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Poor health and premature death are direct manifestations of biological processes influenced by genetic, environmental, and life style factors. These factors operate throughout the life course and interact in complex ways to produce observed differentials in adult health and mortality. To explain these differentials, authors of most studies have typically examined the role of adult environment, employing such explanatory factors as socioeconomic status (e.g., education, income and wealth), health-related behaviors (e.g., smoking and exercise), and social support (kin and social networks and marriage) (see, for example, Adler et al. 1994; Feinstein 1993; House et al. 1994; Kaplan and Keil 1993; Lillard and Waite 1995; Lynch et al. 1996; Menchik 1993; Preston and Taubaman 1994; Rogers et al. 1996).

In recent years, increasing attention has also been paid to the possibility that one's childhood environment may contribute, either directly or indirectly, to health differentials in adulthood. It has been hypothesized, for example, that a positive causal association exists between poor health in childhood and adverse health outcomes in later life. More specifically, it has been suggested that permanent biological impairments, caused by nutritional deprivation and exposure to infectious diseases in childhood, result in adverse health outcomes in adulthood. Examples of disease mechanisms which operate in this way include respiratory tuberculosis, rheumatic heart disease, stomach cancer, and hepatis B viral infection (for reviews, see Elo and Preston 1992; Mosley and Gray 1993). In all instances, exposure to infectious agents in childhood can lead to chronic diseases in later life.

Barker and his colleagues have further argued that a direct causal link exists between birth weight, weight at age one, childhood respiratory diseases, fetal environment and selected chronic diseases in adulthood, including cardiovascular diseases, chronic lung disease, and diabetes (see Barker and Robinson 1993 for a collection of related articles on this topic). In support of their hypotheses, the authors most commonly report correlations between above factors and chronic diseases in adulthood without controls for other potential influences, such as other childhood or adult characteristics. Or the authors draw their inferences from ecological studies (see Elford, Sharper, and Wincup 1992; Barker and Robinson 1993).

The second direct mechanism between childhood illness and adult ill health is negative, although it is less

commonly discussed (Elo and Preston 1992; Preston, Hill, and Drevenstedt 1997). For example, most individuals who survive an attack of an infectious disease acquire a partial or complete immunity to that disease, and thus are less susceptible to the same disease in adulthood (Elo and Preston 1992; Preston, Hill, and Drevenstedt 1997). That negative association between childhood ill health and adult disease is possible, is demonstrated, for example, by the fact that the 1977 influenza A epidemic had only a small effect on persons born prior to 1952, who had a high probability of having been infected by a closely associated flu virus (Elo and Preston 1992:195; see also Preston, Hill and Drevenstedt 1997).

Health in childhood can also have important selection effects on later educational and economic achievement and social circumstances, because health itself can influence later social and economic outcomes. Healthier people achieve higher social and economic status (Lichtenstein et al. 1992). Thus, observed adult differentials in health and mortality by social class may be related to illness and poor health in childhood.

Very few data sets contain information that permit a direct test of the above hypotheses. In the absence of information on childhood disease environment, an inverse association between adult height and mortality has been taken as indirect support for the positive association between adverse childhood environment and adult mortality (e.g., Marmot, Shipley, and Rose 1983; Notkola 1985; Waaler 1984; for a review see Elo and Preston 1992). Although there is a genetic component to height, the most important influences on height worldwide are unquestionably nutritional intake and burden of infectious diseases in childhood (Martorell and Habicht 1986). Leon et al. (1995) have recently cautioned, however, against the interpretation that impaired growth in childhood, reflected in adult height, leads to a general susceptibility to chronic diseases in adulthood. The authors argue that the association maybe confounded by health-related shrinkage prior to measurement of adult height, and by attained social class in adulthood - height is related to one's socioeconomic position which in turn is associated with health and mortality (Wadsworth 1986; Kuh and Wadsworth 1989; Nyström Peck 1992; Liao et al. 1996). Thus, an absence of controls for adult social class and health status at the time height is measured may lead to overestimates of the effects of height.

An association between childhood poverty, measured by father's occupation or economic hardships experienced by the family of origin, and adult health has also at times been interpreted as evidence of a potential direct causal mechanism between childhood health environment and health status in later life (Lundberg 1993; Nyström Peck 1992, 1994; Rahkonen, Lahelma, and Huuhka 1997; Preston, Hill and Drevenstedt 1997). When information on child health has been available in longitudinal studies, the results have been mixed. In one study, based on data from the Terman Life Cycle Study of Children with High Ability, no significant association was found between adult mortality and birth weight, health during the first year of life, health at recruitment to the study population (between ages 11 and 12), or childhood accidents and surgery (Schwartz et al. 1995). In a study of a British birth cohort born in 1946, on the other hand, serious illness in early life was predictive of health status at age 36, even after adjusting for current social circumstances and health related behaviors (Kuh and Wadsworth 1993).

Other potential mechanisms that connect childhood environment to adult health are indirect (Elo and Preston 1992; Preston, Hill, and Drevenstedt 1997). Social and economic resources available to individuals in childhood, for example, influence one's own attained socioeconomic status (Blau and Duncan 1967; Featherman and Hauser 1978; Alexander, Pallas, and Holupka 1987), which in turn is strongly associated with adult health and mortality (Adler et al. 1994; Feinstein 1993; Preston and Taubaman 1994). Thus, individuals from advantaged backgrounds are likely to enjoy social and economic privileges throughout life, which are beneficial to their health over the life course. Attitudes toward illness and its treatment, and health-related behaviors acquired in childhood are also likely to carry into adulthood and influence subsequent health outcomes. We would thus expect to find a positive association with low social class in childhood and adult health and mortality, which may be substantially attenuated or eliminated when adult social class and later risk factors are taken into account (e.g., Mare 1990; Menchik 1993).

Other characteristics of the respondent's family background may also contribute indirectly to an individual's subsequent health outcomes. Schwartz et al. (1995), for example, found an association between

parental divorce before age 21 and adult mortality in a longitudinal study using data from the U.S. The authors hypothesized that early stress may lead to unhealthy behaviors, such as substance abuse, risk-taking, and a failure to take preventive measures, which in turn lead to adverse health outcomes in later life (Schwartz et al. 1995:1237; see also Lundberg 1993; Rahkonen, Lahelma, and Huuhka 1997).

In addition to a positive indirect relationship between childhood circumstances and adult health, a negative indirect association is also possible via health-related selection, a mechanism commonly referred to as "the survival of the fittest" (Preston, Hill, and Drevenstedt 1997). This hypothesis proposes that more genetically robust individuals who experience superior health in childhood are also more likely to experience better health throughout adulthood. This mechanism "requires that genetic susceptibilities to death in childhood be positively correlated with genetic susceptibilities to death in adulthood" (Elo and Preston 1992:195) .

This paper examines the effects of childhood socioeconomic background and health conditions on adult health outcomes using data from Waves 1 and 3 of the Health and Retirement Study (HRS). It begins by discussing data collected in an experimental module included in Wave 3 of the HRS on socioeconomic status of the respondent's family of origin, childhood health conditions, and living arrangements. It then examines adult health outcomes by childhood characteristics along with demographic and socioeconomic characteristics of the respondents within a multivariate framework.

Data

As noted above, the data for the study come from the Health and Retirement Study (HRS). The HRS is a longitudinal study of approximately 12,600 individuals born between 1931 and 1941, including their spouses or unmarried partners. The study's core questionnaire collects detailed information on health conditions and health status, labor force participation and pensions, family structure and mobility, and various aspects of economic well-being (Juster and Suzman 1995). The first wave of data collection took place in 1992 with subsequent waves fielded in 1994, 1996, and 1998.

Each survey wave has also included a number of experimental data collection modules, which are

designed to examine the feasibility of collecting information on specialized topics for possible inclusion in the core survey in subsequent waves. In conjunction with Wave 3, two experimental modules were fielded, which collected information on childhood health and living conditions (Module 1) and the health of respondents' siblings and parents (Module 2). Each module was given to a distinct sub-sample of HRS respondents. The purposes of including these modules were to examine whether it is feasible to collect information on childhood conditions and the health of close relatives from middle aged adults, and whether childhood conditions are predictive of adult outcomes, including health.

In this paper, I use information from Module 1, which incorporates questions on the socioeconomic status of the respondent's family of origin, living arrangements, and the respondent's health status in childhood. All information collected on childhood conditions pertains to the time prior to the respondent's 17th birthday.

To obtain information on the family's social class questions were asked about the father's main occupation; how well off the respondent thought their family was while he or she was growing up (very well off, above average, average, below average, very poor); and whether the respondent's family had encountered economic hardships. The specified economic difficulties included the following: whether the father ever lost his job and did not find another one right away; whether the family ever lost a business; whether the father or family ever had to declare bankruptcy; whether the family ever moved because of financial problems; and whether the family received help from relatives due to financial difficulties. In addition, information on educational attainment of the respondent's parents is available from the core survey. Retrospective information on father's occupation and education has been previously collected by surveys such as the National Longitudinal Survey of Labor Market Experience of Mature Men (see, for example, Mare 1990; Menchik 1993). The additional questions on socioeconomic conditions of the respondent's family of origin included here attempted to go beyond the two more common measures by trying to get at specific economic problems, and by obtaining a respondent's self-assessment of the family's well-being.

Questions concerning living arrangements of respondents in childhood first asked whether the respondent had lived with both parents. If not, then the respondent was further probed for the reason with the following question: "was it because one of your parents died, because they divorced or separated or for some other reason?" A question was also asked whether the respondent lived with a step-parent, and whether the respondent lived in the same household with a grandparent for a year or more prior to age 17.

To obtain information about the respondent's health status in childhood, two different strategies were employed. First, the respondent was asked to rate his or her health in childhood as either excellent, very good, good, fair, or poor. Second, an attempt was made to collect information on long-term health problems and the disease conditions which caused such problems. To do so, the respondent was first asked the following three questions: "Because of a health condition, did you ever miss school for one month or more?" "Because of a health condition, were your sports or physical activities ever restricted for three months or more?" "Because of a health condition, were you ever confined to bed or home for one month or more?" If the answer to any of these questions was affirmative, the respondent was further asked what was the most serious condition that caused such problems, and for any other disease conditions. In addition, information on the respondent's adult height is available from the HRS core survey.

To examine the effects of early life conditions on adult health outcomes, I linked the Wave 3 experimental data to HRS Wave 1. The purpose for doing so, was to minimize a potential bias in reports of childhood health conditions caused by the respondent's current health status. Wave 1 of the HRS was fielded in 1992, four years prior to the time when information on childhood health conditions was collected in Wave 3.

The resulting sample consists of 520 age-eligible HRS Wave 1 respondents; that is, respondents who were born between 1931 and 1941. The experimental module was given to 735 Wave 3 respondents, of whom 656 were linked to Wave 1. The failure to link respondents to Wave 1 is due to the fact that these respondents were not interviewed in the first wave of HRS. These individuals represent new spouses of Wave 1 respondents or spouses who had previously refused to participate, but have been subsequently brought into the study

population. The HRS staff has made special efforts to bring in spouses who had declined interviews in prior waves. Of the 656 respondents linked to Wave 1, 520 were born between 1931 and 1941. Clearly, one of the drawbacks of the HRS experimental data is the small sample size.

The HRS core survey in turn collects extensive information on health conditions in adulthood. In Wave 1, a question on overall health status at the time of the survey was asked of all respondents: "Would you say your health is excellent, very good, good, fair, or poor?" Self-assessed overall health status is a general measure of health, and combines physical and emotional aspects of overall well-being. It is also a significant predictor of mortality in prospective studies (Rahkonen, Lahelma, and Huuhka 1997). It is employed as one of the dependent variables in this analysis.

In addition to the question about overall health status, each respondent was asked whether a doctor had ever told him or her that (s)he had selected chronic conditions, such as high blood pressure, diabetes, heart attack, stroke, chronic lung disease, et cetera. Of the specific chronic conditions, the following were selected for investigation in the present study: high blood pressure or hypertension; chronic lung disease such as chronic bronchitis or emphysema; a heart attack, heart disease, angina, congestive heart failure, or other heart problems; and stroke. I made this choice based on results from previous research which has linked childhood conditions to cardiovascular and respiratory diseases and to mortality at older ages from these causes.

Information on the respondent's adult characteristics, employed as control variables in the analysis, is also taken from Wave 1. These include age, race, sex, marital status, and educational attainment. Of the various measures of adult social class (education, income, and wealth), I chose the respondent's educational attainment. Education is commonly hypothesized to affect health status through several mechanisms, including attained economic status and knowledge of the beneficial effects of health-related behaviors. In addition, one's level of schooling is unaffected by one's health after the completion of one's education, although it can be influenced by childhood health conditions. The inclusion of total family income and wealth did not substantially change the results with respect to the effects of childhood conditions on adult health, reported below . Height was not a

significant predictor of adult health outcomes in this sample, and thus it has not been included in the analyses reported below.

Sample characteristics

Table 1 presents sample characteristics. As shown, information on childhood conditions collected in the experimental module is available for nearly all respondents. Very few individuals were unable or refused to answer these questions. The largest proportion of missing values are for parents' education and for father's occupation. In the case of father's occupation, the main reasons for missing values were that the individual did not know the father's occupation because he or she did not live with him, the father had died while the respondent was a young child, or the response was ambiguous and could not be assigned an occupational category. Missing information on parents' education is principally the result of the respondent not knowing the level of schooling of his or her parents. The coding of occupations was based on *The Alphabetical Index of Industries and Occupations* developed in conjunction with the 1970 Census of Population (U.S. Census Bureau 1971).

Ten to thirteen percent of the respondents reported that the family had moved for financial reasons, father had lost a job, or the family had received financial help from relatives. Much lower proportions reported that the family had lost a business (5.2%) or the father or a family business had gone bankrupt (1.2%). Over half of the respondents rated their family's financial well-being in childhood as average (59%), while 32% rated it fair or poor. Relatively few respondents replied that their family's financial well-being was above average (9%). It is difficult to know to what extent respondents were able to answer accurately the questions on economic hardships the family had experienced during their childhoods, or the reference point used in evaluating the family's overall well-being. In any case, of these less conventional measures of social class, only family's well-being exhibits a significant association with the respondent's health status in adulthood; the others are dropped from subsequent discussion.

About three-quarters of the respondents had lived with both parents their entire childhood, and close to a quarter of the respondents had lived with grandparents at least one year prior to age 17. About 20% of the

respondents who had lived with both parents had also co-resided with grandparents at some point in their childhood compared to 36% of respondents who did not live with both parents (results not shown). None of the living-arrangement measures was significantly associated with adult health outcomes, and they are dropped from subsequent discussion.

Nearly all respondents also provided information on childhood health conditions. The vast majority reported that their health as a child had been excellent or very good (52%), while only about 9% noted that their health had been fair or poor. Overall, 19% reported that they had experienced at least one long-term illness episode prior to age 17. Given the relatively few number of specific disease conditions, I have simply coded diseases into two broad categories - infectious and non-infectious diseases. Infectious diseases consist of common infectious diseases such as measles, polio, scarlet fever, and pneumonia. I have also included mentions of rheumatic heart disease and heart murmur among infectious diseases, because these diseases have infectious origins (Stollerman 1988). The non-infectious disease category is made up of accidents, appendicitis, and other and unknown causes. Ten percent of respondents reported health problems caused by infectious diseases, while 9% reported health problems due to non-infectious causes.

It is possible that retrospective reporting of childhood health conditions is influenced by the respondent's current health status, in which case any relationship found between childhood and adult health conditions would be biased. By distancing the measurement of adult health from the time when questions on childhood health conditions were asked helps to minimize this bias to some extent. It is also useful to examine the internal consistency of the responses to the questions on overall health status and long-term health problems in childhood. We would expect to find a highly significant correlation between the two measures, if the reporting of childhood health conditions has any validity. Table 2 presents the relationship between overall health status and whether or not the respondent reported at least one long-term health problem in childhood. As is shown in Table 2, the percentage of individuals who reported at least one long term health problem increases steadily as we move from excellent to poor health, from 8% to 82%. Thus, it appears that the respondents were consistent in their reporting

of childhood health conditions.

Table 1 also shows sample characteristics for variables used as demographic and socioeconomic controls. The mean age of respondents at the time of the HRS Wave 1 survey was 55.4 years (Table 1). Information on childhood health conditions was collected four years later, when respondents on average were close to 60 years old. The probability of surviving to age 60 for cohorts born in 1935 was 0.75 for males and 0.84 for females (U.S. Department of Health and Human Services 1992). Thus, to the extent that childhood health conditions influence mortality at older ages, selective attrition from the present sample may have occurred. Nevertheless, the vast majority of members of cohorts born in 1931 and 1941 would have survived to the ages at which information on childhood conditions and adult health outcomes was collected.

Table 3 presents the frequency distribution for the outcome variables used in this study: the respondent's overall health status in adulthood and selected chronic conditions. In the analysis of selected chronic conditions, I have grouped together heart disease, lung disease and stroke, as relatively few individuals reported these conditions.

Methods

I estimate a series of empirical models to examine the relationship between adult health outcomes and early life conditions as well as the relationship between childhood social class and self-assessed health status prior to age 17. To examine the effects of childhood environment on self-assessed health status in childhood and adulthood, I estimate orderedlogit models. In this case, the dependent variable is an ordinal categorical response for which this model specification is appropriate. The underlying score is estimated as a linear function of explanatory variables and a set of cut points. The probability of observing health status i can be expressed as:

$$Pr\ (health = i) = Pr\ (k_{i-1} < \beta X + \mu_j \leq k_i) \qquad (1)$$

The model estimates the parameter vector β along with cut points (k_i); μ_j is assumed to be logistically distributed in this model.

For the presence of specific chronic conditions, I estimate an ordinarylogit model, which is appropriate

when the dependent variable is dichotomous. This model can be expressed as follows:

$$ln[p/1-p] = a + ßX \quad (2)$$

where p is the probability of having a chronic condition, a is the intercept, and $ß$ is the parameter vector of coefficients associated with a vector of explanatory variables, X. The statistical package STATA is used to estimate the models. The score chi-square for testing the proportional odds assumption for the ordered logit models is obtained with SAS statistical software.

I begin the analysis by examining the effects of socioeconomic characteristics of the family of origin on reported childhood health status. I then estimate a sequence of four equations that examine the effects of childhood socioeconomic and health conditions, separately and combined, on self-assessed health status in adulthood, with and without controls for adult characteristics. I begin by including childhood socioeconomic characteristics only, in subsequent discussion referred to as Model 1. I then estimate the effects of childhood health status on adult health (Model 2). I then combine the two sets of childhood conditions (Model 3), and then add to this model the respondent's race, sex, marital status, and educational attainment. The analysis of chronic conditions follows a similar strategy.

The relationship between childhood social class and self-assessed health status prior to age 17

Table 4 presents the effects of race and socioeconomic conditions in childhood on reported childhood health status. Childhood health status is grouped as follows: poor and fair health are combined into a single category,[1] good, very good, and excellent. No significant associations were found between self-reported long-term health problems in childhood and the family's socioeconomic characteristics (results not shown). For explanatory variables, categories are created for what are usually a small number of cases with missing values on a characteristic (results not shown).[2]

[1] This choice was made because very few respondents classified their childhood health status as poor (Table 1).

[2] Missing categories are created for father's occupation and mother's education. One missing case for the family's well-being is included in the omitted category; the results shown are not affected by this

Of mother's and father's education, only mother's education was a significant predictor of reported health status in childhood, and is included in the Model shown in Table 4. Children of mothers with less than 8 years of schooling are significantly more likely to report lower self-reported health status in childhood than are children of better educated mothers (exp{-0.5391 = 0.58). In addition to maternal schooling, father's occupation is predictive of childhood health status, although the parameter estimate is significant only at the 10%-level with a two-tailed test. In this case, children who grew up in families where the father worked in a white collar occupation[3] are more likely to report higher self-reported health status in childhood than children who grew up in families where fathers were otherwise employed (exp{0.3895} = 1.48). No significant differences were found among other occupations. Growing up in a family whose well-being was rated below average or being African American are not significantly associated with reported health status in childhood, although the signs of the parameter estimates are in the expected direction.

These results are generally consistent with expectations. Already in the 1920's, well before the respondents were growing up in 1930's and 1940's, social class differences in child mortality were evident in the United States. Ewbank and Preston (1990), for example, have shown a widening of child mortality differentials by father's occupation during the first decades of this century. Changes in medicine and medical practice and the growing acceptance of the germ theory of disease led to behavioral changes which upper class families were apparently quicker to adopt. Major public health campaigns targeted at mothers were also undertaken during the first decades of this century, and it is quite possible that better educated mothers were initially more likely to adopt measures aimed at improving child health (Ewbank and Preston 1990). That child health status varies by mother's education has been documented in a wide variety of settings in recent years, although the extent to which

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choice.

[3] White collar occupations consist of professional, managerial, sales, and clerical occupations.

the relationship is causal continues to be debated (e.g., Hobcraft 1993; Desai and Alva 1998).

Somewhat surprisingly, however, the differences in the reported childhood health status by race are not significant. Although the parameter estimate for being African American is in the expected direction - African Americans are more likely than whites to report lower self-reported health status in childhood - the estimate is far from being significant. Racial differences in infant and child mortality in the 1930's and 1940's were substantial. The 1939-41 life table estimates, for example, show that the probability of dying between birth and age 5 was nearly twice as high for African Americans ($_5q_1$=0.09) than for whites ($_5q_1$=0.05) (Greville 1946). Therefore, one would expect to find significant differences in self-reported childhood health status by race as well. That the racial differences are not significant in the present analysis may be due to measurement error in the retrospectively reported childhood health status and reporting differences by race.

The effects of childhood conditions on self-assessed health status in adulthood

I now turn to investigations of the effects of childhood conditions on self-assessed adult health status. Table 5 shows the results for self-assessed health status in adulthood. Again, categories are created for the small number of cases with missing values on a characteristic (results not shown)[4]. Of the family's socioeconomic characteristics, I have included father's occupation and education, and the respondent's self-assessment of the family's well-being. The effects of mother's education is captured by childhood health status. In all models, I also control for the age of the respondent.

All three measures of family's socioeconomic status are significant predictors of self-assessed health status in adulthood in Model 1. Respondent's whose fathers were employed in white collar occupations report higher self-assessed health status in adulthood than do respondents whose fathers were otherwise employed (exp{0.6529}=1.92). No significant differences were found among other occupational categories. In addition,

[4] Missing categories are created for father's occupation and father's education. One missing case for the family's well-being and one missing case for childhood health status are included in the omitted category. The results shown are not affected by this choice. For Wave 1 data, I accept the imputations for missing values prepared by the HRS staff included in the Wave 1 public release data file.

respondents whose fathers had less than 8 years of education (exp{-0.4687}=0.63) and whose family's well-being was assessed to be below average (exp{-0.3545}=0.70) report lower self-assessed health status in adulthood than do respondents whose fathers had at least 8 years of schooling and whose family's well-being was average or above. These results are consistent with previous investigations which have found a significant association between father's occupation and economic problems experienced by the family while the respondent was growing up and adult health and mortality (e.g.,Notkola 1985; Lundberg 1993; Nyström Peck 1994; Rahkonen, Lahelma, and Huuhka 1997).

As noted previously, it has been hypothesized that effects of family's socioeconomic status on adult health outcomes may at least in part reflect differences in childhood disease environment and childhood health conditions, with individuals from poorer backgrounds having worse health in adulthood because of a higher disease burden in childhood. In these data, two measures of childhood health conditions are available to examine this hypothesis directly. Model 2 shows the effects of self-assessed health status in childhood on self-assessed health status in adulthood. Childhood health status is a highly significant predictor of adult health status in this model - as an individual's self-reported health status in childhood declines she or he is progressively less likely to report higher self-assessed health status in adulthood. These results are consistent with the hypothesis that poor health in childhood has a positive association with poor health in later life. The effects of long-term health problems in childhood on self-assessed health status in adulthood are also in the expected direction, but the results are not statistically significance (not shown).

The effects of childhood health status on self-assessed health status in adulthood appear to be largely independent of the socioeconomic status of the respondent's family of origin in this sample, as we might have anticipated based on the results reported in Table 4. Only mother's education and father's occupation were significantly associated with childhood health status. Moving from Model 2 to Model 3, the coefficients of childhood health status decline by only 6-13% when controls for father's education and occupation and family well-being are added. The reduction in the coefficients for the variables measuring childhood social class decline

by 6-12% between Model 2 and Model 3 and they also remain significant.

The addition of controls for race, sex, and adult characteristics, that is, the respondent's marital status and educational attainment, further reduces the coefficients for father's education and occupation by 49-31%. The reduction for the respondent's self-assessed family well-being are smaller, but none of the three measures retain statistical significance at the 5%-level. The effects of the socioeconomic status of the respondent's family of origin thus appear to be working through in part through the individual's own attained social class. As noted earlier, individuals from advantaged backgrounds enjoy social and economic advantages throughout the life course, which are undoubtedly beneficial to their health in later life.

On the other hand, the effects of childhood health status persist and are barely affected by the inclusion of the additional controls (Model 3 versus Model 4). Relative to the respondents who reported that their health in childhood had been excellent, those who reported that their health had been very good (exp{-0.3765}=0.69), good (exp-{0.7274}=0.48) or fair or poor (exp{-1.0544}=0.35) are progressively less likely to report higher self-reported health status in adulthood. The results remain consistent with the hypothesis that poor health in childhood leads to poor health in adulthood. The addition of total household income and wealth to the model did not change this conclusion (results not shown). To what extent, a tendency to report worse health in childhood by those in worse health in adulthood is difficult to know. I have attempted to minimize this problem by distancing the measurement of current and childhood health status, but nevertheless a reporting bias may persist.

The effects of childhood conditions on the presence of selected chronic conditions

In addition to examining the effects of childhood health conditions on a self-assessed health status in adulthood, a general measure of overall health, it is also useful to investigate the relationship between childhood conditions and specific chronic diseases. As noted previously, for these investigations I have chosen reports of chronic conditions for which a relationship is expected based on previous research, namely blood pressure or hypertension, heart disease, lung disease, and stroke. In these investigations, the last three measures are grouped into one dependent variable due to the relatively small number of individuals who reported these specific disease

conditions (Table 3).

Contrary to expectations, none of the childhood conditions for which information was collected are significantly associated with blood pressure or hypertension (results not shown). Therefore, the analyses reported below are limited to the effects of childhood conditions on reports of heart disease, chronic lung disease, and stroke. The results are shown in Table 6. As before, categories are created for the small number of cases with missing values on a characteristic.

Of the childhood socioeconomic characteristics, only family well-being exhibits a significant association with reports of heart disease, chronic lung disease, or stroke. Those who reported that their family well-being was below average have almost twice the odds of reporting such conditions (exp{0.6542}=1.92) relative to respondents whose family well-being was average or above (Model 1). Both measures of childhood health conditions are also significant predictors of the specified chronic diseases. Relative to those who reported that their health status in childhood was excellent, those reporting that their health had been good (exp{0.8926}=2.44) or fair or poor (exp{0.8607}=2.36) have over twice the odds of reporting the presence of heart disease, chronic lung disease, or stroke (Model 2). Similarly reports of childhood infectious diseases are associated with the presence of the specified chronic diseases in adulthood (exp{0.9519}=2.59).[5] These effects persist when controls for race, sex, and respondent's education and marital status are included in the model (Models 4 and 5).

Undoubtedly, the retrospective reports of specific disease conditions contain some unknown degree of measurement error. Therefore, it is of particular interest to note that the results reported in Table 6 are consistent with expectations. Based on previous research and epidemiological evidence, we would expect to find an association between childhood infectious diseases and heart disease, chronic lung disease, and stroke, but not necessarily between non-infectious childhood diseases and these chronic conditions (see Elo and Preston 1992).

[5] Because the presence of long-term health problems in childhood is highly correlated with self-reported childhood health status, these variables are not included in the same model.

As shown in Table 6, only self-reported childhood infectious diseases exhibit a significant association with the selected chronic diseases in adulthood. Unfortunately, due to the small number of specific disease conditions, we cannot examine this relationship in greater detail. The coding of infectious diseases include heart murmur and rheumatic heart disease, which by definition should be strongly associated with reports of heart disease at older ages. Nevertheless, if chronic lung disease is examined separately, the effects of infectious diseases reported in Table 6 continue to hold (results not shown).

Of the other explanatory variables included in Table 6, only the respondent's age shows a significant association with chronic lung disease, heart disease and stroke. The signs of the other coefficients are in the expected direction, but they are not statistically significant.

Summary

This paper has examined the effects of retrospectively collected information on childhood conditions on self-assessed health status and selected chronic conditions in adulthood. The results are consistent with previous research which has found a significant association between socioeconomic status of respondents' family of origin and adult health outcomes. Respondents who grew up in less well-off households report lower self-assessed health status in adulthood. The effects of respondent's social class in childhood are, however, substantially attenuated when respondents' adult characteristics are controlled. Such a result is expected, because individuals from higher social class backgrounds are likely to have greater access to economic and other resources throughout the life course which in turn should be beneficial to health over the entire life span.

In addition to information on socioeconomic characteristics of the respondent's family of origin, retrospective information was collected on the individual's self-assessed health status in childhood, and long-term health problems as well as disease conditions which caused such problems. Here the results are consistent with the hypothesis that poor health in childhood leads to worse self-assessed health status in adulthood. The possibility that retrospective reporting of childhood health conditions is influenced by an individual's current health status cannot be ruled out entirely. I have tried to minimize this problem by distancing the measurement

of adult health outcomes from the time when information on childhood health conditions was obtained. This solution may not, however, eliminate the problem entirely.

Reports of childhood health conditions are also internally consistent and an analysis of the effects of the socioeconomic status of the family of origin on self-reported health status in childhood are generally consistent with expectations. The only surprising finding in this respect is a lack of a significant association between the respondent's race and self-assessed childhood health status. This finding raises the possibility that reporting of self-reported childhood health status varies by race of the respondent.

The positive association between lower social class origins and poor adult health outcomes is stronger for self-assessed health status than for the chronic conditions selected for investigation. Of the childhood socioeconomic variables, only family well-being exhibits a significant association with heart disease, lung disease, and stroke. On the other hand, poor self-reported health status in childhood and childhood infectious diseases are highly significant predictors of the selected chronic conditions. Although information on specific disease conditions causing long-term health problems in childhood is likely to be affected by measurement error, the results reported here are consistent with epidemiological evidence. Only self-reported childhood diseases show a significant association between heart disease, chronic lung disease, and stroke. No such relationship is found for self-reported non-infectious diseases. In summary, the findings of this study are consistent with the hypothesis which proposes a positive association between ill health and adverse health outcomes in later life.

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Table 1: Sample Characteristics, Health and Retirement Study, Experimental Module 1, Wave 3 Linked to HRS Wave 1

Characteristic	%	Characteristic	%	Characteristic	%
Father's Occupation		*Move for Fin. Rea.*		*Reported Illness*	
Prof./Managerial	15.2	Yes	10.7	Infectious disease	10.0
Sales/Clerical	4.4	No	88.4	Non-inf. disease	9.3
Craftsmen/kindred work	22.2	Dk/Refused	0.8	N/A	80.7
Operatives	19.5				
Labor/service	13.3				
Farmer/farm labor	19.3				
Missing	6.1				
Father's Education		*Receive Help*		*Health as a Child*	
< 8 yrs.	21.0	Yes	13.0	Excellent	51.8
8-11 yrs.	30.0	No	84.9	Very Good	25.4
12+ yrs.	37.1	Dk/Refused	2.0	Good	13.9
Missing	12.0			Fair	6.9
				Poor	1.8
				Dk/Refused	0.2
Mother's Education		*Live with Parents*		*Race*	
< 8 yrs.	16.6	Live with both	76.8	African American	7.5
8-11 yrs.	34.3	No-parent died	9.5	All other races	92.5
12+ yrs.	43.1	No-divorce/sep.	9.6		
Missing	6.0	No-other reason	3.8		
		Dk/Refused	0.3		
Family Well-being		*Live with Grandparents*		*Respondent's education*	
Very well	3.9	Yes	23.9	< 12 yrs.	20.8
Above average	5.3	No	75.8	12 yrs.	40.2
Average	58.7	Dk/Refused	0.2	13+ yrs.	39.1
Fair	23.2				
Poor	8.8			Mean education	12.6 (2.6)
Missing	0.1				
Father Lost Job		*Miss School*		*Sex*	
Yes	12.9	Yes	12.1	Male	47.6
No	82.8	No	87.6	Female	52.4
Dk/Refused	4.3	Dk/Refused	0.2		
Lost a Business		*Sports Restricted*		*Marital Status*	
Yes	5.2	Yes	10.3	Currently Married	76.3
No	93.1	No	89.6	All Other	23.7
Dk/Refused	1.8	Dk/Refused	0.2		
Go Bankrupt		*Confined to Bed*		*Mean Age*[a]	55.4 (3.3)
Yes	1.2	Yes	12.9		
No	97.6	No	86.9		
Dk/Refused	1.1	Dk/Refused	0.2		

[a] For continuous variables standard deviation given in parentheses.

Sample size: 520 age-eligible respondents linked to Wave 1 of the Health and Retirement Study. Percentages may not add up to 100 due to rounding. Weighted percentages using Wave 1 weights.

Table 2: Test of the relationship between overall health status in childhood and reports of long-term health problems, Health and Retirement Study, Experimental Module 1, Wave 3 Linked to HRS Wave 1

	At least one long-term healthproblem[a]		
Health status in childhood	No	Yes	Total
Excellent	237	21	258
Very good	113	28	141
Good	56	17	73
Fair	14	22	36
Poor	2	9	11
Total	422	97	519
Likelihood ratio chi-square with 4 degrees of freedom		76.1 df=4	*p*-value = 0.00
Pearson chi-square		91.5 df=4	*p*-value = 0.00

[a] Either missed school for one month or more; participation in sports restricted; or confined to home or bed.

Note: One case was dropped due to missing information on health status in childhood.

Table 3: Dependent Variables: Health and Retirement Study, Experimental Module 1, Wave 3, Linked to HRS Wave 1

Current Health Status	%		
Excellent	25.0	*Blood Pressure*	
Very good	30.2	Yes	38.0
Good	26.1	No	62.0
Fair	11.6		
Poor	7.1		
Chronic Lung Disease (CHL)		*Heart Disease (HD)*	
Yes	8.2	Yes	12.6
No	91.8	No	87.4
Stroke (S)		*CHL, S, or HD*	
Yes	2.5	Yes	18.5
No	97.5	No	81.5

Sample size: 520 age-eligible respondents. Percentage may not add to 100 due to rounding. Weighted percentages using Wave 1 weights.

Table 4: Estimated Coefficients Predicting Self-Assessed Health Status in Childhood from Ordered Logit Regression, Health and Retirement Study, Experimental Module 1, Wave 3 Linked to HRS Wave 1

Characteristic	Coefficient	z
Father's occupation		
White collar occupations	0.3895	1.740
All Other	---	---
Mother's education		
< 8 yrs.	-0.5391	2.467
8+ yrs	---	---
Family well-being		
Average or above	—	—
Below average	-0.1425	0.796
Race		
African American	-0.1653	0.644
Other	---	---
_cut1	-2.4243	
_cut2	-1.2980	
_cut3	-0.0574	
Model $?^2$	14.0 df=6	
Score test $?^2$	9.8 df=12	

--- reference category. Sample size: 519 age-eligible respondents; one case dropped due to missing value on childhood health status.
Note: Coefficients for categories on missing values not shown.

Table 5: Estimated Coefficients Predicting Self-Assessed Health Status in Adulthood from Ordered Logit Regression, Health and Retirement Study, Experimental Module 1, Wave 3 Linked to HRS Wave 1

	Model 1		Model 2		Model 3		Model 4	
Characteristic	Coefficient	z	Coefficient	z	Coefficient	z	Coefficient	z
Father's occupation								
White collar occupations	0.6529	3.073			0.5760	2.683	0.3972	1.825
All Other	---	---			---	---	---	---
Father's education								
< 8 yrs.	-0.4687	2.317			-0.4217	2.055	-0.2165	1.025
8+ yrs.	---	---			---	---	---	---
Family well-being								
Average or above	—	—			—	—	—	—
Below average	-0.3545	2.069			-0.3336	1.937	-0.3087	1.788
Health as a child								
Excellent			---	---	---	---	---	---
Very good			-0.4009	2.168	-0.3782	2.031	-0.3765	2.005
Good			-0.8023	3.215	-0.7007	2.773	-0.7274	2.853
Fair/poor			-1.1986	4.097	-1.1168	3.765	-1.0544	3.570
Respondent's Age	-0.0589	2.292	-0.0674	2.669	-0.0599	2.326	-0.0508	1.956
Sex								
Female							---	---
Male							-0.1534	0.930
Race								
African American							-0.4716	1.933
All other races							---	---
Marital Status								
Married							---	---
All other							-0.3289	1.641
Respondent's education								
< 12 yrs.							-0.8322	3.951
12+ yrs.							---	---
_cut1	-6.1544		-6.7677		-6.5693		-6.4956	
_cut2	-4.9478		-5.5518		-5.3320		-5.2109	
_cut3	-3.5929		-4.2065		-3.9415		-3.7528	
_cut4	-2.2313		-2.8719		-2.5559		-2.3309	
Model $?^2$	37.8 df=6		30.5 df=4		57.1 df=9		83.4 df=13	
Score test $?^2$	13.6 df=18		19.5 df=12		32.3 df=27		43.7 df=39	

--- reference category. Sample size: 520 age eligible respondents.

Note: Coefficients for categories on missing values on characteristics not shown.

Table 6: Estimated Coefficients Predicting the Presence of Chronic Lung Disease, Heart Disease and Stroke, Health and Retirement Study, Experimental Module 1, Wave 3

Characteristic	Model 1	Model 2	Model 3	Model 4	Model 5
Father's occupation					
White collar occupations	-0.1405			-0.0190	-0.0521
All other	---			---	---
Father's Education					
< 8 yrs.	0.1237			-0.0101	0.0940
8+ yrs.	---			---	---
Family Well-being					
Average or above	---			---	---
Below average	0.6542 **			0.5937*	0.5940*
Health as a Child					
Excellent		---		---	
Very good		-0.0299		0.0217	
Good		0.8926**		0.9202**	
Fair/Poor		0.8607*		0.8637**	
Long-term Health Problems					
None			---		---
Infectious disease			0.9519**		1.0354**
Non-infectious disease			0.2244		0.2015
Respondent's Age	0.1345**	0.1377**	0.1314**	0.1385**	0.1305**
Sex					
Female				---	---
Male				0.4107	0.3710
Race					
African American				-0.0169	0.0588
All other races				---	---
Marital Status					
Married				---	---
All other				0.1028	0.1452
Respondent's Education					
< 12 yrs.				0.3107	0.3896
12 + yrs.				---	---
Constant	-9.2855**	-9.4932**	-9.0407**	-10.0324**	-9.5180**
Model $?^2$	22.3 df= 6	23.8 df= 4	19.5 df=3	36.5 df=13	33.8 df=12

---- reference category; ** p≤ 0.01; * p ≤ 0.05; _ p ≤ .10 Sample size: 520 age-eligible respondents.
Note: Coefficients for categories with missing values on a characteristic not shown.