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MRDRC WP 2021-435

UM21-07

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October 2021

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Acknowledgements

The research reported herein was performed pursuant to a grant from the U.S. Social Security Administration (SSA) funded as part of the Retirement and Disability Research Consortium through the University of Michigan Retirement and Disability Research Center Award RDR18000002-03. The opinions and conclusions expressed are solely those of the author(s) and do not represent the opinions or policy of SSA or any agency of the federal government. Neither the United States government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of the contents of this report. Reference herein to any specific commercial product, process or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply endorsement, recommendation or favoring by the United States government or any agency thereof.

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Abstract

A growing body of research implicates life span adversity in later-life outcomes. We use data from the Life History Mail Survey (LHMS) with data from the Health and Retirement Study (HRS) core surveys to examine the relationship between adverse experiences over the life course and retirement due to disability. We employ 31 measures of childhood and adulthood adversities in both the financial and social domains. We create three measures of retirement due to disability based on survey responses to questions about health as a reason for retiring and the extent to which health limits work ability. For each measure of early retirement due to disability, we perform competing risk survival analysis modeling these outcomes relative to continued work or retirement for any other reason. We conduct these analyses in four samples depending on the component of the survey the data from which the data derived, with the sample including LHMS information being the most restricted but including the greatest number of adversities. Cumulative life adversity was associated with all outcomes examined, including the most conservative specification of disability retirement (i.e., retirement in the context of a health problem that completely limits work) and across all samples. We also found that childhood financial adversity and adult social adversity were most consistently associated with an increased hazard of retirement due to disability in our analysis, which balances the greatest number of adversities with a reasonably large sample (Sample 3).

Citation

Sonnega, Amanda, and Brooke Helppie-McFall. 2021. “The Relationship Between Adverse Experiences Over the Life Course and Early Retirement Due to Disability.” Ann Arbor, MI. University of Michigan Retirement and Disability Research Center (MRDRC) Working Paper; MRDRC WP 2021-435. https://mrdrc.isr.umich.edu/publications/papers/pdf/wp435.pdf

Authors’ acknowledgements

The authors are grateful to Daniel Baker for excellent research assistance.

Introduction

Over the past 40 years, a large body of social science research has established a relationship between psychosocial stress and both physical and mental health. As the field has evolved, many different aspects of the experience of stress and its effects have been investigated and expounded in the literature. One area of stress research that has recently received growing attention is adverse life experiences or events over the life course — from birth to midlife — and later-life outcomes. The term adverse childhood experiences (ACEs) describes negative exposures and unfavorable conditions in childhood. ACEs have been associated with a wide range of later-life outcomes such as chronic disease (Chang et al. 2019), mental illness (Copeland et al. 2018; Chang et al. 2019; Von Cheong et al. 2017; Yang et al. 2020), health risk behaviors (Campbell et al. 2016; Chang et al. 2019), obesity and smoking (Rehkopf et al. 2016), and telomere length (Ridout, Kahn, & Ridout, 2018). Other research examines adversity in young adulthood and midlife on later-life health outcomes findings, for example, a connection to the incidence of Type 2 diabetes (e.g., Smith et al. 2020). New data resources in large surveys are increasing opportunities to examine both childhood and early adulthood experiences simultaneously, creating measures of cumulative life stress (Slopen et al. 2018). For example, Puterman et al. (2016) examined childhood adversity and adulthood adversity (creating a measure of life span adversity) as a risk for shortened telomere length later in life.

A smaller number of studies have examined the association between childhood adversity and later-life disability. Schüssler-Fiorenza et al. (2014) use data from the Behavioral Risk Factor Surveillance System (BRFSS) Adverse Childhood Experience

Module and two questions assessing respondent's activity limitations and use of assistive devices. Their cross-sectional analysis demonstrates a strong association between ACEs and adult disability. To our knowledge, only two other studies have investigated a possible link between childhood adversity and disability retirement and disability pension. Björkenstam et al. (2017) find a graded connection between cumulative ACEs and uptake of disability pension in Sweden, with a mediating role for school performance. Using data from the Health and Social Support Study in Finland, Harkonmäki et al. (2007) follow a cohort of working men and women, ages 40 to 54 at baseline, to evaluate the role of ACEs in subsequent self-reported disability retirement. They find a similar pattern of increasing risk of disability retirement associated with ACEs. In contrast to our current study, neither of these studies specified the timing of pension uptake or retirement; they also included only adverse childhood experiences. Additionally, these studies focused on northern European countries, which differ in many ways from the United States context.

In the present study, we address an outcome of key importance in Social Security policy: retirement due to disability and especially early disability retirement. This is important because early retirement often translates to lower retirement wealth and income along with other potentially adverse aftereffects than would be the case with longer work (Fisher, Chaffee, and Sonnega 2015; Fisher Ryan, and Sonnega 2015). We also extend prior research by evaluating domains of financial and social adversity in childhood and adulthood, and we examine these both separately and as a cumulative life adversity index. We use data from the Life History Mail Survey (LHMS) with data from the Health and Retirement Study (HRS) core surveys to examine the relationship

between adverse experiences over the life course and the inability to work in one's late 50s and early 60s. The LHMS, an off-year study of the HRS, enhances previously available childhood information and provides information about relevant child and young adult precursors of later-life outcomes in the HRS (Smith et al. in press).

Methods

Data

The HRS is a nationally-representative study of adults ages 51 and older in the United States with rich longitudinal measurement of employment, financial, psychosocial, and health changes through late middle age to death. The study began in 1992 with the original HRS cohort, born 1931 to 1941. In 1998, the study added the War Babies cohort, born 1942 to 1947, and introduced a steady state design in which a new birth cohort is enrolled every six years. Early baby boomers (born 1948 to 1953), mid baby boomers born (1954 to 1959), and late baby boomers (born 1960 to 1965) were enrolled in 2004, 2010, and 2016 respectively.

The HRS core interview is conducted every two years in person or by phone, and supplemental studies are conducted in the off years. Core interview data are now available through the 2018 wave of the HRS. The study is approved by the University of Michigan Institutional Review Board. Further details are available elsewhere (Sonnega et al. 2014). The RAND Center for the Study of Aging produces a processed version of many measures from the core interview (Bugliari et al. 2021), which serves as a base data set for our analysis.

Information on childhood and adulthood (before age 50) adversity is available in three components of the HRS data, which we describe below. The adverse experiences we examine fall into two broad domains: financial adversity and social adversity. Note that all of the childhood and early-to-mid adulthood adversity items we use were asked only once, as they reference earlier lifetime experiences, which are not expected to change.

First, a limited number of childhood financial adversity items are available in the core interview as part of the baseline enrollment interview beginning in 1992 and for all new enrollment cohorts. Second, the Participant Lifestyle Questionnaire (PLQ) includes some questions on social adversity in childhood and early adulthood. The PLQ is a self-administered questionnaire fielded to a rotating random half of the core sample beginning in 2006. Third, the Life History Mail Survey (LHMS) provides many additional measures of childhood and adulthood financial and social adversity. The HRS began fielding the LHMS in 2015 in an effort to greatly expand data about respondents' lives before age 50. Various methods have been used to obtain life history information in a survey context, most notably the computer-assisted event history calendar (Morselli et al. 2019). While this method produces reliable and valid information, it is quite costly. The LHMS is a self-administered questionnaire that appears to yield reliable and valid life history information (Smith et al. in press). To coordinate with other HRS data collections and smooth respondent burden over time, LHMS data are available from three separate field periods so far: fall 2015, spring 2017, and fall 2017. Note that the 2015 fielding was a pilot; respondents to the 2015 fielding were also invited to complete a short version, or supplement, for their 2017 questionnaire to ensure that almost all of

the same data would be available for 2015 respondents and those who first responded in 2017. There are, however, four adverse experience measures that were never asked of respondents who completed both the 2015 LHMS and the 2017 supplement, compared to those who first completed the survey in 2017. We will discuss this issue in more detail when we discuss samples and measures. The questionnaire was sent to the Late Baby Boomer cohort in the fall of 2019; these data are not yet available.

Analytic samples

For all analyses, we begin with HRS respondents who have a "baseline" interview completed between age 51 and 56 and who reported themselves to be working and not completely retired at that time. This excludes the Asset and Health Dynamics of the Oldest Old (AHEAD) and Children of the Depression (CODA) HRS cohorts, as well as a portion of the original HRS cohort, who older than 56 when they entered the study. We further require that respondents in our sample have core interview data available at least to age 62. This may result in some selection bias, because some sample members die before the age of 62. However, subject to living to at least 51, mortality in one's 50s and very early 60s is relatively uncommon (5% for women and 8% for men between the ages of 51 and 62[1]). Relative to a study of retirement at later ages, however, this has the advantage of somewhat reducing concerns about selection bias based on mortality at later ages and increasing our sample and power by including younger respondents from the mid baby boom cohort,

[1] Based on author calculations using the Social Security Actuarial Life Table from 2004, around the time that many of our sample entered: https://www.ssa.gov/oact/STATS/table4c6_2004.html downloaded on 9/29/2021 at 10:30 a.m.

who had not reached full retirement age by the last core interview for which we have data (2018).

In an effort to leverage all of our data, while acknowledging the potential for survival bias to affect our estimates using data from later years, in particular, we conduct our analyses on four different samples. Sample 1 includes HRS participants meeting the above criteria who also provided responses in at least one wave to the childhood financial adversity questions from the core interview (n=7,996). By only requiring core interview responses, analysis results from this sample will be least susceptible to bias due to differential mortality rates among subgroups of respondents (including, perhaps, those who experienced many adverse experiences prior to age 50) compared to the samples that rely on data gathered in more recent years.

The second sample includes the subset of respondents from the first sample who also completed the PLQ section of the HRS first added in 2006 (n=5,996). This sample is slightly more selected based on survival to the PLQ fielding date, but expands the number of adverse experience measures we can make use of in our analyses.

The third sample includes the subset of individuals from the second sample who also started the LHMS in either 2015 or 2017 and completed the 2017 LHMS (supplement or long version) by the end of 2017 (n=3,265). This sample requires that respondents have lived to 2017, so estimates are likely subject to selection bias due to differential mortality. However, we expect this will attenuate the estimated effects of adverse events on early retirement due to disability.

The fourth sample includes the subset of individuals from the second sample who completed an LHMS survey in 2017 (n=1,269). This sample allows us to examine

the effects of the largest possible set of childhood and early-to-mid adulthood adverse events. It excludes respondents who responded to the 2015 LHMS, because these respondents were not asked all such questions.

Analytic approach

To provide insight into the characteristics of our sample, we conduct descriptive analyses on all study variables and analysis of variance to evaluate health status across groups of respondents with the following labor market outcomes: continued work, retirement due to disability, and retirement for other reasons.

To model the association of lifetime adversity with these outcomes, we use competing risk analysis, a type of survival analysis that evaluates the marginal risk of an event given other potential causes of failure using the proportional hazards regression (PHREG) procedure in SAS (Statistical Analysis System) 9.4. In this instance, retirement due to poor health/disability is the outcome of interest, and retirement due to any other cause is the competing risk. We therefore estimate cause-specific hazards for retirement due to disability and for all other reasons, which is the instantaneous hazard of retirement from the specific cause given that retirement from any cause has not yet happened. Time-to-event in these analyses is the number of waves from baseline to the wave in which respondents report being fully retired. Hazards can be interpreted as the risk of retiring at an earlier age. Independent variables include the summary variables of adverse experiences specific to domain (financial and social) and life-period (childhood and adulthood), and a cumulative index of adverse early life experiences. To begin to understand the impact of lifetime adverse experiences on the Social Security Disability program, we also conduct a multinomial logistic regression that explicitly evaluates the

association between cumulative life adversity and disability retirement before age 62 versus other labor market outcomes.

Measures

Outcome: In the competing risk analysis, the model requires both an event and a timing variable. The timing variable is the number of waves we observe individuals from their baseline interview at age 51 to 56 to the wave they report that they are fully retired.

We evaluate three specifications of the event variable using two different sets of questions. First, in the employment section of the interview, if respondents reported that they are fully retired in the previous wave, the interviewer presents them with a series of "reasons" that people retire. We code those who rate health as a somewhat, moderately, or very important reason for retiring equal to 1, 0 if they had not retired by age 62, and 2 if they retired for any other reason. Second, in the disability section of the interview (available in waves 6 to 14, 2004 to 2018), respondents are asked if they are limited in any way in activities because of an impairment or problem. If they answer yes, the interviewer then asks them if that limitation keeps them from working altogether. We code affirmative responses to this question as having retired due to a work limitation. We create a third categorical variable in which our outcome variable is equal to 1 if either of the other two specifications indicate retirement due to disability / poor health, 0 if the respondent had not retired prior to 62, and 1 if the respondent did not indicate that they had retired due to disability / poor health.

In the multinomial logistic regression models, we use these indicators to create a four category variable with the following options: retirement before age 62 due to disability; retirement before age 62 for any other reason; did not retire, and retirement

after age 62, which is the contrast category. We present results for the most stringent specification, where health prevents work completely. We also conducted an alternative model that included a category for retirement due to disability at age 62 or older.

Childhood financial adversity: We draw three measures of childhood financial adversity from the core interview taken from the Cross-Wave Childhood Health and Family Aggregated Data (HRS 2020). The interview asks respondents “Now think about your family when you were growing up, from birth to age 16, would you say your family during that time was pretty well off financially, about average, or poor? Some respondents offered that their circumstances varied. We created a dichotomous variable coded 1 for poor or varied family financial circumstances, and 0 otherwise. In the same section, the interview asks if there was a time of several months or more when their father had no job, and whether financial difficulties ever caused them or their family to move to a different place. These three indicator variables make up the core summary measure (potential range 0 to 3). These measures are available for all of our analytic samples.

There were no additional measures of childhood financial adversity in the PLQ. One additional measure of childhood financial adversity was available in the 2015/2017 LHMS. The questionnaire asked, “When you were 10 years old, approximately how many books were in the place you lived? Do not count magazines, newspapers, or your school books.” Response categories include none or very few (0 to 10 books), enough to fill one shelf (11 to 25 books), enough to fill one book case (26 to 100 books), enough to fill two bookcases (101 to 200 books), enough to fill more than two bookcases (more than 200 books). We created a dichotomous variable for having 25 books or fewer.

Thus, the summary childhood financial adversity variables for Samples 3 and 4 add this extra variable to the core measures of childhood financial adversity and may range from 0 to 4.

Childhood social adversity: The core interview contains no information on childhood social adversity. Beginning in 2006, however, the PLQ asks respondents to report on several life adversities before age 18: physical abuse by parents, whether drinking or drug use caused problems, if they had trouble with the police, or if they repeated a year of school. The summary variable for childhood social adversity in Sample 2 thus potentially ranges from (0 to 4).

The 2015/2017 LHMS asks the following additional childhood social adversity questions: “Before you were age 16... did you ever live in a children’s home or orphanage, did you ever live with a foster family or in a foster home, did your biological or adoptive parents separate or divorce, did one or both parents die?” The 2015/2017 LHMS also includes a residential information grid that includes the years of residence at each place respondents lived. We used this information to determine how many moves the respondent reported before age 16 and coded a dichotomous indicator equal to 1 if the respondent reported more than three moves. The childhood social adversity summary variable for Sample 3 therefore potentially ranges from (0 to 11).

Two additional childhood social adversity indicators were available only in the version of the 2017 LHMS questionnaire that was not fielded to the 2015 LHMS respondents. To capture a sense of neighborhood belonging, the questionnaire asked, “When you were 10, how much did you feel part of your local area? (That is, the area within a 20 minute walk or about a mile of your home.)” The response scale ranges from

1 = I felt that I didn't belong in this area to 7 = I really felt part of this area. We created a dichotomous variable to indicate a sense of not belonging equal to 1 if the respondent indicated a 3 or lower in the response scale. The 2017 LHMS also added a question about sibling death: "Before you were age 16, did one or more of your sibling die?" The summary variable for Sample 4, including measures from the core, SAQ and LHMS, has a potential range from 0 to 13.

Adulthood financial adversity: The only measure of adult financial adversity we include comes from the 2017 fielding of the LHMS, which asks respondents to fill in an employment grid for information on places they have worked for one year or more after completing full-time education. For each job listed, the questionnaire asks, "What did you do after leaving this job?" One response option is unemployed. We use this to sum the number of times unemployed before age 50. The maximum possible for this variable is 9. This summary measure for Samples 3 and 4 potentially ranges from 0 to 9, but only ranges from 0 to 6 in our sample.

Adulthood social adversity: The PLQ contains several measures of lifetime social adversity. The questionnaire asks, "For each of the following events, please indicate if the event occurred at any point in your life." The list includes the death of a child; firing a weapon in combat; being in a major fire, flood, earthquake, or other natural disaster; having a spouse or partner addicted to drugs or alcohol; having a child ever addicted to drugs or alcohol; being the victim of physical attack; a life-threatening illness or accident; and a spouse or child's life-threatening illness or accident. The respondent is asked to record the date of the most recent occurrence. If the event happened before the respondent turned 50, the respondent was coded as having experienced such an

event in early- or mid adulthood. The summary adulthood social adversity variable for Sample 2 has a range of possible values from 0 to 7.

The 2015/2017 LHMS asks, “Before age 50, were you ever in a jail, prison, or a detention center for more than three days?” and “Were you ever homeless for one month or more?” We create dichotomous indicators for each of these items. The questionnaire also includes a partnership history grid for marriages and significant relationships that lasted for a year or more. For each marriage and relationship listed, the grid asks how the marriage or relationship ended. Response options include widowed or partner died and divorced or split up. We use this information to create a count of the number of marriages and relationships that ended with the death of the spouse or partner, top-coded at three. Using this, we create a count variable for spouse or partner deaths. We also create a count of the number of marriages or relationships that ended through divorce or splitting up, also top coded at three. Adding these variables to those described above, the summary adulthood social adversity variable for Sample 3 has a range of possible values from 0 to 11.

From the 2017 LHMS, a sense of belonging on the respondent’s first job and the sense of neighborhood belonging at age 40 is available. As with the reported sense of belonging in childhood, the response scale ranges from 1 for “I felt that I didn’t belong in this area” to 7, “I really felt part of this area.” We created a dichotomous variable to indicate a sense of not belonging that was equal to 1 if the respondent indicated a 3 or lower in the response scale. The summary adulthood social adversity for Sample 4 summary variable ranges from 0 to 13.

Cumulative lifetime adversity before age 50: We create cumulative adversity measures across the four domains for each sample. Figure 1 provides the ranges for each of these cumulative measures and summarizes the individual variables that are part of each summary measure along with the ranges for each domain summary variable.

Covariates include indicator variables for female gender, cohort, nonwhite race, and father's years of education (range 0 to 17).

Results

We present descriptive statistics on all study variables for each of the analytic Samples (1 to 4) in Tables 1a to 1d, respectively. The first rows in each table show the means and standard errors (with 50^{th}, 75^{th}, 90^{th}, and 95^{th} percentiles) on the summary measures in each of the four lifetime adversity domains and the overall cumulative adversity index. The following rows display means and standard errors (SE) for the additional continuous and categorical variables used in our analyses, or those that shed important light on the sample. The last several rows display percentages for dichotomous variables.

In Sample 1 (Table 1a), the mean number of childhood financial adversities was 0.62 (SE 0.86), with a range of 0 to 3. In Sample 2 (Table 1b), the mean for the cumulative adversity index was 1.78 (SE 1.64), with a range of 0 to 10. In Sample 3 (Table 1c), the mean for the cumulative adversity index was 4.05 (SE 2.77), with a range of 0 to 17. In Sample 4 (Table 1d), the mean for the cumulative adversity index was 4.69 (SE 3.08), with a range of 0 to 17. The interquartile ranges demonstrate the

relative left skewedness of the both the cumulative as well as the domain-specific summary measures.

Looking across these tables (1a to 1d) reveals how the structure of the samples changes, becoming progressively female, more married, less nonwhite, and with fewer current smokers, as the sample becomes more selected on survival to the dates of the later data collections (PLQ and LHMS). As expected, the cohort structure changes as well, with a decreasing fraction of the HRS cohort comprising the sample, going from samples 1 to 4.

Table 2 provides a comparison of several health indicators by labor force outcome (in columns: still working, retired due to disability, retired for other reasons) according to each of our three different definitions of retirement due to disability (in rows). The table reports the mean value on the CESD (range 0 to 7), self-rated health (range 1 to 5), chronic conditions (range 0 to 8), BMI, and proportion smoking, all at baseline. Comparing across the three different definitions of retirement due to disability (rows), we find an expected pattern of results, namely, that those who would eventually retire early due to disability (poor health and/or where a health problem prevented them from working) were in worse health at baseline. For example, in the second panel, third row under “chronic conditions,” it can be seen that the mean number of chronic conditions for those who retired with a health problem that completely prevents work is 1.28 (standard deviation [SD] 1.13), compared to 0.74 (SD 0.90) for those still working, and 0.84 (SD 0.93) for those who retired for any other reason. In addition, comparing means going down the middle column (retired due to disability), for all health measures, the mean increases across the three different early disability retirement patterns we

consider (either reason, retired where poor health is important, retired where work was completely limited) with the third pattern exhibiting the worst health, as expected. For example, the mean number of chronic conditions for those who retired for “either reason” is 1.18 (SD 1.07), 1.20 (SD 1.06), for “health important,” and 1.28 (SD 1.13) for “health prevents work.”

Tables 3a to 3d show the results of the competing risk analysis in each of the four samples, respectively. Each table presents hazard ratios (HR) associated with each of the three different event outcomes from the most to the least generous definition (Model 1: either definition; Model 2: health an important reason for retiring, and Model 3: work completely limited by health problem). HRs greater than 1 indicate excess risk; those less than one indicate a protective association.

The patterns we find for the covariates are similar in all four tables. Namely, there is a slight tendency for women to be more likely to retire in any given wave, but in no case is the HR statistically significant, and in Samples 3 and 4 the pattern reverses but again is not statistically significant. Relative to the (oldest) HRS cohort, all three cohorts (war babies, early baby boomers, and mid baby boomers) have statistically significantly elevated hazards of health-related retirement across all three outcomes. Relative to white respondents, nonwhite respondents have statistically significantly elevated hazards of health-related retirement in the first two samples. The pattern is the same but not statistically significant in Samples 3 and 4. Father’s education is statistically significant and higher levels of father’s education is protective across all outcomes and all samples.

In Table 3a (Sample 1, core data only), the HR associated with childhood financial adversity is similar in magnitude across the three models, and statistically significantly different from 1 in Model 1 (HR 1.11; 95% confidence interval [CI] 1.05, 1.17) and Model 2 (HR 1.11; 95% CI 1.05, 1.18), though not for the most conservative definition of complete work limitation in Model 3 (HR 1.07; 95% CI 0.97, 1.18).

In Table 3b (Sample 2, core data plus PLQ measures), we add childhood social adversity and adult social adversity counts to the analysis. The pattern for the childhood financial adversity summary measure remains similar to Table 3a (Sample 1). HRs for the childhood financial adversity measure are elevated and statistically significant for Model 1 (HR 1.08; 95% CI 1.01, 1.14) and Model 2 (HR 1.09; 95% CI 1.03, 1.17), while the estimate in Model 3 drops slightly below 1, but remains imprecisely estimated (HR 0.97; 95% CI 0.86, 1.09). Childhood social adversity, by contrast, is statistically-significantly greater than 1 in all three models (Model 1: HR 1.10; 95% CI 1.02, 1.18. Model 2: HR 1.08; 95% CI 1.00, 1.17. Model 3: HR: 1.17, 95% CI 1.03, 1.33.). Likewise, the HRs associated with the adulthood social adversity summary measure are all elevated and statistically significantly different from 1 (Model 1: HR 1.06; 95% CI 1.01; 1.13. Model 2: HR 1.08; 95% CI 1.02, 1.14. Model 3: HR 1.18; 95% CI 1.07, 1.30.).

Moving to the more restricted Sample 3 (Table 3c), which adds a measure of adulthood financial adversity as well, we find that the hazard ratios for childhood financial adversity measures remain statistically significantly greater than 1 for all models, which is fairly consistent with Samples 1 and 2. In this sample, however, the measure of childhood social adversity is no longer statistically significant for any of the three outcomes (Model 1: HR 0.99; 95% CI 0.93, 1.05. Model 2: HR 0.98; 95% CI 0.92,

1.04. Model 3: HR 1.09; 95% CI 0.99, 1.20.). Similarly, the measure of adulthood financial adversity is not statistically significantly different from 1 in Model 1 (HR 0.86; 95% CI 0.71, 1.05), Model 2 (HR 0.82; 95% CI 0.67, 1.01), or Model 3 (HR 0.92; 95% CI 0.65, 1.31). As in Table 3b, the HRs associated with adulthood social adversity remain elevated and statistically significant (Model 1: HR 1.10; 95% CI 1.04, 1.16. Model 2: HR 1.11; 95% CI 1.05, 1.17. Model 3: HR 1.22; 95% CI 1.11, 1.34.).

The final sample includes several additional measures available only for respondents who first participated in the LHMS in 2017. The results in Table 3d thus provide the greatest number of adversity measures but the most restricted sample. Childhood financial adversity loses statistical significance in this sample, although the HRs all remain elevated (Model 1: HR 1.08; 95% CI 0.96, 1.22. Model 2: HR 1.09; 95% CI 0.97, 1.24. Model 3: HR 1.02; 95% CI 0.80, 1.31.). The HR on childhood social adversity is only statistically-significantly different from 1 in Model 3 (Model 1: HR 1.00; 95% CI 0.92, 1.08. Model 2: HR 0.99, 95% CI 0.92, 1.08. Model 3: HR 1.17; 95% CI 1.03, 1.33.). Adulthood financial adversity remains statistically indistinguishable from 1 (Model 1: HR 0.84; 95% CI 0.53, 1.34. Model 2: HR 0.85; 95% CI 0.53, 1.36. Model 3: HR 0.72; 95% CI 0.24, 2.17.), and adulthood social adversity remains statistically significant with slightly weaker associations than in prior samples (Model 1: HR 1.08; 95% CI 1.00, 1.16. Model 2: HR 1.09; 95% CI 1.01, 1.17. Model 3: HR 1.17; 95% CI 1.02, 1.34.).

Tables 4a to 4c show the results of the analyses using the cumulative adversity index in Samples 2, 3, and 4, respectively. Note that the cumulative adversity index for Sample 1 includes only the childhood financial adversity measure, which we present in

Table 3a. The cumulative adversity score for Sample 2 (Table 4a), which has a potential range of 0 to 14 (Figure 1) and an observed range of 0 to 10 (Table 1b), is statistically significant in all three models (Model 1: HR 1.08; 95% CI 1.04, 1.11. Model 2: HR 1.09; 95% CI 1.05, 1.12. Model 3: HR 1.11; 95% CI 1.05, 1.17.). In Sample 3 (Table 4b), where the sample is reduced but the number of adversities is expanded (potential range is 0 to 26, actual range is 0 to 17), the pattern is the same. HRs are elevated and statistically significant across all three models (Model 1: HR 1.04; 95% CI 1.02, 1.07. Model 2: HR 1.04; 95% CI 1.01, 1.07. Model 3: HR 1.13, 95% CI 1.08, 1.19.). Table 4c (Sample 4) expands the number of adversities in the cumulative (potential range is 0 to 31, actual range is 0 to 17) but at much reduced sample size shows. Nonetheless, the cumulative index remains elevated and statistically significant across the three models (Model 1: HR 1.04; 95% CI 1.00, 1.08. Model 2: HR 1.04; 95% CI 1.00, 1.09. Model 3: HR 1.15; 95% CI 1.07, 1.23.). Note that although the HRs associated with the cumulative measures are relatively modest in size, they are associated with a one-unit increase in the cumulative measure.

Table 5 shows relative risk ratios (RRR) and 95% confidence intervals from a multinomial logistic regression. The RRR for cumulative stress is 1.11 (1.03 to 1.20). This is the relative risk ratio for a one unit increase in stress score for being more likely to retire before age 62 due to disability than to retire after age 62 for any reason, given that the other variables in the model are held constant. If a respondent were to have a one unit higher stress score, the relative risk for disability retirement before age 62 relative to retirement after age 62 for any reason would be expected to increase by a factor of 1.11 if the other variables in the model are held constant. In the alternative

model that added a category for disability retirement after age 62, the coefficient on disability retirement before age 62 remained the same, and the coefficient on later disability retirement was slightly larger (RRR 1.18;95% CI 1.01 to 1.32).

Discussion

We find evidence that cumulative adverse life experiences are associated with an increased hazard of early retirement due to disability relative to continued work or retirement for any other reason. Specifically, cumulative life adversity is associated with increased hazard of retirement due to disability using all three of our measures, including the most conservative specification of disability retirement (i.e., retirement in the context of a health problem that completely limits work). This finding is robust to the range of sample specifications. To shed more light on which forms of adversity may be most deleterious, we also explore domain-specific adversity and find that childhood financial adversity and adult social adversity were most consistently associated with an increased hazard of retirement due to disability in our analysis that balances the greatest number of adversities with a reasonably large sample (Sample 3). When we explicitly model early disability retirement (before age 62), we find remarkably similar results, with each additional observed adversity increasing the risk of early disability retirement by a factor of 1.11 relative to retirement after age 62 for any reason.

These findings are in line with a large and growing body of research that implicates life span adversity in later-life outcomes. In particular, they resonate with findings from the most comparable study by Harkonmäki et al. (2007). The addition and statistical significance in our study, however, of measures of adult social adversity,

underscore the importance of assessing both childhood and adulthood experiences to capture a full range of early life span adversity.

Despite its robust findings, our study has several limitations. One measure of disability retirement relies on self-reported attributions (reasons) for retirement. It is possible that there is some form of justification bias inherent in such an answer. The other specification is perhaps less subject to this risk, given that the question about work limitations is in a different section of the interview and less clearly associated with having been a reason one might have retired. Our findings that the baseline health status of respondents who were working when we initially observed them was worse for both specifications, however, provides some reassurance that these measures are valid. That is, people who eventually retired due to disability had worse health status in their early-to-mid 50s, several years before they decided to retire.

Another limitation is the lack of consistency in our adversity measures in the context of other studies. This is not a problem unique to our study but rather plagues the literature on the effects of stress (Cohen et al. 2019). We selected measures based on their presence in the literature but also added some new measures that have not been previously available (e.g., number of childhood moves, few books at home). Interestingly, despite different measures, studies, including ours, consistently find deleterious effects of life span adversity on a range of later-life outcomes.

We also recognize the limitations in our study due to sample size constraints in Samples 3 and 4, as well as due to loss of sample size due to item nonresponse. In future, we hope to increase our analytic sample size by using multiple imputation to reduce the sample loss due to individual missing items. Additionally, sample sizes for

our analytic samples will increase over time with the public release of the LHMS 2019 data and as the late baby boomers come into early retirement age.

Lastly, sample selection due to survival may have affected our estimates in Samples 3 and 4. In particular, given that adverse life experiences are associated with a host of bad health outcomes, the HRS respondents with high adverse experience counts who are still present in Samples 3 and 4 may represent particularly resilient individuals, and therefore may have attenuated the estimated effects of adverse experiences on later-life disability due to retirement. We have run some sensitivity analyses on slightly different samples: While we lose the power to identify statistically significant effects, analyses using the LHMS variables and only younger cohorts of respondents generally find higher HR estimates on the stress measures.

Having found suggestive evidence that cumulative life adversity is associated with later-life disability using self-report measures, we are eager to examine the relationship between adverse experiences and actual SSDI applications and receipt. Results of this work may be used to compare the estimated cost to the SSDI program in additional disability payments and decreased payments into the trust funds due to lost wages if the average American reaches older adulthood with more or fewer adverse experiences.

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Figure and tables

Figure 1: Summary of individual adversity variables comprising summary indices

	Core (Sample 1)	**+SAQ (Sample 2)**	**+LHMS 15/17 (Sample 3)**	**+LHMS 2017 (Sample 4)**
Childhood financial adversity	Father unemployed before 16 Moved due to financial difficulty before 16 Poor or varied family financial circumstances before 16	None additional	Fewer than 25 books in household at age 10	None additional
Summary variable	Childfinadv1 range (0-3)	Childfinadv2 (range 0-3)	Childfinadv3 (range 0-4)	Childfinadv4 (range 0-4)
Childhood social adversity	None	Physical abuse by parents before 18 Drinking or drug use caused problems before 18 Trouble with police before 18 Repeated year of school before 18	Lived in orphanage before 16 Lived in foster care before 16 Parents divorced/separated before 16 Parent died before R was 16 Separated from mother >6 months before 16 Separated from father >6 months before 16 More than 3 moves before 16	Lack a sense of neighborhood belonging at age 10 Sibling died before age 16
Summary variable		Childsocadvcomb2 (range 0-4)	Childsocadvcomb3 (0-11)	Childsocadvcomb4 (range 0-13)
Adulthood financial adversity	None	None	Number of times unemployed before age 50	Non additional

Summary variable			Adultfinstress3 (0-1)	Adultfinstress4 (range 0-1)
Adulthood social adversity (before age 50)	None	Death of a child Fired a weapon in combat Respondent was in a fire or disaster Spouse or partner dealt with alcohol or drug addiction Victim of physical attack Self life-threatening illness Spouse/partner or child life-threatening illness	Incarceration more than three days Spouse/partner died (top coded at 3) Spouse/partner divorce (top coded at 3) Ever homeless before age 50	Lack a sense of belonging 1st job Lack a sense of neighborhood belonging at age 40
Summary variable		Adultsocstress2 (range 0-7)	Adultsocstress3 (range 0-11)	Adultsocstress4 (range 0-13)
Cumulative adversity index	0-3	0-14	0-26	0-31

Table 1a: Descriptive statistics of study variables, Sample 1 (N = 7,966)

Adverse event counts	Mean	Standard error	50th %ile	75th %ile	90th %ile	95th %ile	min	max
Childhood financial adversity (0-4)	0.62	0.86	0	1	2	2		
Childhood social adversity (none)	-	-	-	-	-	-		
Adult financial adversity (none)	-	-	-	-	-	-		
Adult social adversity (none)	-	-	-	-	-	-		
Cumulative adversity (0-4)	0.62	0.86	0	1	2	2	0	3

Continuous / categorical variables	Mean	Standard error
Education (years)	13.09	2.98
Household income ($) (lnitot)	10.79	1.22
Household wealth ($) (lnatota)	10.74	3.37
Self-rated health	2.35	1.03
BMI	27.73	5.29
CES-D	1.27	1.79
Chronic conditions	0.85	0.95

Dichotomous variables	Percent	Standard error
HRS cohort	41%	0.49
War babies cohort	23%	0.42
Early baby boomers cohort	24%	0.43
Mid baby boomers cohort	12%	0.32
Female	53%	0.50
Nonwhite	23%	0.42
Married	76%	0.43
Has DB pension	34%	0.47
Current smoker	23%	0.42

Source: Health and Retirement Study, 1992 to 2018.

Table 1b: Descriptive statistics of study variables, Sample 2 (N = 5,996)

Adverse event counts	Mean	Standard error	50th %ile	75th %ile	90th %ile	95th %ile	Min	Max
Childhood financial adversity	0.62	0.86	0	1	2	2	0	3
Childhood social adversity	0.46	0.72	0	1	1	2	0	4
Adult financial adversity (none)	-	-	-	-	-	-		
Adult social adversity	0.68	0.92	0	1	2	3	0	6
Cumulative adversity	1.78	1.64	1	4	5	7	0	10

Continuous / categorical variables	Mean	Standard error
Education (years)	13.28	2.82
Household income ($) (lnitot)	10.85	1.14
Household wealth ($) (lnatota)	10.93	3.17
Self-rated health	2.31	1.02
BMI	27.71	5.26
CES-D	1.22	1.77
Chronic Conditions	0.83	0.93

Dichotomous variables	Percent	Standard error
HRS cohort	38%	0.49
War babies cohort	25%	0.43
Early baby boomers cohort	26%	0.44
Mid baby boomers cohort	11%	0.31
Female	54%	0.50
Nonwhite	19%	0.40
Married	77%	0.42
Has DB pension	36%	0.48
Current smoker	20%	0.40

Source: Health and Retirement Study, 1992 to 2018

Table 1c: Descriptive statistics of study variables, Sample 3 (n=3,265)

Adverse event counts	Mean	Standard error	50th %ile	75th %ile	90th %ile	95th %ile	Min	Max
Childhood financial adversity	1.22	1.08	1	2	3	3	0	4
Childhood social adversity	1.27	1.50	1	2	3	4	0	9
Adult financial adversity	0.12	0.44	0	0	0	1	0	6
Adult social adversity	1.46	1.38	1	2	3	4	0	8
Cumulative adversity	4.05	2.77	4	6	8	9	0	17
Continuous / categorical variables	**Mean**	**Standard error**						
Education (years)	13.81	2.43	-	-	-	-		
Household income ($) (lnitot)	11.01	1.00	-	-	-	-		
Household wealth ($) (lnatota)	11.30	2.90	-	-	-	-		
Self-rated health	2.20	0.96	-	-	-	-		
BMI	27.62	5.26	-	-	-	-		
CES-D	1.14	1.69	-	-	-	-		
Chronic Conditions	0.80	0.90	-	-	-	-		
Dichotomous variables	**Percent**	**Standard error**						
HRS cohort	33%	0.47	-	-	-	-		
War babies cohort	26%	0.44	-	-	-	-		
Early baby boomers cohort	29%	0.45	-	-	-	-		
Mid baby boomers cohort	12%	0.33	-	-	-	-		
Female	56%	0.50	-	-	-	-		
Nonwhite	15%	0.35	-	-	-	-		
Married	81%	0.39	-	-	-	-		
Has DB pension	38%	0.49	-	-	-	-		
Current smoker	16%	0.37	-	-	-	-		

Source: Health and Retirement Study, 1992 to 2018.

Table 1d: Descriptive statistics of study variables, Sample 4 (n=1,269)

Adverse event counts	Mean	Standard error	50th %ile	75th %ile	90th %ile	95th %ile	Min	Max
Childhood financial adversity	1.22	1.08	1	2	3	3	0	4
Childhood social adversity	1.58	1.71	1	2	4	5	0	9
Adult financial adversity	0.12	0.44	0	0	0	1	0	3
Adult social adversity	1.83	1.57	1	3	4	5	0	8
Cumulative adversity	4.69	3.08	4	6	9	11	0	17

Continuous / categorical variables	Mean	Standard error
Education (years)	13.82	2.50
Household income ($) (lnitot)	11.00	0.96
Household wealth ($) (lnatota)	11.20	2.97
Self-rated health	2.23	0.97
BMI	27.48	5.14
CES-D	1.18	1.72
Chronic Conditions	0.81	0.91

Dichotomous variables	Percent	Standard error
HRS cohort	31%	0.46
War babies cohort	26%	0.44
Early baby boomers cohort	27%	0.44
Mid baby boomers cohort	15%	0.36
Female	56%	0.50
Nonwhite	17%	0.37
Married	80%	0.40
Has DB pension	36%	0.48
Current smoker	16%	0.37

Source: Health and Retirement Study, 1992 to 2018.

Table 2: Baseline health by outcome variables

	Definition of retirement due to disability	Still Working			Retired Due To Disability			Retired Other Reason				
		Mean	SD	Freq	Mean	SD	n	Mean	SD	n	F-stat	p-value
CESD												
	Either reason	1.15	1.72	1,701	1.76	2.03	1,072	1.07	1.64	1,731	1.37	0.2534
	Health Important	1.15	1.72	1,701	1.77	2.03	995	1.10	1.66	1,808	6.36	0.0117
	Health prevents work	1.15	1.72	1,701	1.91	2.16	412	1.24	1.74	2,391	1.83	0.1768
Self-rated health												
	Either reason	2.28	0.99	2,269	2.77	1.05	2,079	2.16	0.96	3,671	11.35	0.0000
	Health Important	2.28	0.99	2,269	2.80	1.05	1,926	2.17	0.96	3,824	26.41	0.0000
	Health prevents work	2.28	0.99	2,269	2.88	1.07	653	2.32	1.02	5,097	29.24	0.0000
Chronic conditions												
	Either reason	0.74	0.90	2,270	1.18	1.07	2,079	0.72	0.85	3,671	0.82	0.4419
	Health Important	0.74	0.90	2,270	1.20	1.06	1,926	0.73	0.87	3,824	21.84	0.0000
	Health prevents work	0.74	0.90	2,270	1.28	1.13	653	0.84	0.93	5,097	16.07	0.0001
BMI												
	Either reason	27.56	5.15	2,222	28.85	5.97	2,048	27.18	4.84	3,642	3.96	0.0191
	Health Important	27.56	5.15	2,222	28.88	5.78	1,900	27.23	5.01	3,790	10.75	0.0010
	Health prevents work	27.56	5.15	2,222	29.31	6.61	642	27.59	5.12	5,048	4.25	0.0392
Smokes now												
	Either reason	0.18	0.38	2,267	0.30	0.46	2,077	0.21	0.41	3,665	4.67	0.0094
	Health Important	0.18	0.38	2,267	0.30	0.46	1,924	0.22	0.41	3,818	16.71	0.0000
	Health prevents work	0.18	0.38	2,267	0.36	0.48	652	0.23	0.42	5,090	0.98	0.3226
IADL count												
	Either reason	0.03	0.17	1,811	0.05	0.27	1,108	0.02	0.13	1,820	3.02	0.0489
	Health Important	0.03	0.17	1,811	0.05	0.27	1,028	0.02	0.14	1,900	4.34	0.0372
	Health prevents work	0.03	0.17	1,811	0.07	0.29	424	0.02	0.18	2,504	0.05	0.8226
ADL count												
	Either reason	0.05	0.34	1,811	0.13	0.53	1,108	0.05	0.30	1,820	2.02	0.1331
	Health Important	0.05	0.34	1,811	0.13	0.52	1,028	0.05	0.33	1,900	0.37	0.5426
	Health prevents work	0.05	0.34	1,811	0.14	0.54	424	0.07	0.38	2,504	0.24	0.6257

Table 3a: Hazard ratios from competing risk analysis of retirement due to disability with summary adversity measures, Sample 1

	Model 1 (Either reason)			Model 2 (Health Important)			Model 3 (Health prevents work)		
	HR	95% CI		HR	95% CI		HR	95% CI	
Female	1.04	0.95	1.15	1.03	0.93	1.13	1.13	0.95	1.34
HRS cohort	-	-	-	-	-	-	-	-	-
War babies	1.22	1.08	1.38	1.19	1.04	1.35	2.28	1.82	2.86
Early baby boomers	2.16	1.90	2.46	2.12	1.86	2.42	4.84	3.79	6.19
Mid baby boomers	5.48	4.40	6.82	5.28	4.22	6.60	16.85	11.34	25.02
Nonwhite	1.20	1.07	1.34	1.18	1.05	1.33	1.26	1.03	1.54
Father's education	0.96	0.95	0.97	0.96	0.95	0.97	0.95	0.93	0.98
Childhood financial adversity	1.11	1.05	1.17	1.11	1.06	1.18	1.07	0.97	1.18
Childhood social adversity	-	-	-	-	-	-	-	-	-
Adulthood financial adversity	-	-	-	-	-	-	-	-	-
Adulthood social adversity	-	-	-	-	-	-	-	-	-

Notes: Reported results are estimated hazard ratios and 95% confidence intervals from a competing risk (survival) analysis with 4,994 observations. The outcome variable of interest in Model 1 is retirement due to one's health preventing work, or for which health was an important reason. In Model 2, it is retirement with health being an important reason for retirement. In Model 3, the respondent must have reported that they were retired and that their health completely prevents work. In all columns, the reported HRs are relative to respondents who had not retired by age 62. The sample is Sample 1, which requires only that respondents were 51 to 56, working and not completely retired at baseline wave, and were observed in the HRS at least once at or after age 62. The reference categories are male, HRS cohort, and white race.

Table 3b: Hazard ratios from competing risk analysis of retirement due to disability with summary Adversity measures, Sample 2

	Model 1 (Either reason)			Model 2 (Health Important)			Model 3 (Health prevents work)		
	HR	**95% CI**		**HR**	**95% CI**		**HR**	**95% CI**	
Female	1.08	0.96	1.20	1.07	0.95	1.20	1.13	0.92	1.39
HRS cohort	-	-	-	-	-	-	-	-	-
War babies	1.42	1.24	1.64	1.38	1.19	1.59	2.77	2.11	3.63
Early baby boomers	2.42	2.08	2.80	2.37	2.03	2.76	5.81	4.31	7.82
Mid baby boomers	6.23	4.77	8.13	5.97	4.54	7.85	21.23	13.22	34.10
Nonwhite	1.22	1.06	1.40	1.20	1.04	1.39	1.45	1.14	1.85
Father's education	0.95	0.94	0.97	0.95	0.94	0.97	0.94	0.91	0.96
Childhood financial adversity	1.08	1.01	1.14	1.09	1.03	1.17	0.97	0.86	1.09
Childhood social adversity	1.10	1.02	1.18	1.08	1.00	1.17	1.17	1.03	1.33
Adulthood financial adversity	-	-	-	-	-	-	-	-	-
Adulthood social adversity	1.06	1.01	1.13	1.08	1.02	1.14	1.18	1.07	1.30

Notes: Reported results are estimated hazard ratios and 95% confidence intervals from a competing risk (survival) analysis with 3,978 observations. The outcome variable of interest in Model 1 is retirement due to one's health preventing work, or for which health was an important reason. In Model 2, it is retirement with health being an important reason for retirement. In Model 3, the respondent must have reported that they were retired and that their health completely prevents work. In all columns, the reported HRs are relative to respondents who had not retired by age 62. The sample is Sample 2, which requires that respondents were 51 to 56, working and not completely retired at baseline wave, were observed in the HRS at least once at or after age 62, and that respondents answered the PLQ adversity questions. The reference categories are male, HRS cohort, and white race.

Table 3c: Hazard Ratios from competing risk analysis of retirement due to disability with summary adversity measures, Sample 3

	Model 1 (Either reason)			Model 2 (Health Important)			Model 3 (Health prevents work)		
	HR	95% CI		HR	95% CI		HR	95% CI	
Female	1.05	0.90	1.24	1.09	0.92	1.28	0.92	0.67	1.25
HRS cohort	-	-	-	-	-	-	-	-	-
War babies	1.61	1.30	1.98	1.56	1.26	1.93	3.59	2.21	5.84
Early baby boomers	2.87	2.31	3.58	2.79	2.24	3.49	9.30	5.54	15.63
Mid baby boomers	8.98	6.33	12.72	8.35	5.84	11.94	44.03	22.30	86.95
Nonwhite	1.24	1.00	1.54	1.22	0.98	1.52	1.32	0.89	1.96
Father's education	0.95	0.93	0.97	0.95	0.93	0.97	0.95	0.91	1.00
Childhood financial adversity	1.08	1.00	1.17	1.09	1.01	1.18	1.08	0.93	1.25
Childhood social adversity	0.99	0.93	1.05	0.98	0.92	1.04	1.09	0.99	1.20
Adulthood financial adversity	0.86	0.71	1.05	0.82	0.67	1.01	0.92	0.65	1.31
Adulthood social adversity	1.10	1.04	1.16	1.11	1.05	1.17	1.22	1.1	1.34

Notes: Reported results are estimated hazard ratios and 95% confidence intervals from a competing risk (survival) analysis with 2,241 observations. The outcome variable of interest in Model 1 is retirement due to one's health preventing work, or for which health was an important reason. In Model 2, it is retirement with health being an important reason for retirement. In Model 3, the respondent must have reported that they were retired and that their health completely prevents work. In all columns, the reported HRs are relative to respondents who had not retired by age 62. The sample is Sample 3, which requires that respondents were 51 to 56, working and not completely retired at baseline wave, were observed in the HRS at least once at or after age 62, and that respondents answered the PLQ adversity questions and those in the LHMS that were asked of all LHMS respondents. The reference categories are male, HRS cohort, and white race.

Table 3d: Hazard ratios from competing risk analysis of retirement due to disability with summary adversity measures, Sample 4

	Model 1 (Either reason)			Model 2 (Health Important)			Model 3 (Health prevents work)		
	HR	**95% CI**		**HR**	**95% CI**		**HR**	**95% CI**	
Female	0.95	0.74	1.22	0.96	0.75	1.25	1.11	0.67	1.86
HRS cohort	-	-	-	-	-	-	-	-	-
War babies	1.64	1.17	2.29	1.67	1.19	2.34	4.83	1.95	11.97
Early baby boomers	2.85	2.03	4.01	2.83	2.01	3.99	11.70	4.63	29.61
Mid baby boomers	11.85	7.24	19.40	10.59	6.35	17.68	68.64	24.02	196.17
Nonwhite	1.21	0.88	1.67	1.20	0.86	1.67	0.86	0.44	1.67
Father's education	0.96	0.92	0.99	0.96	0.92	0.99	0.95	0.89	1.02
Childhood financial adversity	1.08	0.96	1.22	1.09	0.97	1.24	1.02	0.80	1.31
Childhood social adversity	1.00	0.92	1.08	0.99	0.92	1.08	1.17	1.03	1.33
Adulthood financial adversity	0.84	0.53	1.34	0.85	0.53	1.36	0.72	0.24	2.17
Adulthood social adversity	1.08	1.00	1.16	1.09	1.01	1.17	1.17	1.02	1.34

Notes: Reported results are estimated hazard ratios and 95% confidence intervals from a competing risk (survival) analysis with 863 observations. The outcome variable of interest in Model 1 is retirement due to one's health preventing work, or for which health was an important reason. In Model 2, it is retirement with health being an important reason for retirement. In Model 3, the respondent must have reported that they were retired and that their health completely prevents work. In all columns, the reported HRs are relative to respondents who had not retired by age 62. The sample is Sample 4, which requires that respondents were 51 to 56, working and not completely retired at baseline wave, were observed in the HRS at least once at or after age 62, and that respondents answered the PLQ adversity questions and those in the LHMS that were asked of LHMS respondents who firsts participated in 2017 only. The reference categories are male, HRS cohort, and white race.

Table 4a: Hazard ratios from competing risk analysis of retirement due to risability with cumulative adversity measure, Sample 2

	Model 1 (Either reason)			Model 2 (Health Important)			Model 3 (Health prevents work)		
	HR	95% CI		HR	95% CI		HR	95% CI	
Female	1.07	0.96	1.20	1.07	0.95	1.20	1.12	0.91	1.37
HRS cohort	-	-	-	-	-	-	-	-	-
War babies	1.42	1.24	1.64	1.37	1.19	1.59	2.82	2.15	3.70
Early baby boomers	2.42	2.09	2.81	2.37	2.03	2.76	5.89	4.38	7.93
Mid baby boomers	6.27	4.80	8.18	5.97	4.54	7.84	21.65	13.50	34.72
Nonwhite	1.22	1.06	1.39	1.20	1.04	1.39	1.43	1.12	1.82
Father's education	0.95	0.94	0.97	0.95	0.94	0.97	0.95	0.92	0.97
Cumulative adversity index	1.08	1.04	1.11	1.09	1.05	1.12	1.11	1.05	1.17

Notes: Reported results are estimated hazard ratios and 95% confidence intervals from a competing risk (survival) analysis with 3,978 observations. The outcome variable of interest in Model 1 is retirement due to one's health preventing work, or for which health was an important reason. In Model 2, it is retirement with health being an important reason for retirement. In Model 3, the respondent must have reported that they were retired and that their health completely prevents work. In all columns, the reported HRs are relative to respondents who had not retired by age 62. The sample is Sample 2, which requires that respondents were 51 to 56, working and not completely retired at baseline wave, were observed in the HRS at least once at or after age 62, and that respondents answered the PLQ adversity questions. The reference categories are male, HRS cohort, and white race.

Table 4b: Hazard Ratios from Competing Risk Analysis of Retirement due to Disability with Summary Adversity Measures (Sample 3)

	Model 1 (Either reason)			Model 2 (Health Important)			Model 3 (Health prevents work)		
	HR	95%CI		HR	95%CI		HR	95%CI	
Female	1.07	0.91	1.26	1.11	0.94	1.31	0.94	0.69	1.28
HRS cohort	-	-	-	-	-	-	-	-	-
War babies	1.61	1.30	1.98	1.55	1.26	1.92	3.63	2.24	5.90
Early baby boomers	2.89	2.32	3.59	2.81	2.25	3.51	9.52	5.67	15.98
Mid baby boomers	8.78	6.20	12.44	8.14	5.69	11.62	44.43	22.55	87.53
Nonwhite	1.27	1.03	1.57	1.25	1.01	1.56	1.36	0.92	2.02
Father's education	0.95	0.93	0.97	0.95	0.93	0.97	0.96	0.92	1.00
Cumulative adversity index	1.04	1.01	1.07	1.04	1.01	1.07	1.13	1.08	1.19

Notes: Reported results are estimated hazard ratios and 95% confidence intervals from a competing risk (survival) analysis with 2,241 observations. The outcome variable of interest in model 1 is retirement due to one's health preventing work, or for which health was an important reason; in model 2 it is retirement with health being an important reason for retirement; in model 3 the respondent must have reported that they were retired and that their health completely prevents work. In all columns, the reported HRs are relative to respondents who had not retired by age 62. The sample is sample 3, which requires that respondents were 51-56, working and not completely retired at baseline wave, were observed in the HRS at least once at or after age 62, and that respondents answered the PLQ adversity questions and those in the LHMS that were asked of all LHMS respondents. The reference categories are male, HRS cohort, and white race.

Table 4c: Hazard ratios from competing risk analysis of retirement due to disability with cumulative adversity measure, Sample 4

	Model 1 (Either reason)			Model 2 (Health Important)			Model 3 (Health prevents work)		
	HR	95%CI		HR	95%CI		HR	95%CI	
Female	0.95	0.74	1.22	0.97	0.75	1.25	1.13	0.68	1.87
HRS cohort	-	-	-	-	-	-	-	-	-
War babies	1.65	1.18	2.31	1.69	1.20	2.36	4.85	1.97	11.95
Early baby boomers	2.90	2.07	4.07	2.88	2.05	4.06	11.77	4.69	29.57
Mid baby boomers	11.79	7.23	19.23	10.49	6.31	17.44	73.72	26.00	209.01
Nonwhite	1.23	0.89	1.69	1.22	0.88	1.69	0.88	0.45	1.70
Father's education	0.95	0.92	0.99	0.95	0.92	0.99	0.97	0.91	1.03
Cumulative adversity index	1.04	1.00	1.08	1.04	1.00	1.09	1.15	1.07	1.23

Notes: Reported results are estimated hazard ratios and 95% confidence intervals from a competing risk (survival) analysis with 863 observations. The outcome variable of interest in Model 1 is retirement due to one's health preventing work, or for which health was an important reason. In Model 2 it is retirement with health being an important reason for retirement. In Model 3, the respondent must have reported that they were retired and that their health completely prevents work. In all columns, the reported HRs are relative to respondents who had not retired by age 62. The sample is Sample 4, which requires that respondents were 51 to 56, working and not completely retired at baseline wave, were observed in the HRS at least once at or after age 62, and that respondents answered the PLQ adversity questions and those in the LHMS that were asked of LHMS respondents who firsts participated in 2017 only. The reference categories are male, HRS cohort, and white race.

Table 5: Multinomial logistic regression of cumulative life adversity and early disability retirement

		RRR	95% CI	
Early retirement due to disability	**HRS**	-	-	-
	War babies	2.84	1.05	7.64
	Early baby boomers	11.74	4.89	28.21
	Mid baby boomers	34.12	12.49	93.21
	Male	-	-	-
	Female	1.25	0.75	2.08
	Father's education	0.98	0.92	1.05
	Cumulative adversity index	1.11	1.03	1.20
	Constant	0.01	0.00	0.02
Early retirement due to other reason	**HRS**	-	-	-
	War babies	1.10	0.89	1.36
	Early baby boomers	1.20	0.96	1.51
	Mid baby boomers	2.50	1.63	3.82
	Male	-	-	-
	Female	1.16	0.98	1.39
	Father's education	1.00	0.97	1.02
	Cumulative adversity index	0.96	0.93	0.99
	Constant	0.59	0.43	0.83
Did not retire	**HRS**	-	-	-
	War babies	1.75	1.26	2.42
	Early baby boomers	7.46	5.62	9.91
	Mid baby boomers	44.64	29.74	66.99
	Male	-	-	-
	Female	0.79	0.65	0.98
	Father's education	1.01	0.98	1.04
	Cumulative adversity index	0.94	0.91	0.98
	Constant	0.16	0.11	0.25

Notes: Reported results are estimated relative risk ratios and 95% confidence intervals from a multinomial logistic regression analysis with 2,965 observations. The outcome variable includes four categories: retirement before age 62 due to one's health preventing work; retirement before age 62 for any other reason; did not retire, and retirement after age 62, which is the contrast category. The sample is Sample 3, which requires that respondents were 51 to 56, working and not completely retired at baseline wave, were observed in the HRS at least once at or after age 62, and that respondents answered the PLQ adversity questions and those in the LHMS that were asked of all LHMS respondents.