having completed 16 years of school under the old system.

(5) Despite its proliferation of categories, the new educational classification fails to distinguish individuals who completed 12 years of school from those who achieved high school equivalency, yet there is strong evidence of differences between regular high school graduates and the growing number of individuals with GEDs (Cameron and Heckman 1992). If the "12th grade no diploma" category made sense, we think that it would make more sense to place GED holders in that category than to combine them with regular graduates.

(6) Finally, despite, or perhaps because of its failure to measure certification directly, the old educational questions come far closer than the new question to telling us how people spent their time during their formative years. That is, the old educational attainment questions tell us more about the process of growing up than how far a person went in school.

In our judgment, it will be best if the new CPS education questions are not used as a model in other surveys. We hope that the Bureau of the Census will modify its question soon, if possible before rather than in conjunction with the Census of 2000. It is a mystery to us why a novel question that was evidently designed within the severe constraints of the decennial census form need have been adopted with minimal changes in the CPS. We recommend that researchers continue

to use the old CPS question to ascertain educational attainment, preferably including the probe about completion of the highest grade attended. We also recommend that a separate question or questions be used to measure the highest diploma, equivalency credential, or degree obtained.³³

Earnings, Income, and Wealth

It is both difficult and time-consuming to collect good income data. There is a high item nonresponse to questions about personal and family income.

Nonresponse probably combines effects both of unwillingness to respond and of ignorance. Moreover, among willing respondents, income may not be measured accurately or reliably. To measure income well, it takes a large battery of questions, administered most carefully, possibly combined with access to personal records (Marquis, Moore, and Bogen 1991). To be sure, we have several special purpose surveys, like the Panel Study of Income Dynamics (PSID), the Survey of Income and Program Participation (SIPP), and the Health and Retirement Survey (HRS), which measure income very well, but the experience of those surveys makes the point that it is not easy to do so. Thus, in most health surveys, we believe, it will be important to find economic substitutes for intensive measurements of income.

The Current Population Survey now collects about 30 components of yearly income in its Annual Demographic Survey, each requiring a separate question, yet it is well known that the only source of income that the CPS measures well is earnings.

³³ One reasonably good series is used by the National Opinion Research Center in its General Social Survey.

Problems of income measurement in the CPS were among the factors leading to the development of the Survey of Income and Program Participation, a short-term longitudinal survey, which collects more than 50 components of income every four months – not annually – and focuses on the measurement of economic standing in the lower income population.³⁴ We think it is unrealistic to demand this level of detail in income measurement as a standard in studies of health and well-being. While we think that it is useful to ask family income questions, we would suggest that they be limited to one query about total income in the preceding year, or a series of questions about the earnings of each adult in the household, perhaps followed by check items to ascertain whether the family received any income from transfer payments, e.g., pensions or Social Security, or participated in government programs such as food stamps, AFDC, or subsidized housing (Section 8).³⁵

In addition to problems of coverage, reliability, and validity in income measurement, income is much more volatile than other measures of social and economic standing. Income often varies rapidly in the short term, both with changes in household composition and in the employment and remuneration of family or other household members. Thus, even a well-constructed series of income questions will not adequately measure economic well-being unless income has been measured

³⁴ The National Academy of Sciences has recommended that SIPP become the main source of future measurements of personal income distribution and poverty. See Citro and Kalton (1993).

³⁵ We take it for granted that it is essential in income measurement to obtain a complete household roster, in order to identify both contributors to and consumers of the family or household income stream.

repeatedly over a long period of time. Furthermore, low current income may well be a consequence, rather than a cause of poor health. On the other hand, educational attainment is cumulative and irreversible, and occupational standing, to which we will turn in the next section, is relatively stable.

One way to obtain a more stable measure of economic resources would be to measure wealth, but this presents many of the same problems as the measurement of income. It is a sensitive matter to many respondents, and it has many components, about which respondents may not be fully informed. Moreover, to measure net worth, the value of assets must be offset by the value of liabilities (debt). However, this can be done reasonably quickly and painlessly, if crudely, with questions about pension coverage, home tenure and equity, and debt for housing and cars.

One relatively easy way to augment questions about current income is to ask only about housing tenure and cost. "Do you own or rent this dwelling?" provides a rudimentary but powerful distinction based on wealth and on stability of residence³⁶ and "What is your monthly rental or mortgage payment?" yields a measure of consumption that is likely to reflect long term economic prospects of the household.³⁷ Neither of these questions – housing tenure, and rent or mortgage payment – raises

³⁶ Housing tenure has a large, independent effect on high school dropout and college entry among American youth (Hauser and Phang 1993; Hauser 1993).

³⁷ In theory, one might prefer to use the imputed rental value of owner-occupied housing or to subtract the equity portion of mortgage payments from interest and taxes; at least among younger households it probably does little harm to ignore these refinements.

the problems of nonresponse that are typical in direct survey measurements of income or wealth.

Jobs, Occupations, and Occupational Status

In our opinion, the social sciences have suffered from a preoccupation with current measures of income or poverty. To some degree, we think this focus is program-driven. In the administration and evaluation of social, economic, and health programs we must necessarily rely upon narrow, temporally specific economic measures of eligibility or of outcome. This focus is also perhaps a consequence of the diffusion of economic thinking beyond the disciplinary boundary of economics, and it may reflect broader social trends. Whatever its sources, we believe that overly economic thinking has diverted us from other major and consequential sources, dimensions, and consequences of social inequality.

There are good reasons to focus more attention on the collection, coding, and scaling of job and occupational data than has recently been the case. First, job-holding is the most important social and economic role held by most adults outside their immediate family or household. When we meet someone new, our first question is often, "What do you do?", and that is a very good question. Job-holding defines how we spend much of our time, and it provides strong clues about the activities and circumstances in which that time is spent. Thus, even if job-holding provided no information about economic or social standing, detailed information about jobs would be highly relevant in studies of health and well-being. Second, job-holding provides strong clues about the technical and social skills that we bring to

the labor market, and for most people job-holding delimits current and future economic prospects. Thus, even for persons who are not attached to the labor market, past jobs or the jobs held by other members of the same family or household offer a great deal of information about economic and social standing. Third, as market labor has become nearly universal among adult women as well as men, it is increasingly possible to characterize individuals in terms of their own current or past jobs. Fourth, once we have a good job description, it is possible to map jobs into a vast array of classifications, scales, and measures, many of which are relevant to health and well-being and which may provide more information about economic standing than we can obtain from the usual questions about income or wealth. Fifth, measurement of jobs and occupations does not entail the same problems of refusal, recall, reliability, and stability as occur in the measurement of income or wealth. While job descriptions – contemporary or retrospective – are imperfect, their reliability and validity are high enough to support sustained analysis, and there is little tendency for the quality of occupational reports to decay with the passage of time.³⁸ Thus, even if we are limited to retrospective questions, a job history can help distinguish between social selection and social causation as sources of health and disease.

³⁸ For example, in the Wisconsin Longitudinal Study, we find virtually no difference between the accuracy of reports of occupations held in 1975 which were reported and coded contemporaneously and reports of the same occupations that were ascertained in 1992-93 (Hauser, Sewell, and Warren 1994). The correlation between contemporaneous and retrospective reports (in the metric of the Stevens-Featherman TSEI2) is 0.84.

It is important to distinguish between jobs and occupations and between establishments and industries. A job is a specific and sometimes unique bundle of activities carried out by a person in the expectation of economic remuneration. An occupation is an abstract category used to group and classify similar jobs. Such abstractions are often heterogenous and idiosyncratic in construction, but they usually involve determinations of similarity in typical activities, in the sites where work is performed, in the form of job tenure, in the skill requirements of the job, or in the product or service that results from the job. The distinction between establishments and industries parallels that between jobs and occupations. An establishment is a specific geographic location where products or services are made or delivered, while an industry is an abstract category used to group and classify products or services. There are multiple systems for the classification of jobs and establishments and, within them, complex interdependencies between occupational and industrial classifications. Most social scientific uses of occupational data are based on the classification systems of the U.S. Bureau of the Census, which are revised each decade at the time of the decennial census or else on the *Dictionary of Occupational Titles*, which is produced by the Employment and Training Administration of the Department of Labor.

The best way to collect job information relevant to health and well-being may be to ask directly about the conditions of work. For example, Jencks, Perman, and Rainwater (1988) developed a new composite index of the overall quality of jobs, which they call the index of job desirability. Jencks, Perman, and Rainwater argue

that occupational status measures, like the Duncan Socioeconomic Index and occupational prestige, are too distant from the job because they characterize a broad occupational category, while earnings alone fail to capture non-pecuniary job rewards. In a small national telephone sample (N = 809), Jencks, Perman, and Rainwater measured the desirability of jobs directly, using a magnitude estimation task.³⁹ Then, they selected job characteristics that predicted (the natural log of) desirability.⁴⁰ Finally, they constructed a composite of those characteristics (the index of job desirability or IJD) and showed that it had high reliability and desirable analytic characteristics relative to conventional measures of occupational standing, e.g., that it reflects gender and experience differences better than the Duncan SEI. Moreover, unlike occupation-based measures of job characteristics, obtained by matching job descriptions or census occupations to lines in the *Dictionary of Occupational Titles*, the IJD pertains directly to individual jobs. Jencks, Perman, and

³⁹ The question reads as follows: "Now we would like you to rate your job compared to what most people consider an average job. ... Let's give an average job a rating of 100. Then, if your job is TWICE as good as an average job, you should give it a rating of 200. If it is HALF as good, give it 50, and so on. You can give any number you like. So considering everything -- ... -- if an average job is rated 100, how would you rate your job?" We have also used this question in the 1992/93 round of the Wisconsin Longitudinal Study (Hauser et al. 1992).

⁴⁰ From 48 job characteristics, Jencks, Perman, and Rainwater selected 14 that significantly predicted job desirability. They narrowed that list to earnings, plus seven other characteristics, which accounted for most of the explained variation. These are educational requirements of the job, hours greater than 35 per week, on-the-job training, dirtiness of the job, frequency of supervision, repetitiveness, and federal employment; dirt, supervision, and repetition were undesirable. We measured all 14 significant characteristics in the WLS in 1992/93, and most were also measured in the WLS in 1975.

Rainwater argue that it is much easier to ascertain the components of the IJD than to collect and code detailed occupational descriptions, so it is potentially both an economic and powerful measure. The IJD is as yet new and untried in health research, but we think it is worth very careful consideration and evaluation.

Several of the job characteristics that contribute to job desirability have also predicted physical and mental health in other empirical studies. Yet among studies of the relationships between work characteristics and physical health, there is little agreement about which job characteristics are the source of health differentials. High job demands and limited decision-making latitude have been identified as predictors of coronary heart disease (Karasek et al. 1981; Karasek et al. 1988), while House et al. (1979) argue that exposure to noxious physical-chemical agents and perceived stress predicted hypertension and other heart disease risk factors. Similarly, there is little commonality among the measures of job traits that affect psychological well-being. Kohn and Schooler (1982) found that intellectual flexibility and self-directedness exert powerful influences on psychological well-being, while Link et al. (1993) found that one's control over other workers affected mental health.

From the perspective taken here, some measures of social class reflect job or personal characteristics, while others are strictly occupational. For example, consider two conceptions of "social class," each of which is widely used in international comparative studies of social stratification. Both schemes are shown in Figure 4. Wright's (1985:88) class typology combines concepts of ownership, authority, and expertise. Its measurement requires information about a person's educational

attainment as well as ownership, authority, supervision, and occupational classification. On the other hand, although it uses some information that is not routinely collected in the course of occupational measurement in the U.S., Erikson and Goldthorpe's (1992:38-39) "class schema," is ultimately a grouping of occupational categories based upon Goldthorpe and Hope's 1974 study of occupational prestige in Great Britain (Goldthorpe 1980). Our strong suspicion is that differences between these two measures in their proximity to jobs and persons are far more important than other theoretical or conceptual distinctions that have been debated by their authors. Other things being equal, we should expect a classification based partly upon personal and job characteristics to be more direct and powerful in its influence on health and well-being than a classification based on occupational characteristics alone. Wright's class typology somewhat resembles Hollingshead's well-known (and too widely used) index of class position in that both combine information about jobs and educational attainment, though in very different ways (Hollingshead 1957, Hollingshead and Redlich 1958). Just as in the cases of the official poverty measure and of other socioeconomic indexes, we might ask whether such composite measures make effective use of the information that they contain about the chances of health and disease.

People are linked to jobs, most often through job-holding, but also through their relationships with other people who hold or have held jobs. Jobs can be mapped into standard occupational classifications, and the categories of those classifications may be linked to occupational characteristics. By working back

through this series of linkages, we can describe people in terms of occupational characteristics. Such characteristics will be valid as descriptions of jobs only to the degree that occupations are homogeneous and the intervening maps and linkages are sound. In our view, the remarkable thing about this way of measuring social and economic characteristics is not that it is error prone, which would seem obvious, but that it has remarkably high reliability and validity. That it does so is a social fact, which rests on skill and care in classification and coding and, also, on strong uniformities in social structure.

Unlike income, there is little perceived risk to respondents in describing the jobs held by themselves and others they know. Rates of refusal and nonresponse to occupation questions are very low. Moreover, unlike the case of income, respondents usually know enough about their jobs (or those held by other significant persons in their lives) to provide information that can be coded reliably. At the same time, it takes time and care to collect occupational data. One way of describing this is to say that the collection of income data places a large cognitive burden on the respondent, while the collection of occupational data places that burden on the collector and coder of the data. In a complete series of occupation questions, it is necessary to ascertain industry and class of worker as well; a typical series is shown in Figure 5. These questions would be sufficient to permit coding entries into the classification systems used in any of the U.S. Censuses from 1940 to 1990. The Census revises its classification system decennially, but over the past 50 years there has been a seven digit coding system, three digits each for occupation and industry and one digit for

class of worker. The classification system was relatively stable from 1940 to 1960. There was a minor upgrade in 1970, and in 1980 the system was overhauled completely in order to bring it up to date and render it more comparable to other (including international) classification systems. The 1980 system was carried forward with minor changes in 1990.

It takes time for respondents to answer all five questions, and it takes time to code them. We usually allow about 1.5 minutes of telephone or household survey time per occupation-industry entry, and experienced coders can complete about 10 entries per hour. To code occupation and industry, a trained coder must attempt to match text between survey reports and listings in the Census Bureau's alphabetic or classified indexes of industries and occupations.⁴¹ The alphabetic indexes list permissible codes for occupation and industry, based on an alphabetic sort of common responses. The classified index is a reverse listing, in which the same set of entries is sorted by occupation or industry code, thus providing a definition by

⁴¹ We have examined the codebooks for public use files from several major health surveys carried out by the National Center for Health Statistics. They all included detailed occupation and industry codes. Thus, it is feasible to map the codes into vectors of occupational characteristics. On the other hand, the senior author has often been approached by investigators in *ad hoc* health surveys, and his experience has been that they have little interest in detailed occupation-industry coding. Often, they have not asked the right questions to begin with, and they are looking for a way of sight-coding one-line descriptions into some scheme like the Hollingshead index. This reflects a casual attitude toward socioeconomic measurement that probably would not be tolerated by the same investigators if it pertained to their major health interests. Readers who imagine that detailed occupation-industry coding requires too great an investment might ask themselves about the cognitive demands that are placed on respondents by detailed income questions.

extension of each line of the classifications.⁴² Coders must occasionally refer to other resources, like the *Dictionary of Occupational Titles*, to learn more about specific occupations or to find synonyms for unfamiliar descriptions. Where more than one occupation or industry line may be appropriate, codes can be allocated at random with probabilities determined by the distributions across the candidate lines in the preceding Census, that is, from a cross-classification of detailed occupation by detailed industry. In some surveys, the senior author has trained interviewers as well as coders in occupational classification, and this pays dividends in the quality of industry and occupation reports.

In connection with the 1990 Census, the Bureau of the Census is distributing a VMS software product that can be used to code about half of typical occupation or industry entries, leaving the remaining half for trained coders. Experienced coders can achieve 85 percent agreement in the classification of 3-digit industry and 80 to 85 percent agreement in the classification of 3-digit occupation. This level of agreement is sufficient to produce high levels of correlation between independent codings of the same occupational characteristics. For example, using data from the 1973 Occupational Changes in a Generation Survey (OCG), Bielby, Hauser, and Featherman 1977:1258, 1262) report correlations of 0.94 and 0.93 between Duncan SEI

⁴² In the last three decennial Censuses, these references are U.S. Bureau of the Census (1971a) U.S. Bureau of the Census (1971b), U.S. Bureau of the Census (1982a), U.S. Bureau of the Census (1982b), U.S. Bureau of the Census (1992a), U.S. Bureau of the Census (1992b). Two recent editions of the *Dictionary of Occupational Titles* are U.S. Department of Labor (1977) and U.S. Department of Labor (1991).

scores of independent Census codings of the first, full-time civilian jobs held by white and by black men.

Occupations can also be reported reliably by respondents, whether the jobs are or were their own or someone else's.⁴³ Again, using occupations from the 1973 OCG survey that were mapped into the Duncan SEI, Bielby, Hauser, and Featherman (1977) obtained test-retest correlations of 0.64 among black men and 0.87 among white men for father's occupational status over about a 3-month period.⁴⁴ The corresponding test-retest correlations were 0.77 and 0.87 for men's first, full-time civilian occupations, and they were 0.72 and 0.80 for current occupations. The latter figures may seem low, but they do not measure reliability in the strict sense. They are based on reports of own current occupation in the March 1973 CPS and in a reinterview six months later; thus, the correlation reflects true changes in status as well as reporting error. These correlations of occupational status are somewhat lower than corresponding test-retest correlations of own educational attainment, 0.87 among blacks and 0.92 among whites. In a recent study, Hauser, Sewell, and Warren (1994) obtained correlations between socioeconomic status scores of occupations that were reported contemporaneously by a sample of more than 6000 male and female high

⁴³ Given the likely uses of occupational data in studies of health and well-being, we believe that the reliability and stability of an occupational measure, like the Duncan SEI, is more pertinent to an evaluation of the quality of occupational measurement than would be a measure of simple agreement between reports across occasions.

⁴⁴ The unusually low value obtained for blacks in this study underscores the need to measure reliability contemporaneously in social surveys.

school graduates from Wisconsin in 1975, when the sample was about 36 years old, and that were reported again, retrospectively, in 1992-93. The test-retest correlations over the 17 to 18 year recall period were 0.83 among men and 0.84 among women. Parent's occupations also can be reported reliably by older teenage youth. In a study of 6th, 9th, and 12th grade boys from Fort Wayne, Indiana, Mason, et al. (1976) report correlations between son's and father's reports of the father's occupational status of 0.80, 0.92, and 0.93 at the 6th, 9th, and 12th grades among white boys and correlations of 0.39, 0.38, and 0.74 among black boys at the same grade levels.⁴⁵

What are the relevant socioeconomic characteristics of occupations? Many discussions of occupations in the stratification system begin with the concept occupational prestige, the general level of social standing enjoyed by the incumbents of an occupation. There has been great debate about the definition of prestige. For example, should it, as in the classic sociological literature, describe a relationship of deference or derogation between role incumbents, or does it merely pertain to the general desirability or goodness of an occupation? However defined, there is substantial agreement about the properties of occupational prestige.

First, it does not matter much how people are asked to rate occupations. Regardless of the form of the question and the mode of response, essentially the same ranking will be obtained. In an Israeli sample, Kraus, Schild, and Hodge (1978) found that prestige was the main dimension of perceived differences among

⁴⁵ The Fort Wayne samples are very small, 80 white boys at each grade level and 30 to 50 black boys at each grade level.

occupations when respondents were asked to sort pairs of occupation titles into similar groups, without any specification of the kind of similarity that they were to use. Duncan, Featherman, and Duncan (1972:77) found a correlation of 0.81, between expert judgments of required occupational intelligence (the Barr scale from the 1920s) and the Duncan SEI for matched 1950-basis Census occupations. For 47 Barr titles that could be matched to a 1964 study of occupational prestige by the National Opinion Research Center (NORC), they found a correlation of 0.91.

Second, it does not matter much who rates the occupations. Even from a small sample, one can obtain a reliable and valid prestige scale by averaging ratings of occupations. Someone has suggested that a serviceable prestige scale can be constructed from the reports of any 30 individuals over the age of 10 anywhere in the world. Prestige ratings of occupations are highly correlated in the U.S. between the 19th and 20th centuries (Hauser 1982). Between the second major national survey of prestige, carried out in the middle 1960s by NORC, and the most recent survey, carried out in 1989 by NORC, the correlation is 0.97 across 160 titles that were rated both in the 1960s and in 1989 (Nakao and Treas 1994). Earlier, Hodge, Siegel and Rossi (1964) had found a correlation of 0.99 for a smaller set of titles over the 1947 to 1963 period. Occupational prestige ratings are also highly correlated across countries. Treiman (1975; Treiman 1977) assembled a definitive international collection of prestige studies up through the early 1970s, and he found an average intercorrelation of 0.81 across 55 countries. He combined these data to create SIOPS, the Standard International Occupational Prestige Scale, into which one can map from the 1950,

1960, and 1970 U.S. Census Classifications and the 1958 and 1969 International Standard Classifications of Occupations (Treiman 1977). Finally, there are scant variations in occupational prestige ratings across populations defined by sex (Bose and Rossi 1983), race (Siegel 1970), or location in the social hierarchy within industrialized nations and most of the non-industrialized world (Haller and Bills 1979).

In the U.S. there have been three major, national surveys of occupational prestige. The first was carried out at NORC in 1947, but its major findings were not reported until 1961 (Reiss 1961). These ratings are available for the 1950 Census classification and the 1960 Census classification. The second major U.S. study of prestige was carried out in a series of NORC surveys in the mid-1960s and reported by Siegel (1970). These ratings were initially mapped into the 1960 Census classification by Siegel, but they were later updated to the 1970 Census classification (Hauser and Featherman 1977) and to the 1980 Census classification (Stevens and Hoisington 1987).⁴⁶ The third U.S. prestige study was carried out in conjunction with the 1989 General Social Survey of the National Opinion Research Center (Davis et al.

⁴⁶ Since there were large changes between the 1960 and 1970 Census classification schemes, the Hauser-Featherman update was carried out by estimating weighted average scores for detailed 1970 Census lines in terms of their 1960 Census components, using a cross-classification of the 1960 population whose jobs had been classified using both systems (U.S. Bureau of the Census 1972). Similarly, Stevens and Hoisington (1987) used a matrix that expressed detailed 1980 Census lines in terms of their 1970 Census components, using a cross-classification of the 1960 population whose jobs had been classified using both systems (U.S. Bureau of the Census 1982). Our guess is that the latter set of scores will not be used widely, for the prestige scores on which it was based dated from the 1960s, and a new set of prestige scores and status scores is now available.

1991; Nakao and Treas 1994). These occupational prestige ratings were initially mapped into categories of the 1980 Census classification, and have been updated to be usable with the 1990 system.

This is perhaps an appropriate point for us to explain our distaste for the Hollingshead Index of Social Position, a classification of selected occupational titles into seven occupational grades. There must be something appealing about it, for its use has persisted over more than 30 years, and, as far as we know, it has never been published formally.⁴⁷ Perhaps one reason for this is a comparison between the Hollingshead Index and the Duncan SEI by Haug and Sussman (1971), which came out most unfavorably to the SEI.⁴⁸ In an invited commentary on Haug and Sussman's paper, Hollingshead described the development of his occupational "index," which was based on the social standing of occupations in his study of New Haven, Connecticut. In response to a query about the placement of certain occupations, Hollingshead (1971:566) wrote:

⁴⁷ The senior author obtained his copy from a colleague at Brown University in the late 1960s.

⁴⁸ The central finding of the Haug-Sussman paper, on which they base a resounding rejection of the SEI, is a correlation of 0.74 between the SEI and Hollingshead's Two Factor Index of Social Position, where the latter combines Hollingshead's occupational ratings with a rating of the educational attainment of each individual in a national sample survey. This low correlation, they argue, invalidates the SEI as a measure of "social class." Of course, the Hollingshead Index includes individual variation in education within occupation, while the SEI does not. It is thus not surprising that the correlation was far less than unity. It would be interesting to know what the value of the correlation would have been, had Haug and Sussman regressed the Two Factor Index on the educational attainment as well as the SEI of each member of the sample.

"The problem of allocation of a given individual's occupation to a particular place on the economic scale is occasionally difficult. Haug and Sussman puzzle over why a correction officer was assigned a rating of 2 while a policeman rated 5. This particular correction officer was a professional social worker attached to the juvenile court. He held a Master of Science degree from a recognized school of social work. Policemen were rated 5 because they are trained men and were generally regarded in the community as skilled municipal employees."

In other words the Hollingshead "index" is a combination of his ratings of specific individuals in New Haven and of his perception of the general social standing of occupations. If we were going to use a prestige scale in a study of health or well-being, we should want to use ratings based on the opinion of more than one individual, and we certainly should not want to rate entire occupational categories based on the characteristics of a single occupational incumbent.

The main problem with occupational prestige ratings is that they lack criterion validity. Prestige is not as highly correlated with other variables as are other measures of occupational social standing, specifically, measures of the socioeconomic status of occupations, as indicated by the average educational attainment and income of occupational incumbents. One well-replicated example of this is intergenerational occupational mobility. In analyses of correlations between the occupational standing of fathers and sons, prestige scales behave as if they were error-ridden measurements of the socioeconomic status of the occupations held by fathers and sons (Featherman,

Jones, and Hauser 1975; Featherman and Hauser 1976). Indeed, Treiman found few takers for his Standard International Occupational Prestige scale.

How did we get from occupational prestige to occupational status? While the two more recent prestige surveys obtained ratings for all occupational titles in the then-current Census classification schemes, only 90 titles were rated in the 1947 NORC survey (Reiss 1961:5-6, 261-62). This created a problem for investigators who might wish to "fill in" scores for unrated occupations (Duncan 1961:110-14); not only did they have to create new scores, but there was no basis for comparability between studies. As part of a project on "Occupational Classification for Vital Statistics Use," Duncan created a set of socioeconomic scores for all occupations, and he transformed these back into the original metric of the NORC prestige scores. First, Duncan matched titles that had been rated in the survey into lines from the 1950 Census; unfortunately, only 45 titles could be matched. Then he regressed the percentage of "good" or "excellent" ratings on the 5-point scale used in the NORC survey on age-standardized percentages of male occupational incumbents in the 1950 Census who had completed high school or more and who had reported incomes of \$3500 or more in 1949. This regression yielded roughly equal weights for the two regressors, and the multiple correlation was 0.91. The socioeconomic index was constructed by applying the regression weights to the age-standardized characteristics of all 1950-basis Census titles (including distinctions by industry and class of worker within

large residual groups).⁴⁹ Finally, Duncan also reported a transform of the index back to the metric of the original NORC prestige scores, which were the mean ratings of each occupation on the 5-point scale, and a set of decile scores, pertaining to the position of each occupation in the ranking of the employed population by values of the socioeconomic index. Most subsequent use of Duncan's work has employed the index, rather than the NORC transform or the decile scores. For example, perhaps the best known application of the Duncan SEI scale was by Blau and Duncan (1967), in their classic study of social mobility among American men.

The Duncan SEI has been updated or elaborated in several ways, and researchers should be cautious in choosing among these because of their potential lack of comparability. Duncan assigned scores to categories of the 1960 Census occupational classification, and these were the scores used in the Blau-Duncan monograph. Hauser and Featherman updated the 1960-basis SEI scores to occupation lines from the 1970 Census, using the same averaging method described above in relation to the 1960-basis NORC (Siegel) prestige scores.⁵⁰ Stevens and Featherman (1981) published a major revision of the SEI. Using the map of Siegel scores into 1970-basis Census occupation lines, they ran regressions of prestige scores for all occupations on measures of the educational attainment and income of all

⁴⁹ Unfortunately, none of the more recent socioeconomic scales includes these additional distinctions.

⁵⁰ The senior author has elaborated the scale scores by class of worker and industry for selected 1970-basis occupation lines. These scores are available by request.

occupational incumbents in 1970; the scale values were the predicted prestige scores in the regressions. In order to meet complaints that the original Duncan SEI ignored women, they produced two versions of their new scale, one in which the regressors pertained to the characteristics of male workers (MSEI2) and a second scale in which the regressors pertained to the characteristics of all workers (TSEI2). Note that MSEI2 and TSEI2 were entirely new scales; they are not comparable to the Duncan SEI, though they were constructed using a similar methodology. One could compare findings based on those scales to those based on the SEI by mapping 1970-basis occupations into both systems. One could compare findings across time using MSEI2 or TSEI2 by projecting them back into earlier Census classification systems; to our knowledge, no one has carried out the latter task. Stevens and Cho (1985) carried the 1970-basis MSEI2 and TSEI2 forward to the 1980 Census classification system using the same methodology as Hauser and Featherman (1977), that is by taking a weighted average of scores for 1980-basis Census occupation lines in terms of their 1970-basis constituent lines, based on a sample from the 1970 Census (U.S. Bureau of the Census 1982). This rendered MSEI2 and TSEI2 as comparable between 1970 and 1980-basis lines as the Duncan SEI was between 1950 or 1960-basis and 1970-basis lines. As part of their update of Siegel's scores, Nakao and Treas (1994) created socioeconomic scores for 1980-basis Census occupation lines by regressing their prestige ratings on the characteristics of male and female occupational incumbents in

the 1980 Census.⁵¹ It is a bit unfortunate that the new NORC prestige scores were collected at the end of the decade (1989), while the corresponding socioeconomic status scores were based upon characteristics of the work force in 1980. The obvious next step will be to create yet another set of socioeconomic scores, using the 1989 prestige scores as a criterion, but based upon characteristics of the work force in the 1990 Census.

The proliferation of indexes of occupational socioeconomic status may be a good thing, if one's focus is on the present day, but it presents great problems in establishing inter-temporal comparability.⁵² As we understand the situation, findings based on the original Duncan SEI can readily be compared across occupations coded to the standards of the Censuses of 1950 to 1970. Findings based upon the Stevens-Featherman scales may be compared freely from 1970 to 1990 (for the 1980 and 1990 systems are very close), and those based upon the Nakao-Treas scales may only be comparable from 1980 to 1990. Of course, these limits are based on the assumption that occupations have been coded only once, to the standards of a single decennial census. We believe that, given the preservation of original responses in machine-readable form, we shall in years to come be able to code old data to new standards economically. For example, in the 1992/93 round of the Wisconsin Longitudinal

⁵¹ The Nakao-Treas prestige and socioeconomic scores may be obtained in machine-readable form from Dr. Tom Smith, General Social Survey, National Opinion Research Center, University of Chicago, Chicago, Illinois 60637.

⁵² In addition to the aforementioned updates of the Duncan SEI, Fridman, Lee, and Falcon (1987) have used Duncan's methodology to construct socioeconomic scores for occupations in the Census of 1940.

Survey, we have first coded all occupation reports to 1970 standards, in order to preserve comparability with past codes. A next step will be to sort the text entries for each occupation-industry report by the 1970 codes and batch code them into lines in the 1990 classification. This will be both faster and cheaper than an independent recode of the data in multiple systems.

The Duncan SEI and its successors are not the only readily available socioeconomic scores for occupations. The major competitor in this respect is the series of Nam-Powers scores now available for Census occupational classifications from 1940 through 1980 (Stafford and Fosset 1990) using a methodology developed by Nam and Powers (1983). Nam and Powers rate occupations on the basis of the average percentile of their incumbents in the cumulative distribution of workers, when the occupations are ranked by median education and by median income. Depending on one's point of view, this has either the advantage or disadvantage of lacking a criterion to weight the relative importance of occupational education and occupational income; indeed, it suggests that, for some purposes, it might make more sense to use measures both of occupational education and of occupational income and avoid any *a priori* combination of them. One might argue that the Nam-Powers scores are, by construction, comparable across years and occupational classifications. We disagree. First, they will vary across time with changes in the relative standing of occupations. Such changes occur with glacial speed (Duncan 1968), and we do not think that they present a serious problem. Second, and more important, the scores will change over time as the occupational distribution changes, even in the absence of

any change in the characteristics of occupational incumbents. We think this is a most undesirable property, and for this reason, we believe that the Nam-Powers scores present even greater problems of comparability across time than do the Duncan SEI and its relatives.

Ganzeboom, De Graaf, and Treiman (1992) have developed a Standard International Socioeconomic Index of Occupational Status (ISEI), which may prove useful in international comparisons. Rather than using prestige as a criterion, they explicitly constructed a set of scores that would best account for the correlation between occupational education and occupational income. They argue that this construction fits Duncan's (1961:116-17) rationale for the SEI: "We have, therefore, the following sequence: a man qualifies himself for occupational life by obtaining an education; as a consequence of his pursuing his occupation, he obtains income. Occupation, therefore, is the intervening activity linking income to education." Ganzeboom, De Graaf, and Treiman estimated this model for a pooled sample of 73,901 full-time employed men from sixteen countries for whom detailed occupational data in the 1968 ISCO classification were available, and they cross-validated the coefficients using five fresh large national surveys in countries for which local socioeconomic indexes were available. In the cross-validation, the ISEI performed about as well as locally constructed indexes. Thus, the ISEI would appear to be a valuable tool for international comparative analyses of the effects of occupational status. Of course, the weighting scheme used by Ganzeboom, De Graaf, and Treiman, as well as those based on occupational prestige as a criterion, may not

be optimal in other content domains, and a test of those assumptions would be a valuable contribution to our understanding of socioeconomic measurement.

We have argued, thus far, that occupations carry a great deal of information about social standing, that respondents are willing and able to describe occupations, they can be coded reliably – whether ascertained by self-report or proxy, and that their social standing can be measured by mapping the prestige or socioeconomic status of occupations into detailed occupational classifications. Occupational status also appears to be rather stable across time. For example, observed father-son correlations of occupational socioeconomic status typically range between 0.35 and 0.45, estimated values which determined econometric analysis has approached only with heroic assumptions about unreliability and instability of incomes across time (Solon 1992; Zimmerman 1992). Within individual careers, occupational status correlations are also moderately high. For example, without correction for attenuation the correlations between the status of a man's first occupation and that of his current occupation in the Blau-Duncan study ranged only from 0.584 at ages 25 to 34 to 0.513 at ages 55 to 64 in 1962. In the Wisconsin Longitudinal Study, without correction for attenuation, the correlations between first, full-time civilian occupations and 1992/93 occupations (Stevens-Featherman TSEI2) were 0.56 among women and 0.63 among men with continuous occupational histories. The correlations between contemporaneous reports of current occupations in 1975 and 1992-93 were 0.66 among women and 0.72 among men. Across the same 17 year span, the correlations of annual earnings were 0.38 among women and 0.51 among men. Findings like

these suggest that occupational status may be a better indicator of long-term – or, as economists call it, permanent – income than is income at a single point in time (Goldberger 1989; Zimmerman 1992). Unlike permanent income, occupational status can be measured well at a single point in time.

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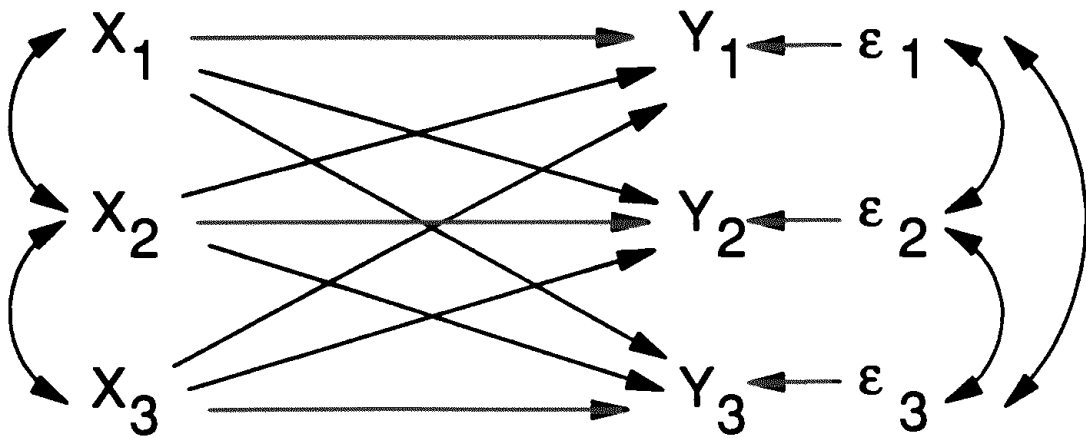
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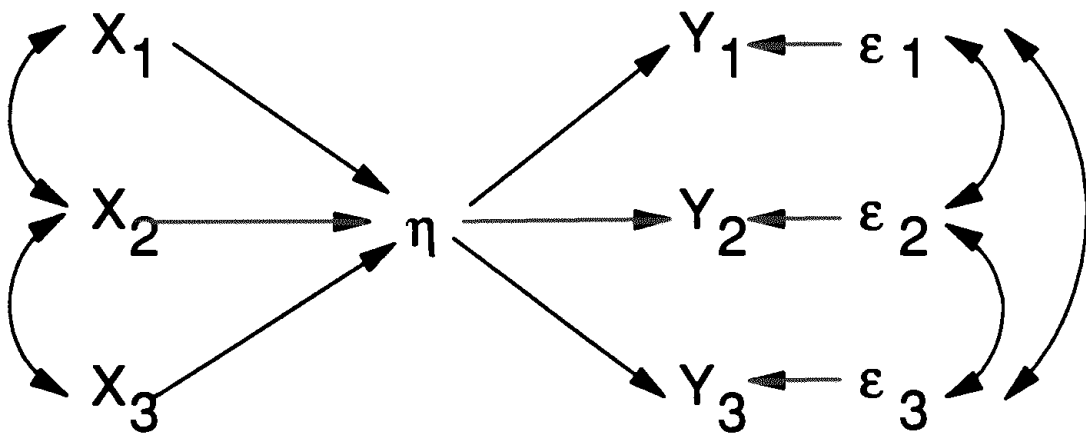
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Figure 1. Socioeconomic Status and Health Outcomes

1. Unrestricted regressions



2. MIMIC model with unrestricted covariances



3. MIMIC model with restricted covariances

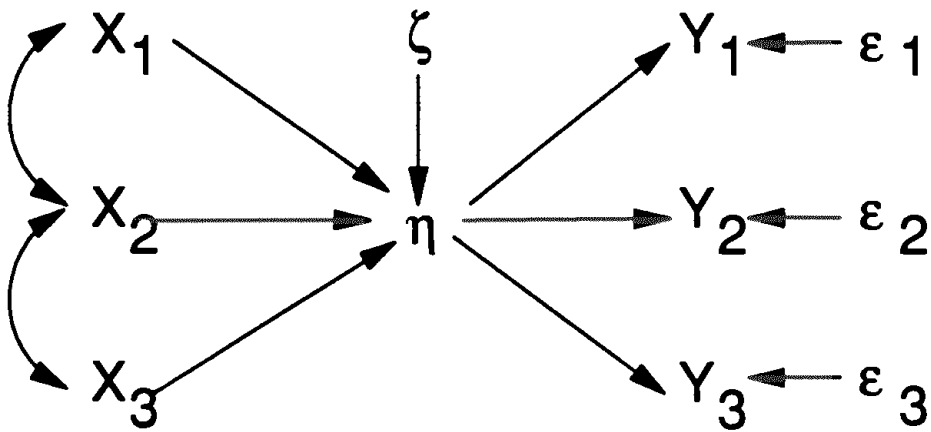
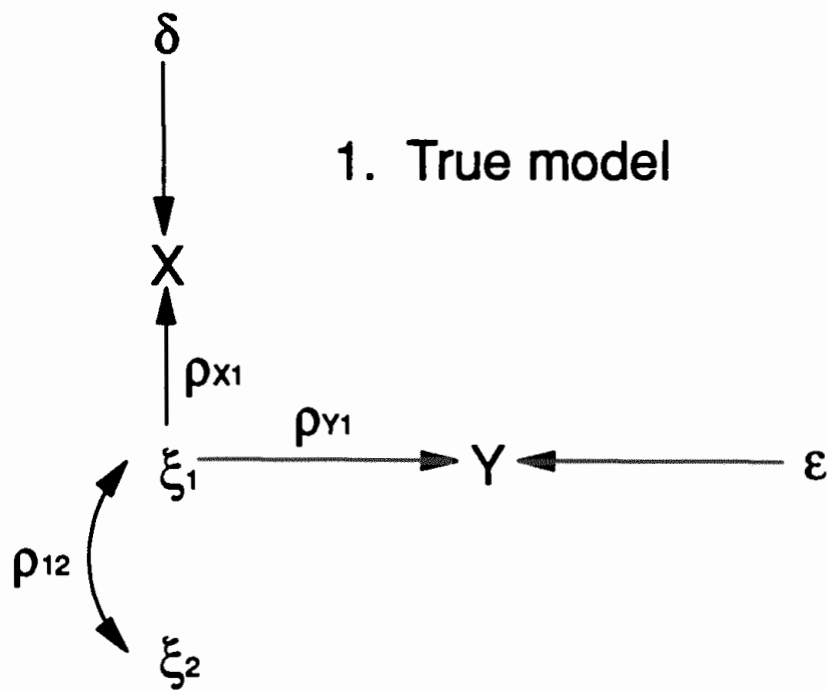
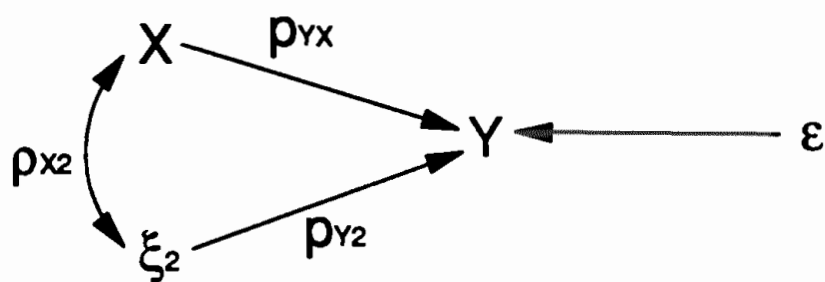


Figure 2. Model of Spurious Contextual Effects



2. Naive regression



X = Observed, individual socioeconomic status
 ξ_1 = True individual socioeconomic status
 ξ_2 = True area socioeconomic status
 Y = Observed health outcome

Figure 3. The 1990-Basis Census Educational Attainment Classification

What is the highest level of school ... has completed or the highest degree ... has received?

- 31 Less than first grade
 - 32 1st, 2nd, 3rd, or 4th grade
 - 33 5th or 6th grade
 - 34 7th or 8th grade
 - 35 9th grade
 - 36 10th grade
 - 37 11th grade
 - 38 12th grade NO DIPLOMA
 - 39 HIGH SCHOOL GRADUATE - high school diploma or the equivalent (For example, GED)
 - 40 Some college but no degree
 - 41 Associate degree in college - Occupational/vocational program
 - 42 Associate degree in college - Academic program
 - 43 Bachelor's degree (For example: BA, AB, BS)
 - 44 Master's degree (For example: MA, MS, MEng, MEd, MSW, MBA)
 - 45 Professional School Degree (For example: MD, DDS, DVM, LLB, JD)
 - 46 Doctorate degree (For example: PhD, EdD)
-

Figure 4. The Erikson-Goldthorpe and Wright Social Class Schemas

Erikson and Goldthorpe's Class Schema

I. Higher-grade professionals, administrators, and officials; managers in large industrial establishments; large proprietors

II. Lower-grade professionals, administrators, and officials; higher-grade technicians; managers in small industrial establishments; supervisors of non-manual employees

IIIa. Routine non-manual employees, higher grade (administration and commerce)

IIIb. Routine non-manual employees, lower grade (sales and services)

IVa. Small proprietors, artisans, etc., with employees

IVb. Small proprietors, artisans, etc., without employees

IVc. Farmers and smallholders; other self-employed workers in primary production

V. Lower-grade technicians; supervisors of manual workers

VI. Skilled manual workers

VIIa. Semi- and unskilled manual workers (not in agriculture, etc.)

VIIb. Agricultural and other workers in primary production

Wright's Class Typology

Owners:

1. Bourgeoisie
2. Small employers
3. Petty bourgeoisie

Non-owners:

4. Expert managers
5. Expert supervisors
6. Expert non-managers
7. Semi-credentialed managers
8. Semi-credentialed supervisors
9. Semi-credentialed workers
10. Uncredentialed managers
11. Uncredentialed supervisors
12. Proletarians

Figure 5. Occupation-Industry Question Series

1. What kind of work does ... do? (For example, electrical engineer, stock clerk, typist farmer)
 2. What are ...'s most important activities or duties at that job? (For example, types, keeps account books, files, sells cars, operates printing press, finishes concrete.)
 3. What kind of business or industry is this? (For example, TV and radio, manufacturing, retail shoe store, State Labor Department, farm)
 4. Is this mainly manufacturing, wholesale trade, retail trade, or something else?
 5. Is ... an employee of a private company, business or individual for wages, salary or commission? a Federal government employee? a State government employee? self-employed in own business, professional practice, or farm? (If not farm, ask, "Is the business incorporated?") working without pay in a family business or farm?
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