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Re-Constructing Childhood Health Histories

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ABSTRACT

Re-Constructing Childhood Health Histories*

This paper provides evidence about the quality of retrospective childhood health histories given to respondents in the HRS and the PSID. Even though information on early life health events is critical, there is legitimate skepticism about the ability of older respondents to remember specific health problems that they had as a child. The evidence presented in this paper suggests that this is too negative a view. Respondents appear to remember salient childhood events about themselves such as the illnesses they had as a child quite well. Moreover, these physical and psychological childhood health events are important correlates of adult health during middle age.

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In the last decade, there have been two non-intersecting literatures that need to be joined. First, with the introduction of Health and Retirement Survey (HRS) in the United States, English Longitudinal Survey of Aging (ELSA) in England, and the Survey of Health and Retirement in Europe (SHARE) in 15 countries in continental Europe, we have high quality panel data that monitor economic and health lives starting at age 50 and beyond. Parallel aging surveys are being conducted or are in the planning stages in Japan, South Korea, China, and India. Second, a growing literature has emphasized the critical importance of childhood health for prevalence and incidence of health events during the adult years.

There are basically three options for combining economic and health data over a long span of the life course. The first collects data prospectively starting at the beginnings of life and then follows people over long periods of time simultaneously gathering data on salient economic and health domains of their lives. The most successful examples of this approach are a series of British cohort studies (1946, 1958, 1970)[1] that sampled people born during a particular week while subsequently following these babies periodically well into their adult years. These British cohort studies are a major source of some of the best knowledge on this subject.[2] But even here there are limitations since the economic, social, and family information available in these cohort studies are not all that we would wish them to be. Moreover, most countries including the US do not have such ongoing cohort studies, or if they do they are of a very recent vintage so we may have to wait 50 years or more to obtain useful results pertaining to the mature adult years.

The second option links surveys to administrative data containing the relevant missing information, but this is far easier on the economic than on the health side. Panels such as the

[1] See www.cls.ioe.ac.uk/studies.

[2] Another important source is the Helsinki birth cohorts (people born between 1924-1944). This cohort contains detailed periodically collected biomedical data with some SES information made possible by the widespread collection of administrative data in Finland.

PSID can capture most of the relevant economic history within the survey. Even when that is unavailable, social security earnings histories or W-2 forms may be attached to a survey to fill in the missing economic history with some accuracy. This is impossible for health histories since there are no administrative records of these events, especially for the critical pre-Medicare years.

The third option collects information retrospectively, but the challenges are formidable. We are often asking people to remember events taking place a half century ago or more. Skepticism about respondents' ability to do so is understandable (Sudman and Bradburn 1974). Judging by the absence of any significant health history data in social science surveys, the research community seems pessimistic about respondents' ability to accurately report health histories.

This is too negative an assessment. First, the missing information on early life health events is critical. Abandoning attempts to collect this data basically means giving up on some critical questions of the science. Second, information about important childhood health events is likely to be amongst the more salient to the individual queried.

One difficulty faced by longitudinal "aging" surveys (PSID and HRS are two examples in the US) concerns how to deal with "initial conditions"—life before the baseline survey year. Knowing health or economic status beginning at baseline is not sufficient since the entire prior histories of health and economic trajectories may matter for current decision making. The absence of information on pre-baseline health histories including childhood health means that researchers have to rely on a key untestable assumption—baseline health conditions sufficiently summarize individuals' health histories. If they do not, new health events unfolding during the panel may be the delayed (and perhaps predictable) consequence of some knowable part of an individual's health history. If so, health events within the panel cannot be used to measure effects

of new exogenous unanticipated events. The value of data from childhood health histories may be great, and the only realistic option for retrieving them is to obtain it directly from respondents.

This paper is divided into five sections. The following section provides a short summary of the literature that indicates that childhood health is an important predictor of later life as an adult both in health and in economic domains. The third section outlines how I designed the childhood retrospective health histories in an internet panel for HRS respondents and for the regular PSID panel. The fourth section summarizes my main results about the quality of this retrospective childhood health, and the last section contains my main conclusions.

THE IMPORTANCE OF CHILDHOOD HEALTH

In a classic demographic paper, Elo and Preston (1992) carefully documented that the incidence of many diseases during adulthood had their antecedents in childhood, an insight supported in subsequent demographic research (Hayward and Gorman 2004; Preston et al. 1998). Renewed interest in consequences of poor childhood health can be traced partly to the impact of David Barker (1997). He provides evidence that even nutrition in utero impacts health outcomes—particularly heart disease and diabetes—much later in adulthood. Although controversial, data from some natural experiments lend support to this view. Ravelli et al. (1998) studied people born in Amsterdam exposed prenatally to famine conditions in 1944-1945. When compared to those conceived a year before or after the famine, prenatal exposure to famine, especially during late gestation, was linked to decreased glucose tolerance in adults producing higher risks of diabetes. Several recent studies examined the impact of ‘natural experiments’ that impacted people during this critical stage of life and have tended to report significant effects on the subsequent adult health of those affected (Almond et al. 2007).

Social scientists documented the importance of childhood health on adult health outcomes, but also, partly due to a health linkage, on adult economic outcomes—education, labor supply, income, and occupation. Using data from two health surveys (NHANES III and NHIS) and the PSID child development supplement, Case et al (2002) show that the adult relationship between SES and health originates in early childhood. They report a strong relationship between parental income and childhood health, one that accumulated as children age.

Currie and Stabile (2003) report that the SES health gradient emerges when people become adults not because lower-SES children have a more difficult time recovering from a health shock but rather that low-SES children receive more frequent health shocks during childhood. They find that poor childhood health disadvantages children in part to lower cognitive and academic achievement, as indicated by higher probabilities of grade repetition and lower math and reading test scores among children in poorer health.

In a subsequent study, Case et al. (2005) investigated persistent impacts of childhood health on adult health, employment, and measures of SES using a 1958 British birth cohort followed prospectively into their adult years. People experiencing poorer health outcomes either in terms of low birth weight or the presence of chronic conditions when they were children not only had worse health as adults, but passed fewer O-level exams, worked less during their adult years, and had lower occupational status at age 42.

Despite the rich controls available in prospective British cohort studies, they cannot rule out the possibility that the role of child health in influencing adult SES is driven by unobserved characteristics of the family or home environment correlated with child health. Currie et al

(2004) estimate that among a sample of English siblings 1997-2002, as much as 60% of the total variation in child health might be explained by unobserved family effects.[3]

The existing literature suggests this may be important. Using a unique sample of Norwegian twins, Black et al. (2005) find that low birth weight babies have worse short-run (mortality) and long-run outcomes (schooling and earnings). Within-twin estimates reduced estimated short-run effect, but not longer-run impacts on labor market outcomes. Similarly, Almond et al (2004), using a sample based on twins, suggest that the estimated short-run health costs of low birth weight may be significantly overstated.

Using the PSID, Smith (2008) examined the impact of childhood health on adult SES outcomes, including levels and trajectories of education, family income, household wealth, individual earnings and labor supply. Smith's analysis was conducted with a panel who were originally children and are now well into adulthood. Since all siblings are in the panel, he controlled for unmeasured family background effects. With the exception of education, Smith reports that poor childhood health has a large effect on all outcomes with estimated effects larger when unobserved family effects are controlled.

Figure 1 provides evidence of the link between childhood and adult health by plotting contemporaneous self-reports of general health status by age during adult years against self-reports about general health status during childhood, all from the PSID. For both childhood and adult health, 'good' health is defined as a report of excellent or very good and all other categories are labeled 'bad'. Individuals in 'good' health during their childhood years have adult health levels and trajectories much above those whose childhood health was 'bad'. At age 25, those in 'good' health during childhood reported levels of 'good' health as an adult 10 percentage points

[3] Observable attributes include family income, parental education,health, and employment,and birth weight..

higher than those whose childhood health was ‘bad’ This disparity grows to more than 25 percentage points by one’s early 40’s, suggesting that poor childhood health affects trajectories as well as initial levels of health during one’s adult years.

While knowing this general link between health as a child and an adult is important, tracing specific disease pathways is necessary to understand underlying reasons (Blackwell et al 2001). Elo and Preston (1992) document a relationship between upper respiratory tract infections in childhood to rheumatic heart disease and obstructive lung disease as adults. Similarly, Barker’s work (1997) emphasized particular pathway links to later life onsets of diabetes and heart disease. Tracing these disease specific pathways requires knowledge of prevalence of specific diseases during childhood.

RETROSPECTIVE MEASUREMENT OF CHILDHOOD HEALTH HISTORIES—DATA

My primary analysis relies on two sources. The first is an internet survey I designed with HRS respondents, a panel survey of Americans at least 50 years old and their spouses who agreed to periodically participate in internet interviews. About 30% of HRS respondents indicated they used the internet regularly. Of these, 73% expressed an interest in doing the survey and were sent a mailed invitation to participate in a web survey. Seventy-eight percent of them completed the survey. Couper et al. (2007) conducted an analysis of non-response and non-coverage in this sample. They report that there are demographic, financial, and health differences in access, but fewer differences in willingness (given access) and response (given willingness). According to Couper et al., internet use was associated with better current health status.

Starting in 2003, HRS internet surveys are conducted in ‘off years’ when there is not regular survey (the main survey is fielded in even numbered years). New respondents are

recruited into the internet panel periodically. Data on childhood health histories are from internet waves conducted in the 2005-2007 time frames. To not overload HRS respondents due for a regular interview in 2006, questions on childhood health were separated into two parts—before and after the normal 2006 wave. I find no systematic differences in results from HRS internet panels taken before or after the 2006 wave.

In designing the child health history, I relied on simple Calendar Life History (CLH) methods. One problem with CLH that limit their widespread use is that it can be demanding of scarce survey time simply to set up a CLH. For applications such as this one where the majority of respondents do not have any health events during childhood, this expenditure of time will not yield much useful information and existing surveys are understandably reluctant to do them. I took a mixed approach whereby CLH is only used for the dating of events but not for occurrence.

The initial questions asked were whether or not respondents had in the years before age 17 a list of important childhood illnesses—asthma, diabetes, respiratory disorders (bronchitis, wheezing, hay fever, shortness of breath, or sinus infection), speech impairment, allergic condition, heart trouble, chronic ear problems or infections, epilepsy/seizures, severe headaches or migraines, stomach problems, high blood pressure, difficulty seeing with eyeglasses, depression, drug or alcohol problems, mumps, measles and chicken pox. This list was obtained by my consultation with experts on implications of childhood health problems and in particular with the principal investigator of the 1946 British cohort study with the criteria being that a childhood disease was important for later life onsets of diseases (Wadsworth and Kuh 1997).

If no childhood illnesses were mentioned, respondents were finished. If any childhood illness was mentioned other than mumps, measles, or chicken pox, respondents were asked to set

up a set of markers used in the CLH. The specific markers included markers for house moves, marital events of parents, and entry into different levels of schooling before age 17.

Following the implementation in the HRS internet sample, the PSID gave essentially the same retrospective childhood health instrument I designed to all respondents in the 2007 round of its regular survey. The information requested included the existence and timing of the same list of childhood illnesses with the same memory triggers. Consistent with normal PSID practice of having a single respondent, the main respondent answered childhood health questions for themselves and their spouses. PSID staff report that the retrospective history was easy to administer (a couple of minutes) and respondents had little problem answering the questions.

To validate recall data on childhood health, I searched to find the best past data on prevalence. Although historical prevalence data does not exist for all conditions, one can get a reasonable portrait by using closest in time data to when respondents were children. My oldest source is the 1966-1970 National Health Examination Survey (NHES) a national probability sample of 7,514 children ages 12-17. Information about prevalence of measles, mumps, chicken pox, asthma, allergic conditions, and diabetes was obtained from NHES. Given this age span and years sampled, these children were born between the years 1949 and 1958 and would have been 49-58 years old by the last year of the HRS and PSID retrospective surveys on childhood health.

The other two data sets used for external comparison for other diseases were the 1971-1975 NHANES 1 and the 1986 National Health Interview Survey (NHIS). For NHANES 1, I computed prevalence rates for available diseases (diabetes, hypertension, asthma, respiratory disorders) for those 12-17 years old (N= 2,125). Since this survey was fielded five years later than NHES, these respondents were 44-53 years old when HRS and PSID retrospective childhood health surveys were done. The assumption with all these sources which post-date the

childhood of many HRS and some PSID respondents is that disease prevalence did not change significantly before these surveys. I return to how reasonable this assumption is below.

Do They Remember?

How can we evaluate quality of these retrospective histories given to HRS and PSID respondents since we do not know what actually happened to them during their childhood? Quality of retrospective reports are typically evaluated by comparisons with external records such as hospital or medical records (Krall et al. 1988), test-retest using the same questions over time (Hass 2007), or a comparison to external prevalence rates available in the past. The first two options are not available in this case and I rely primarily on the third.

One simple test is whether prevalence of childhood diseases obtained from recall histories are reasonable given what is known about prevalence when HRS and PSID respondents were children. This is not as simple as it seems. Since all HRS and some PSID respondents are at a minimum over age 50 and many much older than that, they would have been age 10 from 40 to 80 years ago. American government recording of childhood disease prevalence was very sketchy then compared to now and there exists no direct comparison from official government statistical agencies. For many childhood diseases, incidence rather than prevalence was routinely collected and there is no easy conversion between the two.

To make these comparisons, I divided childhood diseases for which some historical comparison can be made into three sub-groups. The first are very rare childhood diseases affecting less than one percent of children—childhood diabetes, hypertension, epilepsy and seizures. The second set I label ‘moderately common’ childhood conditions—asthma, respiratory problems, allergic conditions, chronic ear problems, severe headaches or migraines, stomach

problems, depression, and heart trouble. The final set contains three ‘very common’ childhood illnesses—especially when HRS respondents were children—measles, mumps, and chicken pox.

Comparisons between HRS internet responses and the historical record are presented in the first two data columns in Table 1. Consider ‘very common’ childhood illness of mumps, chicken pox, and measles. Before the discovery of vaccines to inoculate against these diseases, which I will show took place well after the childhood years of HRS respondents, the external source column in Table 1 indicates that these highly contagious diseases were almost universal among children. The portrait of near universality is supported in the HRS internet panel—84% said they had chicken pox as a child and 88% mentioned measles. Mumps is less common, but two-thirds of HRS respondents mentioned mumps during childhood. Recall prevalence rates are remarkably close to those obtained in NHES—92% for measles, 65% for mumps, and 84% for chicken pox. Recall and historical prevalence for chicken pox and mumps are essentially the same while historical data on measles are within four percentage points of HRS.

The same close correspondence exists for childhood diseases that are extremely rare (childhood or type 1 diabetes, epilepsy or seizures, and childhood hypertension). These conditions are not only remembered as extremely rare in the HRS recall account but they were all below 1% prevalence in the closest contemporaneous account available.

Correspondence for moderately common diseases is also close. For example, asthma prevalence is 4% in the HRS recall and 6% from both the 1963-1965 NHES and the 1971-1975 NHANES. For virtually all childhood diseases queried, recall prevalence is within a few percentage points of the best contemporaneous benchmark. The rank ordering of the prevalence for moderately common conditions is almost exact between the two reports

There are some unique aspects of the HRS internet panel including a possible selectivity of participants with internet access and the use of an internet mode. Thus, the final column in Table 1 compares prevalence responses obtained from the HRS internet sample with those from the PSID, limiting the PSID to those ages 50 and more to make it comparable to the age range of the HRS sample. For additional comparability with HRS, the PSID sample in Table 1 is limited to respondents reporting on their own childhood diseases. I return to this issue below.

Correspondence between these two recall estimates of childhood disease in the two samples is remarkably close once again. The ranking of diseases during childhood by their prevalence is almost exactly the same with many estimates for specific diseases extremely close. For example, the prevalence rates of measles, mumps, and chicken pox in the HRS (PSID) internet sample are 88% (83%), 66% (67%) and 84% (80%) respectively. The correspondence for very common diseases (diabetes, epilepsy/seizures, and hypertension) is also almost exact—in both cases the remembered prevalence during childhood are very low. Even with moderately common diseases, the rank ordering of diseases is almost identical in the two recall surveys.

This close correspondence between HRS, PSID and historical prevalence supports two important conclusions. There is little evidence of significant mode differences (internet in HRS or phone in PSID) in retrieving childhood health retrospective histories. There is also no indication of significant selectively on childhood health in the HRS internet sample. While HRS internet sample is selective on the current health of HRS,, it is not selective on childhood health conditions. The absence of selectivity on child health and the presence of selectivity on current health may imply that the HRS internet sample is selective on the transmission parameter from childhood to adult health. Fortunately this will not be a problem for long as HRS has now placed my retrospective instrument into the full sample in the 2008 wave.

Given its more complete age range, PSID is useful for another purpose. Table 2 lists prevalence rates obtained from the PSID child health recall history arrayed in the top row by PSID respondent age in 2007 when data were collected. Since that age fixes the time of potential childhood exposure, data are indexed in rows below 'age in 2007' by the year the respondent was born and was age 16—the time span covered by the recall child health module.

This indexing is used because there were some important secular changes in disease prevalence in the US. For both measles and mumps, Table 2 indicates essentially no change in disease prevalence by age (or equivalently calendar year) for those 50 and over. For younger PSID respondents, reported prevalence of measles and mumps declines inversely sharply with age. For measles, 50% for those 41-50 (compared to a relatively constant rate of above 80% for those over age 50) falling quickly until the prevalence is only 8% amongst those 21-30. Similarly, prevalence rates for mumps drops to 43% in the 41-50 age range (from a steady two-thirds of the population above 50) to a low of only 4% in the 21-30 year age range.

These trends closely match the introduction of effective vaccines for measles and mumps in the US and the subsequent fall in incidence and prevalence. The measles vaccine was licensed in1963 and new cases of measles plummeted rapidly from over 500,000 new cases per year in the 1950s to levels mostly below 5,000 cases per year by the 1970s. Childhood measles is now almost non-existent in the US with an average of only 82 cases per year between 1997-2005 (CDC, January 2007). Similarly, the mumps rubella vaccine was licensed only a few year later than measles in 1967 with a reduction in number of cases from levels over 150,000 cases per year in 1967 to only 274 cases in 2001(Zimmerman et al. 2002).

The introduction of vaccines for measles and mumps closely match the drop in prevalence by age data in Table 2 especially given normal lags in diffusion of inoculations.

However, chicken pox (varicella) stands in sharp contrast to trends for mumps and measles since its prevalence remains at very high levels across all age groups. But the varicella vaccine for chicken pox was only approved for those one year and older in the US in 1995. Given this date, very few PSID respondents in the ages listed in Table 2 would have been affected by the vaccine, and prevalence rates for chicken pox should have remained high at all ages of these PSID respondents. That is precisely what the data in Table 2 show.

Table 2 presents PSID age patterns for other childhood diseases. The three very rare childhood diseases (diabetes, epilepsy or seizures, and hypertension) all indicate very low prevalence rates at all ages and raise no particular issues. However, a common pattern amongst the moderately common diseases (asthma, respiratory illness, allergies, stomach problems and depression) is that the younger the respondent the higher reported childhood prevalence.

There are two interpretations of this pattern, each with different implications for validity of retrospective reports of childhood health. Memory decay could lead to a rising understatement of childhood diseases with respondents' age. Questions about events that occurred decades ago yield a less reliable and more forgetful response than a query about a similar event taking place more recently (Sudman and Bradburn, 1974). Second, the more salient an event, the more likely it will be recalled, particularly as time since the event increases. Some studies have shown that salience is associated with a tendency to report an event as having taken place more recently than it actually did (forward telescoping—Smith and Thomas 2003).

The alternative interpretation of Table 2 is that the prevalence of these diseases was rising over time either due to a real increase or improved diagnosis and detection. Many childhood diseases, such as depression and asthma, have become more common over time either through higher prevalence, improved diagnosed, or a lower threshold for diagnosis. At very old ages,

there may be a mortality selection effect as those with the disease as a child had a lower life expectancy and died by the date of the PSID 2007 interview. Most of the inverse increase with age occurs at younger ages so this mortality effect can only be a small part of the total effect.

Figure 2.a illustrates this phenomenon for asthma using actual prevalence rates obtained from the NHIS for years 1982-2003. Asthma childhood prevalence almost doubled over this period consistent with increasing rates of childhood asthma obtained from retrospective accounts in Table 2. Similarly, Figure 2.b displays hay fever, asthma, and bronchitis/emphysema prevalence rates for 12-17 year olds as revealed in NHANES 1 and NHANES 3, surveys fielded 17-19 years apart. While asthma is a separate category in the retrospective questionnaire, hay fever and bronchitis or emphysema are key sub-components of respiratory disease in recall childhood health histories. Figure 2.b indicates that contemporary records of prevalence of these allergic conditions was increasing significantly over time just as indicated by PSID retrospective accounts. While memory decay with age may be part of the reason for an inverse age prevalence relation for moderately common conditions in PSID recall data, contemporary accounts indicate that diagnosed prevalence of many of these diseases was in fact increasing over time.

While important, matching aggregate statistics is not the only test of quality of recall data. Test-retest reliability by repeating questions on childhood disease is not yet possible, but related indirect evidence is available. Krall et al. (1988) demonstrate that comparisons of recalled specific childhood diseases match well to medical and hospital records. There was agreement at age 50 between recall and medical records of 79% for chicken pox and 75% for measles, an understatement of recall accuracy as some medical records likely missed events. Reliability of recalled childhood diseases did not vary much between ages 30, 40, and 50 and was not related

to education of respondents.[4] HRS asks the same questions about adult illnesses in each wave. Using the original HRS cohort, I found that 95% of those who said they were hypertensive in one wave confirmed it in the next wave. Results for other diseases were diabetes (93%), cancer (96%), heart condition (93%), stroke (92%) and diseases of the lung (86%).

Test-retest on specific diseases appears to yield pretty favorable results. In contrast, although most are only off by one point on the five-point scale, only 60% of HRS internet respondents gave precisely the same answer to the five-point general childhood health status scale when asked seven years apart. Test-retest of the PSID recall question of childhood general health is also possible as the same question was repeated in the 1999, 2001, and 2003 PSID waves. Fifty-five percent gave the same answer to the childhood health summary question in the 1999 and 2003 wave with no difference whether the response about childhood health was for oneself (55.3%) or one's spouse (54.7%). Moreover, consistency in response was about the same when the answer was for childhood health (55%) or current adult health (52.9%) which can change somewhat even over a short period of time (see similar evidence in Hass 2007).

Using the PSID childhood health questions, I estimated models of response consistency (the same answer in all three waves) of the general childhood health status question. Response consistency was not related to proxy respondents, gender, age, Hispanic, but was lower for African-Americans and among those with less education, suggesting one must be more careful with data for them. Response consistency was also correlated in the adult and childhood health general health status questions.

The last finding points to a problem with subjective scales, whether for adult or childhood health. Respondents are asked to perform a more difficult calculation than just

[4] For similar evidence of high correspondence between recall of disease and medical records illnesses during the adult years see Bush et al. (1989) and Psaty et al. (1995).

remembering whether something occurred in the past. They have to decide consistently over time what demarcation points (excellent, very good, etc.) in the scale actually mean (to themselves and perhaps to the questioner). Variation over time in responses may be due to variation in the placement of the subjective thresholds rather than any real change in the health of respondents (Kapteyn et al 2007). If I decide that the criteria for 'excellent' health is tougher than the last time I answered the question, I will most likely make the threshold tougher in responding to both adult and child health summaries. This introduces an artificial correlation in changes in health on the adult and child summary measures that is unrelated to real health changes.

Proxy Responses

PSID respondents inform us not only about their own history of childhood diseases, but that of their spouses as well. The reliability of proxy responses is a legitimate issue even for contemporaneous accounts of spousal health (Smith 2007) and may be even more so for childhood health histories which proxy respondents did not actually witness. To address this question, Table 3 presents prevalence rates of childhood diseases for all ages when PSID respondents reported about themselves and as proxies for their spouses. A test of statistical significance is provided for each childhood disease between own and proxy responses with an asterisk indicating statistical significance at the 5% level.

Prevalence of very rare (but serious) diseases is approximately the same whether the response refers to yourself or your spouse. There is evidence of under-reporting of moderately common conditions for a spouse compared to the respondent. In all cases prevalence higher for the proxy response and the average difference is not trivial. In sum, the evidence indicates there is under-reporting of spousal childhood health conditions in the PSID. As with the PSID data on current reports of spousal health, researchers are well advised to test the sensitivity of their

central results to the inclusion of the spousal childhood health data in their models. The long-standing PSID policy of asking one partner to tell us about relevant personal information about the other partner may need reconsideration.

Is there "Coloring' of Responses to the Internet Panel?

A potentially serious problem with retrospectively collected childhood health histories is that there may be significant 'coloring' of responses. Individuals whose adult health has taken a serious turn for the worse may now better remember a childhood health problem or even see their childhood health as worse than it really was. They then may retrospectively attribute their current poor adult health to health problems during childhood. If such 'coloring' was sufficiently important, the relationship between childhood and adult health would actually be flowing through the mechanism of memory retrieval and attribution from the adult to childhood years.

A test of the potential importance of 'coloring' is possible. In the 1998 wave of HRS, respondents were asked the same recall summary question on childhood health using the scale of excellent to poor as was asked in the HRS internet surveys conducted in 2005 and 2007. Sixty percent of respondents gave the same response in both waves, another 33% answered one point removed on the five scale while 6% were two points apart. Eighteen percent of the cases indicated an improved level of childhood health over time and 22% a decrease, a difference not statistically significant.

Besides being asked the same recall summary childhood health question, I know from data obtained prospectively in the regular HRS interviews which new disease onsets they experienced between 1998 and the internet panel wave. If 'coloring' was a significant problem, individuals who experienced an adult disease onset between these waves, especially a significant

health problem, should have downgraded their self-rating of their childhood health. Thirty percent of respondents had either a minor or major disease onset between 1998-2005 or 2007.

The outcome in Table 4 is an ordered probit of change in self-reported childhood health between 1998 and 2005 or 2007 (depending on which HRS internet wave the respondent was a participant) where ordering is improved, stayed the same, or got worse. Regressors include an age quadratic, race, ethnicity, gender, and two dummy variables for education (12-15 years and college or more with less than a high school diploma the reference group). The model includes prospectively collected measures of between-wave onsets of a serious or a minor chronic health condition, where serious onsets are cancer, heart disease, and diseases of the lung and minor onsets are the rest of the conditions. Table 4 indicates that neither a serious nor minor disease onset is associated with any statistically significant change in the reporting of childhood health.

The Informational Value of the Childhood Health Conditions

Knowing that childhood health histories are reliably reported is not enough. The final set of models examines the value of this new information on childhood diseases. The first model is summarized in Table 5 which lists estimated derivatives for each of these childhood diseases alongside associated 'z' statistic obtained from a probit where the outcome is whether childhood health is reported to be excellent or very good. This model is estimated using the larger PSID sample of respondents where issues of selectivity associated with internet use do not arise.

The results are very reasonable. Relatively common childhood health problems such as mumps, chicken pox, and measles have small impacts. All childhood diseases except chicken pox are negatively related to self-assessed childhood health. Estimated effects are small for speech impairments, allergies, headaches/ migraines and eyesight difficulties. Asthma, other respiratory diseases, heart problems, chronic ear problems, stomach problems, childhood

diabetes, epilepsy/ seizures all have statistically significant larger negative effects on recall summary of childhood health. My measure of psychological problems during childhood-depression and drugs or alcohol problems—is associated with worse childhood health. The summary measure of childhood health apparently does relate in a reasonable way to specific diseases of childhood. In related work, Elo (1998) using HRS data reports that recall reports of childhood (excellent to poor) were highly correlated with reports on childhood activities such as missing school, restrictive sports participation, and stays in bed for a month or more.

The companion PSID model in Table 6 asks two related questions. What is the impact of these childhood diseases on adult health; and is there any additional information related to adult health in retrospectively collected childhood health diseases beyond that contained in the previously available childhood summary health measure? The model in Table 6 is a probit predicting whether one had 'good' health (excellent or very good) as an adult. The estimated effects of all childhood diseases except one[5] depress adult health and more than half of the effects are statistically significant. The magnitude of some of disease impacts such as childhood diabetes, hypertension, depression and drug or alcohol problems are quite large.

In the final column, the summary measure of childhood health being 'good' is included as a regressor alongside all childhood health diseases. The childhood health summary has a statistically significant and independent effect on adult health, but the separate effects of most of specific childhood health diseases remain. These measures should not be viewed as strict alternatives to each other as useful information about adult health is contained in both the new specific diseases as well as the existing childhood health summary.

CONCLUSIONS

[5] Chicken pox, as our mothers said, appears to be protective.

Missing information on early life events especially health events is important. Recalled information of health conditions during childhood appears to be a quite useful tool that can be readily added to important demographic and health surveys. Based partly on the evidence presented here, very similar childhood health modules are being placed into the HRS, SHARE, and ELSA surveys so that comparative international research on the impact of childhood health will soon be possible. Moreover, there are other domains during childhood in addition to childhood health that may be critical for latter life. These might include childhood exposures to adverse physical or social environments, substance abuse, or conditions in the home that lead to chronic stress. Based on evidence presented here, the demographer research community must be bolder in conducting similar experiments in retrieving these other relevant domains of the critical childhood years and placing that information into our demographic main surveys.

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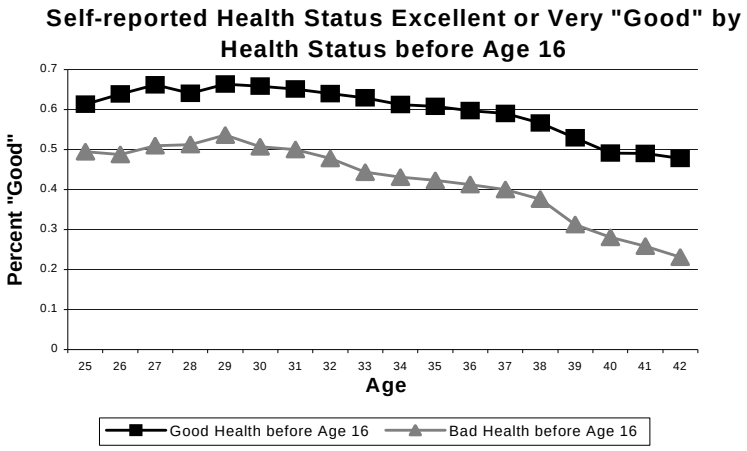
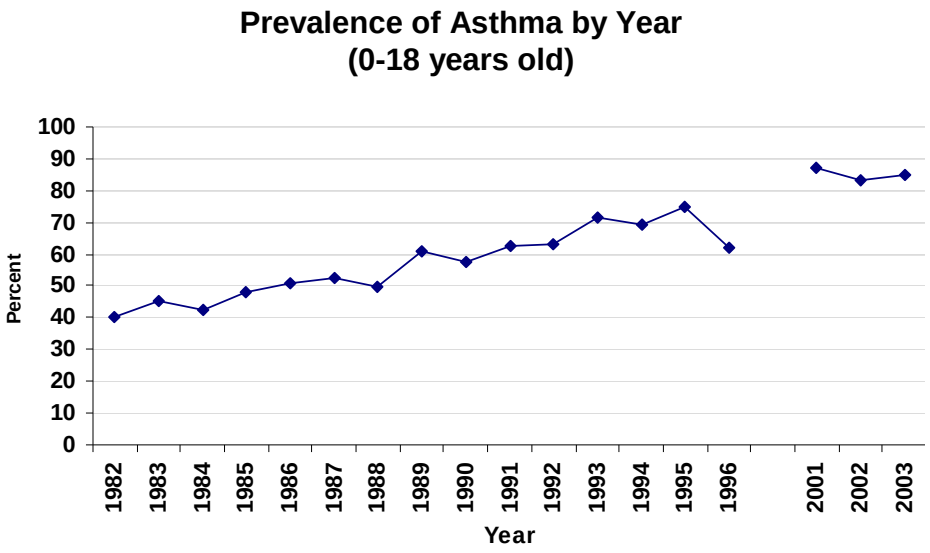
Figure 1



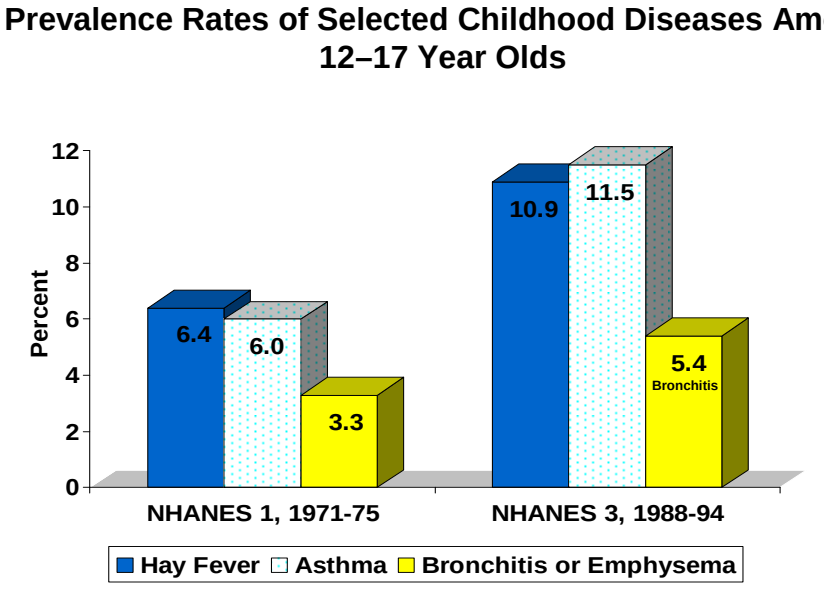
Source: Calculations by author from the PSID. Good health is defined as a report of excellent or very good health.

Figure 2.a



Source: *Trends in Asthma Morbidity and Mortality-American Lung Association*, May 2005, Table 7. All data are derived from the National Health Interview Survey. Data from 1982-1996 reflect current prevalence of asthma and post-2001 data are based on an ever had and currently have question sequence so they are not comparable to the pre-1996 series.

Figure 2.b



Source: Calculations by author from NHANES and NHANES 3.

Table 1

Comparison of Responses in Childhood Health Histories of HRS Internet Panel to External Sources and to PSID Respondents Ages 50+

	HRS Internet	External Source	PSID Ages 50+
Very Common Diseases			
Measles	88.0	92.4[a]	82.9
Mumps	65.5	64.6[a]	67.3
Chicken Pox	83.5	83.9[a]	80.0
Moderately Common Diseases			
Asthma	4.0	6.0[a,b]	4.5
Respiratory Disorder	13.8	12.3[b]	8.9
Speech Impediment	1.6	1.9	2.0
Allergic Condition	10.9	13.4[a]	7.8
Heart Trouble	1.8	1.6	1.5
Chronic Ear Problem	9.9	6.9	6.5
Severe Headaches or Migraines	6.1	6.0	6.1
Stomach	4.8	3.1	3.1
Depression	2.2	2.1	2.1
Very Rare Diseases			
Childhood Diabetes	0.1	0.4[a,b]	0.2
Hypertension	0.4	0.6[b]	0.4
Epilepsy/Seizures	0.7	0.3	0.4
N	3,964	NA	7,778

Source: **HRS internet**—calculations by author based on HRS internet panel.

External Source

a 1963-1965 National Health Examination Survey.

b 1971-1975 National Health and Nutrition Survey.

All others 1986 National Health Interview Survey.

PSID Ages 50+—calculations by author based on childhood health retrospective designed by author and placed into the 2007 wave of PSID.

Table 2

PSID Responses to Child Health History by Age

Age in 2007	21-30	31-40	41-50	51-60	61-70	71+
Year age 16	2002-1993	1992-1983	1982-1973	1972-1963	1962-1953	< 1952
Year age 0	1986-1977	1976-1967	1966-1957	1956-1947	1946-1937	<1936
			Measles			
			Vaccine 1963 ↓			
	7.6	15.5	49.8	81.8	85.2	86.7
			Mumps Vaccine 1967 ↓			
	4.3	12.7	43.4	68.1	67.3	68.6
Vaccine 1995 ↓			**Chicken Pox**			
	83.0	79.1	75.9	83.0	79.6	72.3
			Asthma			
	12.9	9.0	5.5	5.6	4.1	2.8
			Respiratory Illness			
	14.3	12.6	9.5	10.8	7.2	7.2
			Speech Impediment			
	3.3	2.4	2.7	2.6	1.6	1.0
			Allergies			
	12.3	11.6	8.9	9.4	6.9	5.0
			Heart Trouble			
	1.8	1.7	1.6	1.3	2.8	1.0
			Ear Problem			
	8.6	7.8	5.4	6.2	7.9	7.2
			Headaches or Migraines			
	11.9	9.0	6.6	6.7	5.5	5.8
			Stomach Problem			
	5.5	4.0	3.7	3.4	2.8	2.6
			Depression			
	7.3	4.6	3.1	3.0	1.2	1.0
			Diabetes			
	0.8	0.5	0.1	0.2	0.2	0.2
			Epilepsy or Seizures			
	1.2	1.2	1.3	0.6	0.5	0.0
			Hypertension			
	1.1	0.4	0.3	0.1	0.4	0.9
N	1,813	1,531	1,715	1,375	553	557

Source: Calculations by author using PSID 2007 childhood health retrospective designed by author

Table 3

Comparison of Responses in Childhood Health Histories of PSID Respondents to PSID Non-Respondents- All Ages and for Measles and Mumps All Ages and Selected Ages

	Respondents	Proxy Responses
Moderately Common Diseases		
Asthma	7.9	6.1*
Respiratory Disorder	11.2	4.5*
Speech Impediment	2.6	1.6*
Allergic Condition	9.9	5.2*
Heart Trouble	1.6	0.7*
Chronic Ear Problem	7.0	3.4*
Severe Headaches or Migraines	8.3	2.9*
Stomach	4.1	1.9*
Depression	4.2	1.9*
Other Psychological Problems	1.7	1.2*
Very Rare Diseases		
Diabetes	0.3	0.3
Hypertension	0.6	0.2*
Epilepsy/Seizures	1.0	0.7
Very Common Diseases		
Measles	42.7	38.5*
Mumps	34.8	30.5*
Chicken Pox	79.6	78.0*
N	7,948	3,618

Source: Calculations by author using PSID 2007 childhood health retrospective designed by author.
*Statistical significant difference between proxy and own responses at the 5% level.

Table 4

Ordered Probit on Change in Self Reported Childhood Health Between 1998 and 2006

(Outcome is categorized as Improved, Stayed the Same, Got Worse)

	Coefficient	z
New major onset (2006 – 1998)	-.001	0.01
New minor onset (2006 – 1998)	-.013	0.24
Age in 1998	-.011	0.34
Age in 1998 squared	-.000	0.39
Black	.058	0.34
Hispanic	.501	2.20
Female	-.049	1.11
Education 12-15 years	.108	1.80
Education college or more	.110	1.69
Cut point 1	-1.207	
Cut point 2	0.493	
N	2,798	

Source:Health and Retirement Internet Survey.

Table 5
Predicting Self-Reported Childhood General Health Status
(probit for childhood health being either excellent or very good)

Childhood Disease	dF/dx	z
Measles	-0.029	2.73
Mumps	-0.086	0.83
Chicken pox	0.066	7.09
Asthma	-0.156	10.15
Respiratory disorder	-0.071	5.31
Diabetes	-0.369	5.03
Speech impairment	-0.036	1.54
Allergic condition(s)	-0.026	2.00
Heart trouble	-0.174	5.26
Chronic ear problem	-0.081	5.24
Epilepsy/seizures	-0.106	2.06
Severe headaches or migraines	-0.052	3.59
Stomach problem	-0.123	5.93
High Blood Pressure	-0.091	1.67
Difficulty seeing even with eye glasses	-0.059	3.06
Depression	-0.096	4.54
Drug or alcohol problems	-0.071	2.44
Other psychological problems	-0.015	0.52
Age 21-40	0.049	4.02
Age-41-60	0.049	3.81
Age 61 plus	0.020	1.33
N	11,086	

Source: Calculations by author using all ages of the PSID 2007 childhood health retrospective designed by author.

Table 6

Predicting Self-Reported Adult General Health Status

(probit for adult health being either excellent or very good)

Childhood Disease	dF/dx	z	dF/dx	z
Measles	-0.034	2.22	-0.027	1.83
Mumps	-0.023	1.58	-0.024	1.69
Chicken pox	0.100	7.31	0.087	6.35
Asthma	-0.070	3.06	-0.130	4.32
Respiratory disorder	-0.038	0.19	0.012	0.57
Diabetes	-0.450	4.33	-0.408	3.66
Speech impairment	-0.023	0.61	-0.016	0.42
Allergic condition(s)	-0.008	0.37	0.000	0.01
Heart trouble	-0.077	1.67	-0.039	0.84
Chronic ear problem	-0.031	1.36	-0.014	0.59
Epilepsy/seizures	-0.098	1.62	-0.070	1.15
Severe headaches or migraines	-0.050	2.18	-0.038	1.66
Stomach problem	-0.117	3.57	-0.088	2.67
High Blood Pressure	-0.350	3.57	-0.338	3.36
Difficulty seeing even with glasses	-0.141	4.73	-0.130	4.32
Depression	-0.127	3.63	-0.105	2.97
Drug or alcohol problems	-0.175	2.44	-0.168	3.43
Other psychological problems	-0.050	0.91	-0.042	0.77
Age 21-40	0.240	13.2	0.237	12.92
Age-41-60	0.124	8.16	0.120	7.84
Childhood health ‘good’			0.209	13.97
N	8,913		8,913	

Source: Calculations by author using all ages of the PSID 2007 childhood health retrospective designed by author. ‘Good’ health is a report of excellent or very good health.