RECONSTRUCTING CHILDHOOD HEALTH HISTORIES*

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This article provides evidence about the quality of retrospective childhood health histories given to respondents in the Health and Retirement Survey (HRS) and the Panel Study of Income Dynamics (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 during childhood. The evidence presented in this article suggests that this view is too negative. Respondents appear to remember salient childhood events about themselves, such as the illnesses they had during childhood, quite well. Moreover, these physical and psychological childhood health events are important correlates of adult health during middle age.

In the past decade, two non-intersecting literatures have emerged that need to be joined. First, the introduction of the Health and Retirement Survey (HRS) in the United States, the English Longitudinal Survey of Aging (ELSA) in England, and the Survey of Health and Retirement in Europe (SHARE) in 15 countries in continental Europe, produced high-quality panel data that monitor economic and health lives starting at age 50 and older. 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 is to collect data prospectively, starting at the beginnings of life, and then follow 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 and subsequently surveyed them 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 because 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 United States, 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 is to link surveys to administrative data containing the relevant missing information, but this is far easier on the economic side than on the health side. Panels such as the Panel Study of Income Dynamics (PSID) can capture most of the relevant economic history within the survey. Even when that is unavailable, in the United States, 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 because there are no administrative records of these events, especially for the critical pre-Medicare years.

The third option is to collect information retrospectively, but the challenges are formidable. Researchers often ask people to remember events taking place one-half century ago or longer. Skepticism about respondents' ability to do so is understandable (Sudman

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

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

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

One difficulty faced by longitudinal "aging" surveys (PSID and HRS are two examples in the United States) concerns how to deal with initial conditions—that is, life before the baseline survey year. Knowing health or economic status beginning at baseline is not sufficient because 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.

The remainder of this article is divided into four 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 next section outlines how I designed the childhood retrospective health histories in an Internet panel for HRS respondents and for the regular PSID panel. The third section summarizes my main results about the quality of this retrospective childhood health. The final section contains my main conclusions.

THE IMPORTANCE OF CHILDHOOD HEALTH

In a classic demographic paper, Elo and Preston (1992) carefully documented that many diseases during adulthood had their antecedents in childhood, an insight supported in subsequent demographic research (Hayward and Gorman 2004; Preston, Hill, and Drevestedt 1998). Renewed interest in consequences of poor childhood health can be traced partly to the impact of David Barker (1997), who provided 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 who were exposed prenatally to famine conditions in 1944–1945. When compared with 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 and also (partly because of a health linkage) on adult economic outcomes—namely, education, labor supply, income, and occupation. Using data from two health surveys (the National Health and Nutrition Examination Survey [NHANES] III and the National Health Interview Survey) and the PSID child development supplement, Case, Lubotsky, and Paxson (2002) showed that the adult relationship between socioeconomic status (SES) and health originates in early childhood. They reported a strong relationship between parental income and childhood health, one that accumulates as children age.

Currie and Stabile (2003) reported that the SES health gradient emerges when people become adults not because low-SES children have a more difficult time recovering from

a health shock, but rather because low-SES children receive more frequent health shocks during childhood. They found that poor childhood health disadvantages children in terms of 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, Fertig, and Paxson (2005) investigated persistent impacts of childhood health on adult health, employment, and 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 also 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, these studies 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, Shields, and Price (2004) estimated that among a 1997–2002 sample of English siblings, 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, Devereus, and Salvanes (2005) found 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, Chay, and Lee (2004), using a sample based on twins, suggested that the estimated short-run health costs of low birth weight may be significantly overstated.

In a separate study (Smith forthcoming), using the PSID, I 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. This analysis was conducted with a panel who were originally children and are now well into adulthood. Because all siblings are in the panel, I controlled for unmeasured family background effects. With the exception of education, poor childhood health was found to have a large effect on all outcomes, with estimated effects larger when unobserved family effects were 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; all other categories are labeled "bad." Individuals in "good" health during their childhood years have adult health levels and trajectories much higher than 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 higher than those whose childhood health was bad. This disparity grows to more than 25 percentage points by one's early 40s, suggesting that poor childhood health affects trajectories as well as initial levels of health during one's adult years.

Although 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, Hayward, and Crimmins 2001). Elo and Preston (1992) documented 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.

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

Figure 1. Self-Reported Adult Health Status Is Excellent or Very Good, by Health Status Before Age 16

Source: Author's calculations from the PSID. Good health is defined as a report of excellent or very good health.

RETROSPECTIVE MEASUREMENT OF CHILDHOOD HEALTH HISTORIES: DATA

My primary analysis relies on two sources. The first is an Internet survey that I designed with HRS respondents, a panel survey of Americans at least 50 years old, whose spouses agreed to participate periodically in Internet interviews. About 30% of HRS respondents indicated that 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, Kapteyn, and Schonlau (2007) conducted an analysis of nonresponse and noncoverage in this sample. They reported 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 a 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 frame. To avoid overloading 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 using CLH that limit their widespread use is that they can be demanding of scarce survey time simply to set up a CLH. For applications such as this one, in which 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 include them. I took a mixed approach, whereby CLH is used only for the dating of events but not for their occurrence.

The initial questions asked were whether or not respondents had, before age 17, any of 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 even 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 other than mumps, measles, or chicken pox was mentioned, respondents were asked to create a set of markers used in the CLH. The specific markers included house moves, marital events of parents, and date of 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 that 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 respondents answered childhood health questions for themselves and their spouses. PSID staff reported that the retrospective history was fast to administer (a few minutes) and that 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 do not exist for all conditions, one can get a reasonable portrait by using data closest in time to when respondents were children. My oldest source is the 1966–1970 National Health Examination Survey (NHES), which is an American 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 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 I and the 1986 National Health Interview Survey (NHIS). For NHANES I, I computed prevalence rates for available diseases (diabetes, hypertension, asthma, and respiratory disorders) for those 12–17 years old (N = 2,125). Because 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 conducted. The assumption with all these sources, which postdate 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 later in the article.

DO THEY REMEMBER?

How can the quality of these retrospective histories given to HRS and PSID respondents be evaluated given that what actually happened to them during their childhood is unknown? 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 recalled histories are reasonable, given what is known about prevalence when HRS and PSID respondents were children. This is not as simple as it seems. Because all HRS and some PSID respondents are, at a minimum, older than age 50—and many are much older than

that—respondents would have been 10 years old 40 to 80 years ago. U.S. government recording of childhood disease prevalence was much more sketchy then than it is now, and no direct comparison from official government statistical agencies exists. 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 subgroups. The first are very rare childhood diseases affecting less than 1% of children: childhood diabetes, hypertension, epilepsy, and seizures. The second set I label as 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 the very common childhood illnesses 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 that they had had measles. Having mumps was less common, but two-thirds of HRS respondents mentioned having mumps during childhood. Recall prevalence rates are remarkably close to those obtained in NHES: 84% for chicken pox, 92% for measles, and 65% for mumps. Recall and historical prevalence for chicken pox and mumps are essentially the same, and historical data on measles are within four percentage points of the 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 older, to make it comparable with the age range of the HRS sample. For additional comparability with HRS, the PSID sample in Table 1 is limited to respondents who reported on their own childhood diseases. I return to this issue later in a discussion of proxy responses.

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 in the HRS and PSID Internet samples are, respectively 88% and 83% for measles, 66% and 67% for mumps, and 84% and 80% for chicken pox. The correspondence for very common diseases (diabetes, epilepsy/seizures, and hypertension) is also almost exact—in both cases, the remembered prevalence during childhood is 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

Table 1. Comparison of Responses in Childhood Health Histories of HRS Internet Panel to External Sources and to PSID Respondents Ages 50+

Childhood Disease	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[c]	2.0
Allergic condition	10.9	13.4[a]	7.8
Heart trouble	1.8	1.6[c]	1.5
Chronic ear problem	9.9	6.9[c]	6.5
Severe headaches or migraines	6.1	6.0[c]	6.1
Stomach problems	4.8	3.1[c]	3.1
Depression	2.2	2.1[c]	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[c]	0.4
N	3,964	NA	7,778

Sources: HRS Internet data come from authors' calculations based on the HRS Internet panel. External source data are from the National Health Examination Survey and the National Health Interview Survey (as specified by the footnotes below). Data from the PSID for ages 50 and older are from the author's calculations based on childhood health retrospective designed by the author and placed into the 2007 wave of the PSID.

[a]Data are from the 1963–1965 National Health Examination Survey.

[b]Data are from the 1971–1975 National Health and Nutrition Survey.

[c]Data are from the 1986 National Health Interview Survey.

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. Although the 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 because HRS placed my retrospective instrument into the full sample in the 2008 wave.

Given its more complete age range, the 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. Because 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 of some important secular changes in disease prevalence in the United States. For both measles and mumps, Table 2 indicates essentially no change in disease prevalence by age (or equivalently calendar year) for those age 50 and older. For

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
Very Common Diseases			Vaccine 1963 ↓			
Measles	7.6	15.5	49.8	81.8	85.2	86.7
			Vaccine 1967 ↓			
Mumps	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
Moderately Common Diseases						
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 problems	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
Very Rare Diseases						
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: Author's calculations using the PSID 2007 childhood health retrospective designed by the author.

younger PSID respondents, reported prevalence of measles and mumps declines inversely sharply with age. For measles, reported prevalence is 50% for those age 41–50 (compared with a relatively constant rate greater than 80% for those older than age 50), which falls sharply to only 8% among those age 21–30. Similarly, prevalence rates for mumps drops to 43% in the 41–50 age range (from a steady two-thirds of the population older than age 50) to a low of only 4% in the 21–30 age range.

These trends closely match the introduction of effective vaccines for measles and mumps in the United States as well as the subsequent fall in incidence and prevalence. The measles vaccine was licensed in 1963, and new cases of measles plummeted rapidly from more than 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 nonexistent in the United States, with an average of only 82 cases per year between 1997–2005 (National Immunization Program 2007). Similarly, the mumps-rubella vaccine was licensed only a few years later than the measles vaccine (in 1967), resulting in a reduction in number of cases from more than 150,000 cases per year in 1967 to only 274 cases in 2001 (Zimmerman, Reef, and Wharton 2002).

The introduction of vaccines for measles and mumps closely match the drop in prevalence by age shown 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; its prevalence remains at very high levels across all age groups. However, the varicella

vaccine for chicken pox was approved only for those age 1 and older in the United States 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 among the moderately common diseases (asthma, respiratory illness, allergies, stomach problems, and depression) is that the younger the respondent, the higher the reported childhood prevalence.

There are two interpretations of this pattern, each with different implications for validity of retrospective reports of childhood health. First, 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 the duration of 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 (i.e., forward telescoping; Smith and Thomas 2003).

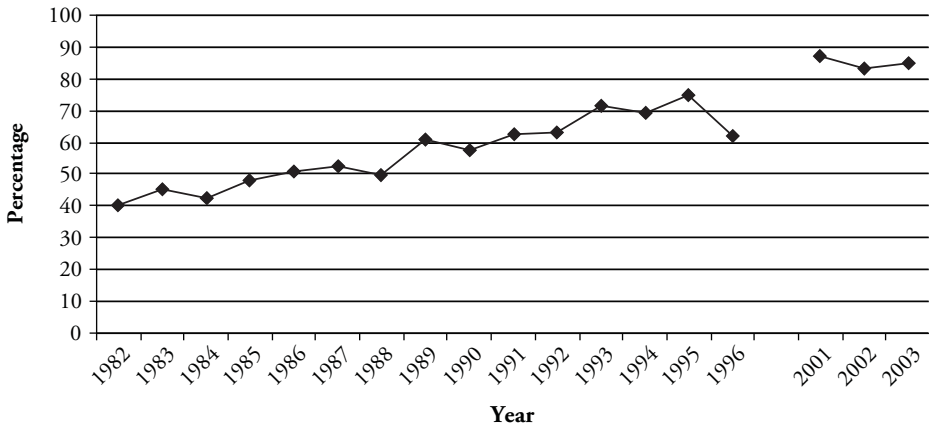
The alternative interpretation of Table 2 is that the prevalence of these diseases was rising over time due to either a real increase or improved diagnosis and detection. Many childhood diseases, such as depression and asthma, have become more common over time through higher prevalence, improved diagnosis, or a lower threshold for diagnosis. At very old ages, there may be a mortality selection effect because those who had 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 be only a small part of the total effect.

Figure 2 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 3 displays hay fever, asthma, and bronchitis/emphysema prevalence rates for 12- to 17-year-olds as revealed in NHANES I and NHANES III, surveys fielded 17 to 19 years apart. Although asthma is a separate category in the retrospective questionnaire, hay fever and bronchitis or emphysema are key subcomponents of respiratory disease in recall childhood health histories. Figure 3 indicates that contemporary records of prevalence of these allergic conditions increased significantly over time, just as indicated by PSID retrospective accounts. Although 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.

Although 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) demonstrated 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, which is an understatement of recall accuracy because 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] The HRS

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).

Figure 2. Prevalence of Asthma by Year (0–18 years old)



Source: American Lung Association (2005: Table 7). All data are derived from the National Health Interview Survey. Data from 1982–1996 reflect current prevalence of asthma; post-2001 data are based on an "ever had" and "currently have" question sequence, so they are not comparable to the pre-1996 data.

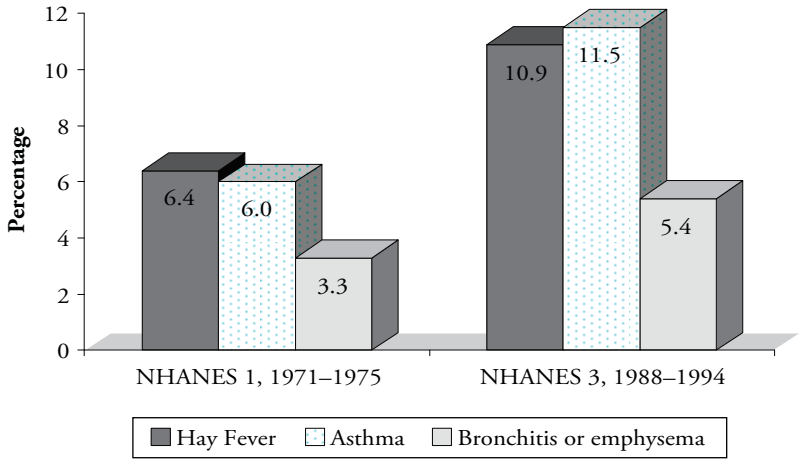
asks the same questions about adult illnesses in each wave. Using the original HRS cohort, I found that 95% of those who said they were hypertensive in one wave confirmed it in the next wave. Results for other diseases were 93% for diabetes, 96% for cancer, 93% for heart condition, 92% for stroke, and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

Test-retest on specific diseases appears to yield favorable results. In contrast, although most are off by only 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 because 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 waves, 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, or Hispanic, but was lower for African Americans and among those with less education, suggesting that one must be more careful with interpreting the 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 remembering whether a health event occurred. 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 attributable to variation in the placement of the subjective thresholds rather than any real change in the health of respondents (Kapteyn, Smith, and van Soest 2007). If a respondent decides

Figure 3. Prevalence Rates of Selected Childhood Disease Among 12- to 17-Year-Olds



Source: Author's calculations from NHANES I and NHANES III.

that the criteria for "excellent" health are tougher than the last time he or she answered the question, the respondent 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 report not only on their own history of childhood diseases but on 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 those childhood health histories that 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 between own and proxy responses is provided for each childhood disease, 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 oneself or one's spouse. There is evidence of underreporting of moderately common conditions for a spouse compared with the respondent. In all cases, prevalence is higher for the proxy response, and the average difference is not trivial. In sum, the evidence indicates underreporting 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 recount 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

Table 3. Comparison of Responses in Childhood Health Histories of PSID Respondents and PSID Nonrespondents: All Ages and, for Measles and Mumps, All Ages and Selected Ages

Childhood Disease	Respondents	Proxy Responses
Very Common Diseases		
Measles	42.7	38.5*
Mumps	34.8	30.5*
Chicken pox	79.6	78.0*
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 problems	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
N	7,948	3,618

Source: Author's calculations using the PSID 2007 childhood health retrospective designed by the author.

*Statistically significant difference between proxy and own responses at the 5% level.

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 flow 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 the 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-point scale, and 6% were two points apart. Eighteen percent of the cases indicated an improved level of childhood health over time, and 22% reported a decrease—a difference that is not statistically significant.

Besides respondents 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

Table 4. Ordered Probit on Change in Self-Reported Childhood Health Between 1998 and 2006 (outcome is categorized as improved, stayed the same, and got worse)

Variable	Coefficient	*z*
New Major Onset (2006–1998)	–0.001	0.01
New Minor Onset (2006–1998)	–0.013	0.24
Age in 1998	–0.011	0.34
Age in 1998, Squared	–0.000	0.39
Black	0.058	0.34
Hispanic	0.501	2.20
Female	–0.049	1.11
Education 12–15 Years	0.108	1.80
Education College or More	0.110	1.69
Cut Point 1	–1.207	
Cut Point 2	0.493	
N	2,798	

Source: Health and Retirement Internet Survey.

childhood health. Thirty percent of respondents had either a minor or a major disease onset between 1998 and 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 the HRS Internet wave in which 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 as 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 a 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 in which the outcome is whether childhood health is reported to be excellent or very good. This model is estimated by 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 effects. 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, and epilepsy/seizures all have statistically significant larger negative effects on recall summary of childhood health. My measure of psychological problems during childhood—depression, and drug or alcohol problems—is associated with worse

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 Problems	–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 or older	0.020	1.33
N	11,086	

Source: Author's calculations using all ages of the PSID 2007 childhood health retrospective designed by the author.

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: (1) what is the impact of these childhood diseases on adult health, and (2) 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.

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

Table 6. Predicting Self-Reported Adult General Health Status (probit for adult health being either excellent or very good)

	Without Childhood Health Summary		With Childhood Health Summary	
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 Problems	–0.117	3.57	–0.088	2.67
High Blood Pressure	–0.350	3.57	–0.338	3.36
Difficulty Seeing Even With Eye 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	13.20	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	

Note: Good health is a report of excellent or very good health.

Source: Author's calculations using all ages of the PSID 2007 childhood health retrospective designed by the author.

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 because useful information about adult health is contained in both the new specific diseases as well as the existing childhood health summary.

CONCLUSIONS

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 partially upon 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, other domains during childhood, in addition to childhood health, may be critical for later 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, demographers must be bolder in conducting similar experiments to retrieve these other relevant domains of the critical childhood years and to place that information into demographic main surveys.

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