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Why Do Older People Change Their Ratings of Childhood Health?

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Abstract

A growing number of studies in life course epidemiology and biodemography make use of a retrospective question tapping self-rated childhood health to assess overall physical health status. Analyzing repeated measures of self-rated childhood health from the Health and Retirement Study (HRS), this study examines several possible explanations for why respondents might change their ratings of childhood health. Results reveal that nearly one-half of the sample revised their rating of childhood health during the 10-year observation period. Whites and relatively advantaged older adults—those with more socioeconomic resources and better memory—were less likely to revise their rating of childhood health, while those who experienced multiple childhood health problems were more likely to revise their childhood health rating, either positively or negatively. Changes in current self-rated health and several incident physical health problems were also related to the revision of one's rating of childhood health, while the development of psychological disorders was associated with more negative revised ratings. We then illustrate the impact that these changes may have on an adult outcomes: namely, depressive symptoms. Whereas adult ratings of childhood health are likely to change over time, we recommend their use only if adjusting for factors associated with these changes, such as memory, psychological disorder, adult self-rated health, and socioeconomic resources.

Keywords

Retrospective questions; Self-rated health; Life course epidemiology; Reliability; Childhood conditions

Introduction

Over the past several decades, a single question asking people to rate their health in four or five categories has become one of the most widely used indicators of health status. Despite its simplicity, or perhaps in part because of it, self-rated health is seen as a valuable assessment of overall health status because it correlates well with biomarkers (Lima-Costa et al. 2012), physician evaluations of health (Ferraro and Farmer 1999), and respondent reports of morbidity and functional disability (Zajacova and Dowd 2011). Beyond its use as an outcome variable, self-rated health is a remarkable predictor of a host of future health outcomes, including incident disability (Idler and Kasl 1995) and mortality (Ferraro and Kelley-Moore 2001; Idler and Benyamini 1997).

Panel surveys that begin in later adulthood are typically missing key predictive information from earlier parts of the life course. Given recent interest in health across the life course, methods to gather such biographical information are critical to demographic analyses of life course health (Hauser and Weir 2010; Palloni 2006). This rise of life course epidemiology and biodemography has led to a variant of the self-rated health question designed to tap into earlier periods of the life course. Given the growing interest in the links between childhood health and adult health, many surveys have included a retrospective question for s*elf-rated childhood health*. Previous research reveals that this retrospective measure correlates well with reported childhood diseases (Smith 2009) and activity limitations (Blackwell et al. 2001) from other sources, suggesting its usefulness as an overall measure of childhood health (Haas 2007). Those studies also demonstrate, however, that validity and reliability differ by background characteristics, pointing to the possibility of nonrandom changes in retrospective health ratings. Given that the latter was mostly tangential to the central research questions of prior research, a detailed study of these changes and their consequences for the emerging literature on the early origins of adult health has not been conducted.

In this article, we build on this line of research by asking a relatively simple question: Why do older people change their ratings of childhood health? We take advantage of a repeated measure of self-rated childhood health among a national sample of older adults to explore whether people change their ratings. In preliminary analysis, 47.6 % of respondents revised their rating of childhood health, piquing interest in our central research question. Although one expects current self-rated health to change in response to incident morbidity and disability, change in self-rated childhood health by older adults raises a number of questions about the use of the measure. Are certain types of respondents more likely to change their ratings? Might recent changes in memory or physical health propel people to change their ratings of childhood health? And do such changes have implications for assessing the influence of childhood health ratings on adult health outcomes? We address these questions in light of several possible explanations for why adults might revise their ratings of childhood health.

By focusing on why these changes occur, we contribute to the literature in several ways. First, we use a comparatively larger window of time (10 years) between ratings of childhood health, allowing more distance between both the separate accounts of childhood health and

childhood itself. Second, rather than examining only how background characteristics or onset of broad categories of diseases influence such changes, we take a dynamic approach by accounting for changes in both life course circumstances and additional aspects of health. Third, rather than using subsets or modules of the Health and Retirement Study (HRS), we capitalize on repeated measures from 1998 and 2008, in which the retrospective accounts were asked of all respondents. Fourth, given distinct preferences for coding self-rated health (cf. Frisvold and Golberstein 2013; Riosmena et al. 2013), we consider both a five-category ordinal outcome and the dichotomy of "fair or poor" and "good or better" for childhood health ratings, with the latter used frequently for clinical applications (Diehr et al. 2001; Lee et al. 2007). Given research revealing notable variability *within* categories of the dichotomy (Benyamini et al. 2003), we examine the consistency of both approaches when considering change.

In what follows, we first describe several hypotheses based on explanations as to why changes in retrospective health ratings might be expected to occur over time. Then, using data from the HRS and two complementary modeling approaches, we examine how these changes are influenced by dynamic life course circumstances—onset of major health problems and changes in self-reported physical and mental health—as well as socioeconomic resources and childhood health conditions. Third, we illustrate the impact of our findings in an analysis of adult depressive symptoms. Finally, we discuss the implications of our findings for research on life course health.

Retrospective Reporting of Childhood Health

Tracking the life course has become paramount to health studies, as evidenced by research revealing that various forms of childhood misfortune—such as poverty, poor health, and child abuse—influence adult health. In addition, most U.S. studies using childhood information to construct life course trajectories of health have relied on retrospective measures to capture childhood. Some of these indicators tapping childhood may be more objective and, therefore, easier to recall with accuracy over time (e.g., parent's occupation), whereas some may be more subjective, leading to increased difficulty in accurate recall over time. Most studies examining self-rated childhood health have concluded that the measures are fairly valid and reliable (Hass 2007; Smith 2009). We concur, but we ask whether the utility of such a measure can be improved by understanding why people change their ratings of health referring to a period at least 40 years in the past. Whereas there is some evidence of threats to reliability when adults are assessing their current health status (Crossley and Kennedy 2002), might the concern about reliability be greater when asking adults to rate their childhood health status? We examine early-life and adult factors as well as background factors as possible explanations for why adults may revise their ratings of childhood health.

Perhaps the most fundamental early-life condition that may contribute to the stability—or lack thereof—in rating childhood health is actual childhood health conditions experienced. Among those who experienced illness during childhood, the more salient an individual perceived the childhood illness to be (as measured by duration and magnitude), the more accurately—and perhaps more consistently—s/he can recall it (Beckett et al. 2001). Remembering severe and/or frequent illnesses during childhood appears to influence overall

ratings of childhood health (Haas and Bishop 2010; Krall et al. 1988; Smith 2009). Thus, those who experienced life-threatening and/or recurrent health conditions during childhood should be able to recall these memories more precisely over time (Smith 2009). Therefore, we expect that people who experienced serious and/or chronic childhood diseases will be less likely to change ratings of their childhood health over time.

Of the several adult circumstances that may also explain why adults may change their retrospective ratings, we outline four social and health related factors. First, adult morbidity may influence the recollection of childhood health. Because self-rated measures are subjective, an individual's subjective thresholds may change over time, especially if that person's memory of childhood health is recalled in light of his/her current health status (Smith 2009). Thus, recent changes in health may provide a new anchor for evaluating health. Research has shown that repeated measures of childhood health are more consistent when childhood health ratings are the same as adult health ratings (Hass 2007; Smith 2009). Therefore, we anticipate that adult onset of a disease and change in current self-rated health may precipitate changes in ratings of childhood health.

Second, just as physical health changes can affect recollection, changes in memory may also be a critical reason why people alter their ratings of childhood health. To account for cognitive declines, previous research has shown that the reliability and frequency of reporting childhood disease decline with age (Haas 2007; Van de Mheen et al. 1998). Unlike previous research, we examine memory as a key component of cognitive ability. Although advanced age is associated with more problems with cognitive functioning, age is a rather crude measure of cognitive ability because rates of cognitive decline vary substantially (Beckett et al. 2001; Wilson et al. 2002). Assessing a respondent's memory while adjusting for age may better elucidate patterns of bias in retrospective reports. We expect that poor memory or declines in memory will impair one's ability to accurately recall childhood health, leading to more change in childhood health ratings.

Third, beyond cognitive ability, psychological disorder has also been shown to bias recollection. Individuals who display depressive symptoms are more prone to reporting negative events, negatively biased perceptions, and false negative memories (Joormann et al. 2009; Kistner et al. 2006; Mathews and MacLeod 2005). Although it is unclear whether depressed individuals are more likely to perceive actual events as negative or more likely to develop false negative memories, the weight of the evidence reveals that depression negatively biases cognitive processing. We, therefore, expect that adults who are diagnosed with depressive symptoms will be more likely to negatively change their ratings of childhood health.

Fourth, life events require readjustment, potentially leading to revisions in one's interpretation of the past. Those who experience stressful life events are likely to remember past events more negatively in an attempt to "make sense" of their current situation (Zimmerman 1983). Although many events can be considered stressful, we draw from previous research to focus on two prevalent events requiring considerable readjustment during adulthood: widowhood and relocation (Holmes and Rahe 1967). Widowhood is widely considered one of the most stressful life events because it typically entails a change

in living arrangements as well as other life domains (e.g., finances). Similarly, research suggests that older adults find change in residence especially challenging. Indeed, one study of older adults found that changing residence was one of the two most commonly cited nonmedical events identified as the most stressful event in the past five years (Hardy et al. 2002). We therefore expect that those who experience these events will be more likely to change their ratings of childhood health.

Beyond these early- and later-life explanations, evidence also suggests that self-rated health is sensitive to demographic factors. Some studies have found that the reliability of retrospective self-rated health measures is lower among nonwhites, men, and those with lower socioeconomic status (SES) (Van de Mheen et al. 1998; Zajacova and Dowd 2011). On the other hand, one study found that although reliability varied by race and SES, there were no significant differences by sex (Haas 2007). Thus, it behooves us to account for these demographic factors given the inconsistency in previous findings and the fundamental role that these factors play in health.

Data and Methods

Data

This study draws from two waves of the Health and Retirement Study (HRS), a nationally representative biennial survey of U.S. adults aged 51 and older.[1] Since 1992, the HRS has used a multistage, clustered area probability frame that included an oversample of black and Hispanic Americans. By 1998, the HRS had included samples from three more birth cohorts: Asset and Health Dynamics among the oldest (AHEAD), Children of the Depression Age (CODA), and the War Babies (WB).[2] Given our interest in assessing change in retrospective reports, we drew from the 1998 and 2008 waves in which all respondents from each HRS sample rated their health as a child, allowing us to capture the sample's recollection of childhood health over a substantial period (10 years). Between the two surveys, 27.3 % of the sample was lost to death, and an additional 8.6 % attrited for another reason. Only those individuals who responded for themselves, rather than via a proxy individual, answered the subjective question rating childhood health. Of the 11,772 nonproxy respondents available in both waves, 9,108 individuals provided valid data on the response variable (77.4 %). After listwise deletion of missing data, the sample size included in our models is 9,051. The distribution of missing data and panel attrition by our outcome is shown in Table 6 in the appendix. All 1998 response categories have a similar percentage who supplied an outcome upon reinterview in 2008 (46 % to 49 %). The reasons for nonresponse vary somewhat: those who reported poor childhood health were unsurprisingly most likely to die, and those reporting excellent health were more likely to be item-missing on the outcome or to attrit by nonresponse.

[1]Most variables come from RAND HRS data, Version L (RAND 2011). The exceptions are childhood health ratings, childhood health conditions, childhood SES, and a recent move, which are derived from the Core HRS data (HRS 2003, 2012).

[2]In 1998, response rates for the main HRS sample, AHEAD, CODA, and WB were 86.7 %, 91.4 %, 72.5 %, and 69.9 %, respectively. In 2008, response rates were 88.6 %, 90.7 %, 90.4 %, and 87.0 %, respectively. We do not use sampling weights in multivariate analyses because the HRS user guide does not necessitate their use (HRS 2001). Since most of the variables used to construct the post-stratification weights are included in our analytic models, unweighted estimates are generally preferred (Winship and Radbill 1994).

In order to account for possible attrition bias, we used inverse proportional weighting (Scharfstein et al. 1999). Two weights were examined separately for attrition by death and attrition for any reason. Several 1998 measures were used to predict attrition between the two waves, including race, gender, age, years of education, a recent move, number of comorbidities, recent hospitalization, and an indicator for missing on income. When each weight was added to the models presented, the magnitude and significance of the coefficients remained unchanged, indicating that our results were robust to attrition biases. The weights themselves were also nonsignificant. Although not discussed further, all attrition analyses are available from the authors upon request.

Measures

Childhood health ratings came from the 1998 and 2008 surveys, when respondents were asked to rate their childhood health as excellent, very good, good, fair, or poor. Our central research question is to determine which factors affect those who changed their ratings between these two survey years. Table 1 displays the responses across childhood health ratings in 1998 and 2008. Given that about one-half of the respondents changed their childhood health rating, it may be useful to briefly outline our approach to assessing change with these data. We use four modeling approaches, each representing a distinct combination of data structure (change score vs. panel) and childhood health coding (five-category vs. dichotomous).

First, we considered those who changed their opinion by any amount in each direction relative to those who maintained as a nominal measure, following Smith (2009:399). As shown in the margins of Table 1, about one-half of respondents answered consistently in both years (52.4 %) and remain on the main diagonal, but about one-half altered their response. Of those who changed their rating, the distribution was about evenly divided, with approximately 23.2 % increasing their childhood health ratings and 24.4 % decreasing their rating.

Second, we examined the dichotomization of “good or better” (excellent/very good/good) and “fair or poor.” Overall, it was rather uncommon to report fair or poor childhood health, with 6.2 % of observations across both waves in those categories. Change across this threshold was also less common. For example, 89.8 % of the sample reported good or better childhood health in 1998 and maintained that rating. By contrast, 3.4 % of the sample downgraded their childhood health, while 4.0 % of the sample upgraded their childhood health.

Next, we considered a panel data structure by using mixed-effects models that account for within-person stability and change. For our third model, we considered childhood health ratings as an ordinal response, with the relevant research question being what influences whether individuals cross the threshold into a higher (or lower) category. Fourth, we consider what influences individuals to cross the dichotomous distinction between good or better and fair or poor.

Based on the possible early-life and adult influences described earlier, we included multiple variables to predict why individuals may change their retrospective ratings of childhood

health. Descriptive statistics for each of these variables are shown in Table 2. Measures of experienced childhood health conditions were drawn from a series of questions asked during the 2008 wave, the first survey in which such questions were asked to the entire sample.[3] Respondents were asked whether they experienced specific illnesses during childhood. Guided by Smith's (2009) categorization and our hypotheses, we grouped childhood health conditions into three categories. The first category of childhood morbidity is serious childhood physical health conditions, which include diabetes, heart trouble, epilepsy or seizures, and hypertension. The second category is childhood mental health conditions, which include depression and other psychiatric problems. Both serious physical health (3.0 %) and mental health (3.4 %) conditions were overall rather rare; thus, we used an indicator variable for the presence of any of the preceding conditions. The remaining childhood conditions—measles, mumps, chicken pox, allergic condition, ear problems, headaches or migraines, stomach problems, difficulty seeing, asthma, and respiratory disorder—comprise the third category of childhood morbidity, which we labeled as "other childhood health conditions." Given the distribution of these other conditions, the variable was treated as continuous.

To assess how change in adult health status may alter retrospective childhood health reports, we also examined changes in self-rated health and adult morbidity between the two waves (i.e., incidence). Measures of physical health morbidity included hypertension, diabetes, cancer, lung conditions, heart conditions, stroke, and arthritis. Respondents were asked whether a physician had ever diagnosed any of the aforementioned conditions. To assess each condition, we measured the prevalence of each disease at both waves. For the panel data structure, presence of the condition was coded as 1 in each wave. For our change score analysis, those who were asymptomatic in 1998 but for whom onset of disease occurred by 2008 were coded as 1. Similar to physical health, mental health incidence included those who were asymptomatic in 1998 but for whom onset of a psychological disorder occurred by 2008. In addition to these objective indicators, we included current self-rated health, measured on the same scale as the childhood rating.

To address disability, we used measures of activities of daily living (ADL) and instrumental activities of daily living (IADL) from both waves. For both ADL and IADL items, respondents reported whether they had difficulty in completing each of the following tasks because of a "physical, mental, emotional, or memory problem." ADL consisted of six items: dressing, bathing, eating, using the toilet, getting in and out of bed, and walking across a room. IADL consisted of five items: making a telephone call, taking medication, preparing a hot meal, grocery shopping, and managing money. To account for changes in memory, delayed word recall, testing 10 words, was included. For the change score analysis, we calculated the difference across waves for each type of disability and memory, as well as self-rated health (t_2–t_1). For each of these four variables, we also included the within-person average or 1998 value in order to account for between-individual variation, rather than change alone.

[3]Small Internet subsamples were given these questions in 2006 and 2007. If not reported in 2008, we used the 2006 or 2007 responses from the Internet subsamples.

For marital status, we included an indicator of widowhood. Other nonmarried categories constituted a very small percentage of the sample and did not affect the results shown when included as additional categories. For the change score model, those who answered married in the 1998 wave and widowed in 2008 wave were coded as widowed between waves. For relocation, participants were asked whether they moved in the last two years. Because this is not a measure of change between the two waves, only the 2008 measure was used in the change score analysis.

We also adjusted for demographic factors of childhood SES, age, sex, race, education, and wealth. Age and education, each measured in years, were included as continuous variables. Race was coded as white, African American, and other. Childhood SES in the HRS was coded as three categories: poor, average, and well off. As constructed by RAND, wealth (log-transformed due to skewness) was the sum of all household assets (e.g., real estate, businesses, retirement, savings) minus debt. All demographic factors were drawn from the 1998 wave.

Finally, in an illustrative example of the effect of changes in childhood health ratings on adult health outcomes, we considered the Center for Epidemiological Studies Depression (CESD) scale. As constructed by RAND, this mental health index measured whether the respondent experienced the following sentiments all or most of the time: depression, everything is an effort, sleep is restless, felt alone, felt sad, could not get going, felt happy (reverse-coded), and enjoyed life (reverse-coded).

Analytic Plan

We considered two complementary modeling approaches. The first compared those who downgraded or upgraded their childhood health rating relative to those who maintained, and the second assessed factors that influenced individuals to cross the threshold to a higher outcome category. First, for our categorical outcomes of change by any amount in each direction (maintained, decreased, or increased retrospective childhood health rating) or across the dichotomous coding, we used multinomial logistic regression and change scores or onset for those predictors that can vary over time. With multinomial logistic regression, we can obtain odds of upgrading or downgrading childhood health ratings relative to those who maintained the same rating, as opposed to ordinal logistic regression, which would assume a ranking and provide the probability of falling into a category relative to all the responses less than a given category. We used Stata's *cluster* option (Hoechle 2007) to account for repeated observations for spouses within the same households (7,380 households across the 9,051 respondents), although results are virtually identical regardless of its usage.

Second, for the panel data analysis, we examined mixed-effects panel models using Stata. For the dichotomous threshold of fair or poor compared with good or better, we used logistic regression via the *xtlogit* procedure. When considering childhood health ratings as an ordinal response, we used ordinal logistic regression via the *xtologit* procedure.[4] For the dichotomous response, we can reject the null hypothesis of a Hausman test that the within- (also commonly referred to as a fixed-effects panel model) and between-individual effects

[4]Note that the "cluster" option is incompatible with both the *xtlogit* and *xtologit* procedures.

are equal (chi-squared = 36.61, df = 15, $p < .001$). For the ordinal response, we could not consider a fixed-effects model for within-person only effects because an ordinal dependent variable cannot be person-centered. Still, we could incorporate both between- and within-effects by including a person-specific mean and a person-centered variable for time-varying independent variables, which was the approach we took in both the binary and ordinal logistic mixed-effects regression. For time-invariant effects, the coefficients are strictly between-person effects.

Results

Change Score Models

Table 3 displays the results of multinomial logistic regression models. For the nominal outcome of any change in childhood health ratings in each direction, two equations are shown that compare those who maintained the same childhood health rating with those who changed their rating to either a lower category or a higher category.[5] We begin with the demographic measures. According to Eq. (1), males were 16.5 % more likely to decrease their childhood health rating between 1998 and 2008 than to maintain the same rating ($p < .01$). As shown in Eq. (2), gender did not affect whether individuals increased their health rating compared with maintaining the same rating. Those who self-identified as poor during childhood, however, were 41.5 % more likely to increase their childhood health rating compared with those who were well off ($p < .05$). Similarly, those in the small heterogeneous "other" category of race were more likely to increase their retrospective health ratings compared with whites by 32.7 % ($p < .05$).

With negative effects of education and wealth in both Eqs. (1) and (2), the two measures of socioeconomic background demonstrate that those in the more advantageous positions were more likely to maintain the same childhood health rating between 1998 and 2008 rather than change their rating. If we take a four-year difference in education (e.g., high school, college), those with the higher level of education are 11.8 % less likely to decrease their childhood health ratings ($[e^{\ln(0.969) \times 4} - 1] \times 100\ \% = -11.8\ \%$) and 19.2 % less likely to increase their rating ($[e^{\ln(0.948) \times 4} - 1] \times 100\ \% = -19.2\ \%$) than to maintain. For wealth, the logarithmic scale makes the interpretation of a one-unit increase misleading. Using a standard deviation increase (0.22) in the log of wealth, the odds ratio of a decreased childhood rating was 0.93 ($e^{\ln(0.723) \times 0.22} = 0.931$, $p < .05$), and the odds ratio of an increased childhood health rating was 0.92 ($e^{\ln(0.693) \times 0.22} = 0.922$, $p < .001$). For both socioeconomic measures, those in the more disadvantaged positions were more likely to change their childhood health ratings.

All three measures of childhood health problems were statistically significant, such that those with health problems as a child were more likely to change their retrospective childhood health rating over the 10 years between measurements. Relative to maintaining the same childhood health rating, those who had any serious physical health problem as a child were 39.5 % more likely to decrease their rating ($p < .05$). Similarly, those who had

[5]We refer to the different comparisons as "equations" because they together constitute one multinomial logistic regression model.

any mental health problem as a child were 76.2 % more likely to decrease ($p < .001$) and 45.2 % more likely to increase their rating ($p < .05$). Stated the opposite way, those who had no serious health ailments or mental health issues during childhood were more likely to answer consistently between the two surveys. Finally, an increase of one other physical health problem corresponded to 7.9 % higher odds of decreased childhood health rating ($p < .001$) and 8.9 % higher odds of increased rating ($p < .001$).

Next, we move on to those characteristics of the individual that changed between the two survey rounds. We begin with acquisition of specific diseases. In Eq. (1), two afflictions emerged as statistically significant. First, the acquisition of hypertension decreased the odds of downgrading childhood health ratings by 13.3 % ($p < .05$), such that those who became hypertensive are more likely to maintain their childhood health ratings. On the other hand, the onset of a psychological disorder resulted in 23.2 % higher odds of a more negative childhood health rating ($p < .01$). No comorbidity was significant in Eq. (2).

We also found significant effects for memory measured via delayed word recall. Both the initial level in 1998 and the change between 1998 and 2008 were significant. For the initial level, those who were higher on word recall in 1998 were more likely to maintain the same childhood health rating in 2008. Although the odds ratio for the change between the two surveys in both equations indicated a negative coefficient, the average change in memory was also negative (−0.92). Thus, those whose memory declined were more likely to either increase or decrease their ratings. Put more simply, those most likely to change their ratings in either direction had an initial lower word recall and experienced more dramatic downward shifts in memory.

We found analogous results for self-rated health, such that those who reported poorer health in 1998—or a decline by 2008—were more likely to change their childhood health rating in either direction. We also estimated an interaction for word recall and self-rated health between the initial values and the change (not shown). This interaction was nonsignificant, indicating that a one-unit change in these measures exhibits the same effect on the likelihood of changing one’s childhood health rating regardless of initial value.

Unlike the effects attributable to memory and self-rated health, initial values of or changes in ADL and IADL, as well as the interaction between them (not shown), were not statistically significant. Life events occurring between the two rounds also did not significantly influence retrospective childhood health ratings.

Whereas Model 1 considers *any* change, we next consider the factors that influence whether respondents maintained or changed their rating using the dichotomy of “fair or poor” and “good or better.” Equation 1 of Model 2 shows the comparison between those who downgraded their health from good or better to fair or poor relative to those who maintained a good or better rating. Many of the results are similar to those of Model 1, Eq. (1), which considers any downgrade. However, a smaller subset of the same significant predictors emerge here, with many of the coefficients markedly higher in magnitude. The significant effect of education again points to the importance of high SES in maintaining childhood health ratings ($p < .001$). Any childhood serious physical and mental health conditions

increase the odds of downgrading across the dichotomy by 5.5 and 2.8 times, respectively ($p < .001$). An increase of 1 on other childhood health conditions increases the likelihood of downgrading by 33.7 % ($p < .001$). Again, incident psychological disorder increases the odds of downgrading by 55.6 % ($p < .05$). Finally, we also observe the same effects of self-rated health initial values and changes ($p < .001$). We do not show the equation for those who increased from fair or poor to good or better compared with those who maintained the lower rating given that few significant results emerged (only childhood SES and other childhood health problems).

The two multinomial logistic regression models demonstrated that those of high SES, who experienced fewer childhood health conditions, who did not experience psychological disorder, and with high initial and low change in memory and self-rated health were the most likely to maintain their retrospective ratings of childhood health. These models specifically address the question of who was more likely to change their childhood health rating compared with maintaining the same rating. They do not explicitly address the changes that result in an individual crossing the threshold either to a higher category or across the dichotomy. Therefore, we turn to models that account for within-person stability and change.

Mixed-Effects Models for Panel Data

Table 4 shows the results of two mixed-effects logistic regression models, with Model 1 showing the ordinal five-category response and Model 2 showing the dichotomy. The table displays both the between- and within-person effects of the predictors. The former simply provides the odds of being in a higher response category for individuals separated by one unit on a given predictor, as opposed to any effect of change. The advantage of the between-person effects is the ability to control for time-invariant predictors and to separate the between- and within-person effects for time-varying predictors, particularly because there is no fixed-effects panel model equivalent for an ordinal outcome. Although our main foci in the mixed-effects models are these latter within-person changes that drive differences in childhood health, we first briefly describe the significant between-person effects.

The significant predictors of an individual being in a higher category on the ordinal or good or better on the dichotomy are largely consistent across the two models. For example, those with more years of education, higher wealth, hypertension, and higher current self-rated health were more likely to be in higher categories on both the ordinal response outcome and the dichotomy; and those in the “other” race category (relative to whites), experiencing any of the childhood health conditions, and with a psychological disorder are more likely to be lower on each. The significant between-person results for the dichotomy, however, are a subset of those in the ordinal logistic regression model. Thus, additionally on the ordinal outcome, those of poor childhood SES (relative to the well-off), higher age, and higher IADL are less likely to be in a higher outcome category; and those experiencing a move in the last two years, with diabetes, with cancer, higher ADL, and higher delayed word recall are more likely to be in a higher outcome category. For example, an individual higher by one unit on delayed word recall is 7.0 % more likely to be in a higher response category relative to the individual one unit lower ($p < .001$).

We next move on to the within-person changes that affect differences in responses across the two time points (wave-level within effects). Beginning with Model 1, an individual who experienced a recent move in 2008 who did not in 1998 is 19.0 % more likely to be in a higher response category as a result of this change ($p < .01$). Similarly, when a given individual became hypertensive, s/he had 31.7 % higher odds of crossing the threshold into a higher response category ($p < .001$). Acquiring arthritis, on the other hand, was associated with a 14.7 % reduction in the odds of being in a higher response category ($p < .05$). Finally, a within-person increase of one unit on current self-rated health was associated with a 21.0 % higher likelihood of being in a higher response category ($p < .001$). We see a similar effect of current self-rated health for the dichotomy in Model 2, where an increase of one unit for a given individual is associated with 23.7 % higher odds of being in the good or better category ($p < .01$). As with the change score models in Table 3, we also find that acquiring a psychological disorder was associated with 55.5 % decreased odds of responding good or better ($p < .001$). For the dichotomy, the effect of time is significant as well: individuals are more likely to respond good or better in 2008 ($p < .01$).

Changes in Childhood Health and Adult Health Outcomes

These results suggest that researchers should consider controlling for particular variables when assessing the effect of childhood health ratings on adult health outcomes. Although many of these variables are typically included (such as education and race), many are less obvious depending on the outcome being assessed (such as memory and psychological disorder). In considering what variables to adjust for when using childhood health ratings as a predictor, we advise researchers to consider the combination of data structure (change scores vs. longitudinal panels) and coding of childhood health (five categories vs. dichotomous) because our results differed somewhat by this cross-classification. Still, most of our results were consistent regardless of these combinations: education, childhood health conditions, psychological disorders, and self-rated health were predictive of childhood health rating changes across *all* models. Whether one adjusts for other variables may depend on data structure and the coding of childhood health. For example, memory was important when using the five-category rating but not the dichotomy.

These findings imply that changes in childhood health ratings may affect adult health outcomes if one does not adjust for these sources of bias; the choice of two childhood health ratings measured on different occasions may be consequential to conclusions. To illustrate this, we examined linear regression models of the CESD scale predicted by both the five-category and dichotomous childhood health ratings, shown in Table 5. In Model 1, we included only the initial five-category childhood health rating and the change between the two measurements. The model illustrates that changes in childhood health ratings significantly affect CESD scores above and beyond the initial 1998 value. Thus, before accounting for those variables that affect change, we found that altering one's childhood health did affect this adult health outcome, such that childhood health might be considered time-varying. Although the initial value shows that those with higher childhood health ratings have fewer depressive symptoms according to the CESD scale ($b = -0.404$, $p < .001$), those who increased their childhood health rating reported fewer depressive symptoms —or, conversely, those who decreased their childhood health rating reported more

depressive symptoms ($b = -0.209$, $p < .001$). Model 3 demonstrates analogous findings with the dichotomous coding ($b = -0.640$, $p < .001$).

In Models 2 and 4, we then added the significant predictors of change in childhood health ratings based on Table 3 (given that we are considering change scores rather than panel models). For the dichotomy in Model 4, we included only the subset of significant predictors relevant for this coding. Given the potential for issues of causal order, we excluded incident psychological disorder as a predictor, although the results are nearly identical if included. Although the initial 1998 childhood health rating decreased in magnitude but maintained its significance, the change between the two measurements was no longer significant (compare Models 1 and 2, and Models 3 and 4).[6] This finding implies that with these measures controlled for, the change no longer mattered; the choice of 1998 or 2008 childhood health ratings is of little consequence. We also estimated mixed-effects models predicting the CESD scale with between- and within-person effects for the five-category childhood health ratings (not shown). We found that within-person changes were significant without controls. Again, however, this coefficient became nonsignificant with the inclusion of the significant panel model predictors in Table 4. Although we caution that these illustrative results may not hold for all outcomes, the findings suggest the utility of adjusting for changes in childhood health when modeling adult health outcomes.

Discussion

Several long-term prospective studies of life course health, mostly from Europe, use exemplary data to study the early origins of adult health. Without such prospective data, however, dozens of scholars have used retrospective information on childhood from either cross-sectional or longitudinal studies to make important contributions to biodemography and life course epidemiology. Although there is strong evidence that these retrospective measures of specific events and conditions are fairly valid (e.g., Smith 2009), our study examined stability and change in a subjective rating of childhood health. Unlike reports of specific health conditions, people may choose to recalibrate their rating of childhood health. Our aims, therefore, were to identify how likely older people are to revise these ratings and what respondent characteristics heighten the likelihood of a revision.

To achieve this aim, we used multiple modeling strategies that each considered change in a different way, and within each strategy assessing the five response categories and the clinically important threshold from fair or poor health to good or better. First, we used a change score approach that examined whether respondents exhibited change in childhood health ratings in each direction relative to maintaining the same rating. This approach, however, does not account for the original starting value or the amount of change on the response. We therefore also took a panel data approach that more closely studied within-person change by considering the likelihood of moving to a higher response category or across the dichotomy. The disadvantage of this modeling approach was that the coefficients for the static childhood health and socioeconomic and demographic background factors

[6]We also estimated intermediate models in nested blocks. It was no single block, but rather the covariates as a whole that appeared to result in this nonsignificance.

provide only between-person effects on childhood health ratings and not the effects on within-person change, an advantage of the change score model. Thus, each approach has its strengths and weaknesses, and the results largely complemented one another. In terms of the few inconsistencies in the results, we recommend that researchers take into account both their data structure and preferred coding of childhood health, as in our illustrative example of the CESD scale.

Using repeated measures from a large nationally representative sample of persons 51 years of age or older, we found that nearly one-half of the sample revised their rating of childhood health. Among those who revised their rating, 48.7 % rated their childhood health more positively at the second interview, and 51.2 % rated it more negatively. Drawing from the extant literature, we examined several reasons why persons might change their childhood health rating, falling into three themes: demographic and socioeconomic background, early-life events, and later-life events. Beginning with demographic and socioeconomic background, and consistent with prior research, we found that maintaining the same rating was more likely for women and those higher on socioeconomic status (Matthews and MacLeod 2005; Van de Mheen et al. 1998; Zajacova and Dowd 2011).

Among the early-life explanations, because serious and persistent childhood health conditions are more likely to be recalled accurately, we expected that people who experienced more serious and/or chronic childhood diseases would be less likely to change ratings of their childhood health (Haas and Bishop 2010; Krall et al. 1988). Instead, we found that both serious and nonserious health conditions during childhood were associated with a higher likelihood of revising one's rating of childhood health, while the panel data models demonstrated that those with childhood health conditions were overall likely to have lower childhood health ratings. We observed parallel findings for childhood mental health conditions. These findings suggest a more general consideration of life course recasting: the more events and problems experienced in early life, the greater the likelihood of revising one's evaluation of them—either positively or negatively.

Shifting to later-life events, change in adult health is another possible reason for why adults might revise their childhood health ratings. Based on prior research that examined how anchoring influences health ratings, we anticipated that onset of a disease and decreased physical health would lead to changes in ratings of childhood health (Dowd and Todd 2011; Smith 2009). The most consistent finding across all models was the significant effect of self-rated health, implying that those who have lower initial or average values or downgrade their health are more likely to change their childhood health rating. We also found that several morbidities led to revision. People who developed hypertension were less likely to negatively revise their rating of childhood health across the five categories in both modeling approaches. Although no other incident comorbidities predicted modifications when measured as change by *any* amount, the mixed-effects analysis showed that incident diabetes decreased the odds of increasing one's childhood health rating.

Second, there was evidence for overall memory and memory decline as an engine of revised childhood health ratings, but specifically for the five response categories. Persons who experienced relatively little decline in memory and who had higher overall memory were

more likely to maintain the same rating of their childhood health—a finding consistent with prior studies (Haas 2007; Van de Mheen et al. 1998). Those who experienced the steepest declines in memory between survey waves altered their childhood health rating, either positively or negatively. Although it is unsurprising that better memory was associated with more consistency in ratings, we note that memory decline led some respondents to more positive ratings at the follow-up survey and other respondents to more negative ratings of childhood health.

Third, given that depressive symptoms may impinge on all subjective ratings, we considered psychological disorder as a reason for change in childhood health ratings (Mathews and MacLeod 2005). Results of all the modeling strategies consistently revealed that the onset of an emotional, nervous, or psychiatric disorder was associated with a more negative rating of childhood health. This finding is comparable to that of Joorman et al. (2009), who linked depression to false recall of negative material; perhaps other types of mental disorders are also associated with false negative memories.

Finally, we examined whether two life events—widowhood and relocation—might lead to changes in childhood health ratings. Contrary to our expectations and prior research (e.g., Zimmerman 1983), we found inconsistent evidence that these life events were consequential in our analyses, with recent relocation significant in only Table 4, Model 1.

The findings reported herein should be tempered by recognition of several study limitations. First, the HRS provided a unique opportunity to study changes in retrospective ratings of childhood health, but it is limited to persons 51 years of age or older. Although nearly one-half of the sample revised their rating of childhood health during the 10-year observation period, this finding is generalizable to an older population only. We welcome findings from studies with different age ranges to support or refute the results presented herein.

Second, although the aim of the study was to investigate changes in retrospective ratings of childhood health, the chronic conditions of childhood were also measured retrospectively. Thus, our ability to assess the congruence between self-rated childhood health and actual health during childhood is subject to recall bias. Previous studies report that recall of childhood health conditions, especially serious illness, correlates well with physician-evaluated childhood health (Krall et al. 1988), but the retrospective nature of childhood health measurement remains an important limitation. Very few long-term prospective studies, such as the British National Survey of Health and Development, can provide a platform for measuring chronic conditions during childhood as well as how older people retrospectively rate their childhood health. Until such comparisons can be made, the fallibility of recalled childhood conditions should be considered alongside the findings from this study.

Although past studies have argued for the validity and reliability of retrospective ratings of childhood health (Haas 2007; Smith 2009), others have questioned these ratings on the basis of bias resulting from nonrandom error (Crossley and Kennedy 2002; Van de Mheen et al. 1998; Zajacova and Dowd 2011). Our results demonstrated that there is indeed nonrandom error, particularly when examining changes in those ratings over a long time window.

Alterations of this subjective measure were patterned by particular characteristics of the respondents. We do not contend that researchers should abandon these retrospective measures; rather, we urge researchers to adjust for nonrandom sources of bias in such ratings. The analysis of the CESD scale provided an illustrative example. When the significant predictors of change in childhood health were not included, alterations of this rating over time were significant in predicting depressive symptoms. With the predictors included and regardless of the coding of childhood health, changes in childhood health rating were no longer consequential for this particular outcome, removing the need to decide on the use of the 1998 or 2008 childhood health rating. We speculate that other outcomes may not so clearly demonstrate the utility of adjusting for covariates to account for change in self-rated childhood health. At the very least, however, this analysis suggests that researchers consider changes in childhood health ratings over time when examining adult health outcomes.

On the positive side, most analyses typically control for many of the background characteristics that are sources of bias in this measure, such as demographics and socioeconomic background. Also, it appears that there would be little if any bias attributable to not adjusting for life events and the onset of several diseases. Childhood health conditions, incident mental health comorbidities and hypertension, self-rated health, and memory capacity, however, might be overlooked. Thus, when researchers use retrospective childhood health ratings in models, they should also include these control measures in order to increase the validity and reliability of such ratings. As we intend to explore in future research, we expect that the conclusions regarding the relationship between childhood health, measured in retrospect, and many other adult health and socioeconomic outcomes will be altered when considering these other sources of bias. Eliminating the bias resulting from these measures may yield a more accurate estimate of the effect of retrospective childhood health ratings on other outcomes.

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Appendix

Table 6

Vital and reinterview status in 2008 by childhood health ratings in 1998, *n* (total percentage)

2008 Response or Status	Excellent	Very Good	Good	Fair	Poor
Reinterviewed, Outcome Known	4,498 (47.4)	2,262 (45.6)	1,734 (48.0)	464 (48.7)	150 (47.3)
Reinterviewed, Valid Skip Due to Proxy	248 (2.6)	193 (3.9)	130 (3.6)	26 (2.7)	10 (3.2)
Reinterviewed, Item-Missing	1,523 (16.1)	660 (13.3)	336 (9.3)	117 (12.3)	24 (7.6)
Attrition Because of Death	2,316 (24.4)	1,441 (29.0)	1,126 (31.2)	288 (30.3)	111 (35.0)
Attrition for Other Reason	902 (9.5)	406 (8.2)	284 (7.9)	57 (6.0)	22 (6.9)
N	9,487	4,962	3,610	952	317

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Table 1

Childhood health ratings in 1998 and 2008, *n* (total percentage), *N* = 9,108

	2008					
1998	**Poor**	**Fair**	**Good**	**Very Good**	**Excellent**	
Poor	47 (0.5)	**31 (0.3)**	**33 (0.4)**	**20 (0.2)**	**19 (0.2)**	**Increased childhood health rating: *n* = 2,112 (23.2)**
Fair	*36 (0.4)*	139 (1.5)	**142 (1.6)**	**91 (1.0)**	**56 (0.6)**	
Good	*37 (0.4)*	*132 (1.5)*	587 (6.4)	560 (6.2)	**418 (4.6)**	
Very Good	*16 (0.2)*	*72 (0.8)*	*412 (4.5)*	1,020 (11.2)	**742 (8.2)**	
Excellent	*13 (0.1)*	*43 (0.5)*	*342 (3.8)*	*1,119 (12.3)*	2,981 (32.7)	
			Decreased childhood health rating: n = 2,222 (24.4)			Maintained childhood health rating: *n* = 4,774 (52.4)

Notes: Values in bold indicate an increase in childhood health rating . Values in italic type indicate a decrease in childhood health rating. Values in normal text indicate maintained childhood health rating across both years.

Table 2

Descriptive statistics for independent variables in the health and retirement study (N = 9,108)

	1998 % or Mean (SD)	2008 % or Mean (SD)	Change
Demographic and Socioeconomic Background			
Self-rated childhood SES: Pretty well-off	5.4	—	—
Self-rated childhood SES: About average	61.0	—	—
Self-rated childhood SES: Poor	33.5	—	—
Age (mean)	73.53 (9.08)	—	—
Gender: Male	36.2	—	—
Race: White	80.4	—	—
Race: African American	15.6	—	—
Race: Other	4.0	—	—
Education (years, mean)	11.99 (3.17)	—	—
Wealth (logged, mean)	0.75 (0.22)	—	—
Childhood Health			
Any childhood serious physical condition	3.0	—	—
Any childhood mental health condition	3.4	—	—
Other childhood health condition (mean)	2.62 (1.35)	—	—
Life Events			
Moved in last 2 years	32.7	11.7	—
Widowed	15.1	28.9	13.3
Adult Morbidity			
Hypertension	39.9	64.9	24.8
Diabetes	11.0	23.8	12.8
Cancer	8.1	18.1	9.9
Lung condition	4.5	12.3	7.9
Heart condition	13.8	29.9	16.1
Stroke	3.6	10.6	7.0
Arthritis	46.4	68.9	22.3
Psychological disorder	8.7	17.2	8.5
Disability			
ADL (mean)	0.23 (0.77)	0.45 (1.10)	0.22 (1.08)
IADL (mean)	0.12 (0.48)	0.32 (0.85)	0.20 (0.86)
Memory			
Delayed word recall (mean)	4.87 (2.06)	3.95 (2.05)	−0.92 (2.18)
Self-rated Health			
Current self-rated health (mean)	3.24 (1.09)	2.96 (1.08)	−0.28 (1.07)

Table 3

Multinomial logistic regression of change in retrospective childhood health rating: Odds ratios (OR) and 95 % confidence intervals (CI) (*N* = 9,051)

	Model 1, Eq. (1): Childhood Health Decreased vs. No Change		Model 1, Eq. (2): Childhood Health Increased vs. No Change		Model 2, Eq. (1): Downgraded Childhood Health From High to Low vs. Maintained High Rating	
	OR	**95 % CI**	**OR.**	**95 % CI**	**OR**	**95 % CI**
Demographic/Socioeconomic Background						
Childhood SES: Average (vs. well-off)	0.999	0.793–1.260	1.227	0.943–1.595	0.858	0.487–1.510
Childhood SES: Poor (vs. well-off)	1.119	0.879–1.426	1.415*	1.077–1.860	1.166	0.656–2.071
Age	1.004	0.997–1.010	0.995	0.988–1.001	0.996	0.981–1.010
Gender: Male (vs. female)	1.165**	1.043–1.300	1.095	0.976–1.227	1.084	0.842–1.397
Race: African American (vs. white)	1.047	0.898–1.220	1.124	0.967–1.306	0.881	0.633–1.224
Race: Other (vs. white)	1.262	0.970–1.642	1.327*	1.026–1.715	1.388	0.868–2.219
Education (years)	0.969**	0.950–0.988	0.948***	0.930–0.966	0.902***	0.567–0.939
Wealth (logged)	0.723*	0.538–0.970	0.693**	0.530–0.906	0.885	0.477–1.641
Childhood Health						
Any childhood serious physical condition	1.395*	1.026–1.895	1.244	0.904–1.712	5.461***	3.639–8.287
Any childhood mental health condition	1.762***	1.327–2.339	1.452*	1.072–1.967	2.841***	1.826–4.420
Other childhood health condition	1.079***	1.036–1.123	1.089***	1.046–1.135	1.337***	1.206–1.481
Life Events						
Widowed since last survey	0.974	0.833–1.139	1.019	0.871–1.192	0.832	0.574–1.205
Moved in last 2 years	0.981	0.832–1.158	1.065	0.905–1.253	1.112	0.793–1.559
Incident Morbidity						
Hypertension	0.867*	0.767–0.980	1.113	0.987–1.255	0.998	0.755–1.320
Diabetes	1.012	0.868–1.179	1.025	0.875–1.201	1.171	0.859–1.597
Cancer	0.908	0.762–1.081	0.947	0.791–1.132	1.118	0.769–1.627
Lung condition	0.845	0.694–1.029	0.976	0.804–1.185	0.886	0.589–1.333
Heart condition	1.067	0.926–1.228	0.972	0.839–1.127	0.947	0.699–1.281
Stroke	1.045	0.854–1.280	1.074	0.868–1.329	0.948	0.616–1.457
Arthritis	1.087	0.961–1.228	0.953	0.804–1.086	0.982	0.739–1.306

	Model 1, Eq. (1): Childhood Health Decreased vs. No Change		Model 1, Eq. (2): Childhood Health Increased vs. No Change		Model 2, Eq. (1): Downgraded Childhood Health From High to Low vs. Maintained High Rating	
	OR	**95 % CI**	**OR.**	**95 % CI**	**OR**	**95 % CI**
Psychological disorder	1.232*	1.027–1.479	0.982	0.836–1.199	1.556*	1.102–2.197
Disability						
ADL (1998)	0.951	0.866–1.046	0.936	0.853–1.025	1.031	0.869–1.222
ADL ($t_2 - t_1$)	0.989	0.931–1.051	1.010	0.948–1.075	1.001	0.895–1.119
IADL (1998)	1.079	0.930–1.253	0.978	0.936–1.241	1.014	0.759–1.354
IADL ($t_2 - t_1$)	1.032	0.957–1.112	0.920	0.902–1.061	1.008	0.874–1.163
Memory						
Delayed word recall (1998)	0.951**	0.918–0.985	0.920***	0.887–0.954	0.933	0.858–1.015
Delayed word recall ($t_2 - t_1$)	0.938***	0.909–0.967	0.930***	0.901–0.959	0.946	0.882–1.015
Current Health						
Self-rated health (1998)	0.835***	0.783–0.889	0.797***	0.746–0.851	0.656***	0.567–0.460
Self-rated health ($t_2 - t_1$)	0.858***	0.809–0.910	0.996	0.936–1.060	0.766***	0.667–0.880
Model Fit Statistics						
Log pseudo-likelihood	−8,975.73				−3,447.88	
Model chi-squared	467.00*** (*df*= 58)				904.60*** (*df*= 87)	

Notes: Robust standard errors accounting for repeated observations within households (7,380 households) are used. In Model 1, comparison for childhood health decreased vs. childhood health increased is not shown. In Model 2, all other comparisons are omitted.

* $p < .05$

** $p < .01$

*** $p < .001$

Table 4

Mixed-effects (ME) logistic regressions of childhood health rating: Odds ratios (OR) and 95 % confidence intervals (CI) (N = 9,051, waves = 2)

	Model 1: ME Ordinal Logistic Regression of Childhood Health		Model 2: ME Logistic Regression of High vs. Low Childhood Health	
	OR	95 % CI	OR	95 % CI
Person-Level Between Effects				
Demographic/socioeconomic background				
Childhood SES: Average (vs. well-off)	0.930	0.738–1.171	1.366	0.816–2.287
Childhood SES: Poor (vs. well-off)	0.671***	0.527–0.853	0.712	0.420–1.207
Age	0.982***	0.975–0.989	1.000	0.985–1.015
Gender: Male (vs. female)	0.982	0.877–1.099	0.843	0.658–1.079
Race: African American (vs. white)	0.879	0.760–1.018	0.820	0.591–1.097
Race: Other (vs. white)	0.703**	0.545–0.908	0.472**	0.291–0.764
Education (years)	1.095***	1.075–1.115	1.112***	1.070–1.156
Wealth (logged)	1.802***	1.398–2.322	1.852*	1.079–3.178
Childhood health				
Any childhood serious physical condition	0.141***	0.106–0.188	0.091***	0.058–0.144
Any childhood mental health condition	0.299***	0.227–0.393	0.214***	0.137–0.336
Other childhood health condition	0.680***	0.654–0.707	0.555***	0.509–0.605
Life events				
Widowed	1.046	0.894–1.224	1.073	0.763–1.509
Moved in last 2 years	1.249*	1.049–1.487	1.181	0.810–1.722
Incident morbidity				
Hypertension	1.283***	1.134–1.451	1.725***	1.313–2.266
Diabetes	1.303***	1.115–1.524	1.221	0.877–1.701
Cancer	1.256**	1.061–1.488	1.023	0.712–1.471
Lung condition	1.131	0.912–1.402	0.720	0.481–1.078
Heart condition	1.043	0.900–1.209	0.941	0.692–1.281
Stroke	1.093	0.866–1.381	1.099	0.680–1.778
Arthritis	0.966	0.853–1.094	0.810	0.614–1.069
Psychological disorder	0.793**	0.665–0.947	0.659*	0.467–0.928
Disability				
ADL	1.091*	1.004–1.185	1.037	0.887–1.212
IADL	0.888*	0.789–0.998	0.868	0.695–1.084
Memory				
Delayed word recall	1.070***	1.035–1.107	1.040	0.966–1.119
Current health				
Self-rated health	1.830***	1.709–1.960	1.764***	1.521–2.046

	Model 1: ME Ordinal Logistic Regression of Childhood Health		Model 2: ME Logistic Regression of High vs. Low Childhood Health	
	OR	**95 % CI**	**OR**	**95 % CI**
Wave-Level Within Effects				
Life events				
Widowed	0.987	0.839–1.161	1.064	0.717–1.580
Moved in last 2 years	1.190**	1.061–1.335	1.249	0.939–1.661
Incident morbidity				
Hypertension	1.317***	1.139–1.523	1.286	0.895–1.848
Diabetes	1.046	0.868–1.261	0.867	0.554–1.358
Cancer	1.099	0.890–1.357	0.795	0.481–1.315
Lung condition	1.199	0.951–1.513	1.024	0.616–1.702
Heart condition	0.872	0.736–1.034	0.797	0.530–1.197
Stroke	1.092	0.855–1.394	1.124	0.641–1.971
Arthritis	0.853*	0.733–0.993	0.708	0.478–1.049
Psychological disorder	0.842	0.675–1.051	0.445***	0.273–0.725
Disability				
ADL	1.007	0.943–1.075	0.973	0.845–1.119
IADL	0.946	0.872–1.027	0.956	0.800–1.142
Memory				
Delayed word recall	1.007	0.978–1.037	0.973	0.906–1.046
Current health				
Self-rated health	1.210***	1.138–1.286	1.237**	1.066–1.435
Time				
2008	1.040	0.939–1.152	1.469**	1.137–1.898
Random Effect	3.210	2.954–3.488	2.361	2.131–2.617
Model Fit Statistics				
Log-likelihood	−19,898.06		−3,459.02	
Model chi-squared	1,603.08*** (*df* = 40)		463.97*** (*df* = 40)	

* $p < .05$

** $p < .01$

*** $p < .001$

Table 5

Linear regression of 2008 Center for Epidemiological Studies Depression (CESD) Scale (N = 9,061)

	Five-Category Childhood Health Rating		Dichotomous Childhood Health Rating	
	Model 1	**Model 2**	**Model 3**	**Model 4**
Childhood Health Rating				
Childhood health (1998)	−0.404*** (0.024)	−0.082*** (0.024)	−1.232*** (0.102)	−0.351*** (0.098)
Childhood health ($t_2 - t_1$)	−0.209*** (0.025)	−0.036 (0.023)	−0.640*** (0.094)	−0.129 (0.087)
Demographic/Socioeconomic Background				
Childhood SES: Average (vs. well-off)	—	−0.131 (0.085)	—	−0.119 (0.085)
Childhood SES: Poor (vs. well-off)	—	−0.162 (0.089)	—	−0.171 (0.089)
Gender: Male (vs. female)	—	−0.335*** (0.040)	—	—
Race: African American (vs. white)	—	−0.107* (0.054)	—	—
Race: Other (vs. white)	—	0.150 (0.097)	—	—
Education (years)	—	−0.035*** (0.007)	—	−0.054*** (0.007)
Wealth (logged)	—	−0.234* (0.093)	—	—
Childhood Health				
Any childhood serious physical condition	—	0.106 (0.113)	—	0.108 (0.113)
Any childhood mental health condition	—	1.147*** (0.106)	—	1.176*** (0.106)
Other childhood health condition	—	0.041** (0.015)	—	0.042** (0.015)
Incident Morbidity				
Hypertension	—	−0.072 (0.044)	—	—
Memory				
Delayed word recall (1998)	—	−0.063*** (0.012)	—	—
Delayed word recall ($t_2 - t_1$)	—	−0.059*** (0.010)	—	—
Current Health				
Self-rated health (1998)	—	−0.740*** (0.022)	—	−0.775*** (0.021)
Self-rated health ($t_2 - t_1$)	—	−0.575*** (0.021)	—	−0.588*** (0.021)
(Intercept)	3.226*** (0.103)	5.109*** (0.164)	2.701*** (0.097)	4.839*** (0.154)

	Five-Category Childhood Health Rating		Dichotomous Childhood Health Rating	
	Model 1	**Model 2**	**Model 3**	**Model 4**
Model Fit Statistics				
F test	138.47***	136.69***	73.29***	218.60***
R^2	.030	.204	.016	.195

* $p < .05$

** $p < .01$

*** $p < .001$