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RESEARCH ARTICLE

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# Does retirement improve health and life satisfaction?

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**Abstract**

We utilize panel data from the Health and Retirement Study to investigate the impact of retirement on physical and mental health, life satisfaction, and health care utilization. Because poor health can induce retirement, we instrument for retirement using eligibility for Social Security and employer-sponsored pensions and coverage by the Social Security earnings test. We find strong evidence that retirement improves reported health, mental health, and life satisfaction. In addition, we find evidence of improvements in functional limitations in the long run. Although the impact on life satisfaction occurs within the first 4 years of retirement, many of the improvements in health show up four or more years later, consistent with the view that health is a stock that evolves slowly. We find no evidence that the health improvements are driven by increased health care utilization. In fact, results suggest decreased utilization in some categories.

**KEYWORDS**

health, instrumental variables, life satisfaction, retirement

## 1 | INTRODUCTION

Life expectancy has improved dramatically over the past half century. Conditional on turning 65, men and women born in 1940 could expect to live for an additional 12.7 and 14.7 years, on average. In contrast, men and women born in 1990 can expect to live an additional 16.1 and 19.5 years, respectively.[1] Because working lives have not kept pace with this increase in life expectancy, the length of retirement has increased (see, e.g., Cushing-Daniels and Steuerle, 2009, and Milligan and Wise, 2012). Faced with impending budget shortfalls in entitlement programs, this fact has led policymakers to raise the full retirement age for collecting some retirement benefits and increased interest in policies that further extend working lives. Such policies are fiscally attractive as longer working lives can both reduce benefits and increase tax revenue. Beyond their direct impact on revenue, they can also affect individual health and well-being, and as a result, they may have additional indirect fiscal and individual impacts.

To fully evaluate the welfare and budgetary consequences of policies that extend the time individuals spend working, it is important to understand these indirect effects. For example, if retirement worsens health and generates increased health care utilization, then policies that delay retirement may further improve Medicare's finances and make individuals better off. Alternately, if retirement improves health, then policies that promote delayed retirement to shore up the fiscal budget may have hidden fiscal costs and negatively impact individuals. To this end, this paper studies the effect of retirement on the health and well-being of individuals and on their health care utilization, with the latter providing a direct assessment of the impact of retirement on public health care expenditures.

[1]These data come from table V.A4 of the 2014 Social Security Trustees report, available at http://www.ssa.gov/oact/tr/2014/lr5a4.html.

  

Retirement might affect health and well-being through a number of channels. Some channels imply that retirement has negative effects on health. For instance, if health is viewed as an investment good that serves as an input into individuals' market output (Grossman, 1972), then retirement may reduce investment in health as health would no longer affect wages in the labor market. In addition, individuals who retire earlier than planned due to a shock (such as disability or permanent job loss) may experience unanticipated declines in lifetime income that reduce subjective well-being and the ability to invest in health. Retirement can also lead to social isolation and a diminished sense of purpose (Bradford, 1979), which may worsen health and subjective well-being. On the other hand, several avenues imply a positive relationship between retirement and health outcomes. Investment in health may increase as retired individuals have a lower marginal value of time, making health investment less costly. Retirement also increases leisure, which may reduce physical and mental stress, improving both subjective well-being and health.[2]

Likewise, the effect of retirement on health spending is also ambiguous, not only because health care spending depends on health status but also because it may be an input into health outcomes. Although improved health in retirement may reduce health care utilization, if the improvement in health is the result of increased spending on medical care, then health care utilization could increase. Similarly, a worsening of health during retirement may be associated with either increases or decreases in health care utilization over the life cycle.

Early studies on the relationship between retirement and health often find a negative correlation (see, for instance, Dave, Rashad, and Spasojevic, 2008). However, correlations between retirement and health or life satisfaction do not indicate a causal effect of retirement because retirement decisions are endogenous. In particular, Dwyer and Mitchell (1999) show that individuals who experience negative shocks to health or life satisfaction disproportionately select into retirement. In fact, McGarry (2004) argues that health may drive retirement expectations to a greater degree than changes in income or wealth. Indeed, we find that retirement is correlated with negative health outcomes in simple OLS specifications that do not control for endogeneity.

This paper addresses endogeneity with panel data from the Health and Retirement Study (HRS) by instrumenting for retirement using age-based variation in eligibility for Social Security retirement benefits, applicability of the Social Security earnings test, and eligibility for retirement benefits in an employer-sponsored pension. These age-based retirement eligibility instruments should not be directly correlated with health except through their effect on retirement behavior, as we would not expect discrete jumps in health status at these ages beyond what is controlled for with age trends. We also account for individual fixed effects to control for time invariant unobservable characteristics.

In addition to addressing endogeneity, we specify our model to study the postretirement dynamics of health and well-being. Dynamic considerations are important for both health and subjective well-being. Objective health indicators such as mobility restrictions and diagnosed conditions are stock variables that respond slowly to changes in health investments. Thus, health effects may not show up immediately upon retirement. In addition, a number of studies have demonstrated that subjective well-being tends to return to a baseline level after a life change.[3] By studying dynamic changes after retirement, we are able to detect changes in the stock of health and differentiate between short-term and long-term effects that are obscured by only focusing on average changes.

Our instrumental variables estimates show that retirement improves both health and life satisfaction on average. The improvements in life satisfaction and reductions in depression are immediate and remain four or more years after retirement. The improvements in self-reported health are not significant immediately but show up four or more years after retirement. In addition, although most functional limitations do not improve on average, results suggest that improvements do occur four or more years after retirement. The delayed health impact is not surprising considering that health is a stock variable that is unlikely to rapidly change over time. For example, Coe and Zamarro (2015b) find that exercise increases upon retirement, and we would expect that the benefits of exercise take time to present themselves. Because we are able to analyze outcomes several years after retirement and look for long-run effects (in addition to short-run and average effects), we find evidence of improvements in objective health measures that have not been detected in past studies. We are also able to better understand the evolution of health and life satisfaction benefits that cannot be discerned from the average effects presented in past studies.

In addition to studying the impact of retirement on measures of health and well-being, we also examine its impact on health care utilization. Although past studies have focused only on changes in health to assess likely changes in costs to the retirement system, we assess these costs directly. Estimating these changes is important for understanding how retirement policy will affect public health care expenditures. Our estimates suggest that health care utilization and

[2]See Coe and Lindeboom (2008) for a more detailed theoretical discussion of the interactions between health and retirement.

[3]See Clark, Diener, Georgellis, and Lucas (2008); Oswald and Powdthavee (2008); Frederick and Loewenstein (1999); and Lykken and Tellegen (1996).

out-of-pocket expenses do not significantly increase and hospitalizations and prescription drug use significantly decline. Therefore, we establish that postretirement health gains are not likely to be driven by increased use of the medical system and that the fiscal externalities from retirement on medical expenses may even be beneficial.

## 2 | PREVIOUS LITERATURE

Many previous studies examine the impact of full or partial retirement on health and well-being, with mixed results. However, only a subset of these studies carefully account for the fact that retirement is endogenous. The studies that address endogeneity take a variety of approaches. Soumerai and Avorn (1983) perform a small randomized trial in which they offer employment opportunities to elderly; however, their results do not apply to typical retirement.[4] Other studies use broadly representative panel data, which allows the use of individual fixed effects, or fixed effects augmented by conditioning on good initial health.[5] Although this approach controls for unobservable, time-invariant health factors that may influence future health shocks and retirement, it does not account for unexpected health shocks that induce retirement and therefore is still subject to selection bias. To estimate the causal impact in the presence of health shocks, another set of studies uses instrumental variables or regression discontinuities. Instruments and discontinuities that are used for retirement include age-specific retirement probabilities (Becchetti, Ricca, & Pelloni, 2012), age-based retirement incentives in public and private pensions (Behncke, 2012; Bound & Waidmann, 2007; Charles, 2004; Coe & Zamarro, 2011; Fitzpatrick & Moore, 2015; Horner, 2014; Johnston & Lee, 2009; Neuman, 2008; and Rohwedder & Willis, 2010), changes in earnings test rules (Charles, 2004), and early retirement offers (Coe & Lindeboom, 2008; Coe, Von Gaudecker, Lindeboom, & Maurer, 2012).

These instrumental variables studies consider a variety of health and well-being outcomes, including life satisfaction ratings, physical health, mortality, mental health, and cognitive function, but their findings remain mixed. For health, Neuman (2008), Coe and Lindeboom (2008), and Johnston and Lee (2009) find that retirement improves individuals' subjective assessment of their health, but not objective health measures like indices for specific functional limitations, specific diseases, and measured health markers. Charles (2004) focuses on the effect of male retirement on two indicators for mental health and finds that retirement improves both indicators. Coe and Zamarro (2011) study several European countries and find that retirement improves contemporaneous self-reported health outcomes but has no effect on depression scales or cognitive function. Bound and Waidmann (2007) study England and find that retirement had no negative effects on health and some positive effects for men. In contrast to these findings, Behncke (2012) uses both nonparametric matching and instrumental variable specifications to find that retirement increases the risk of being diagnosed with a chronic condition and worsens self-assessed health in the United Kingdom.[6] Horner (2014) and Becchetti et al. (2012) find that retirement improves subjective well-being among older Europeans, though Horner finds that life satisfaction tends to return to baseline a few years after retirement. For cognitive function, Coe et al. (2012) find that retirement has no statistically significant impact, whereas Bonsang, Adam, and Perelman (2012) and Rohwedder and Willis (2010) find that retirement is associated with declines in cognitive function.

Although we follow similar techniques to the past literature to estimate causal impacts of retirement on health by using both fixed effects and instrumental variables, our paper updates and extends the previous studies in several ways. First, we analyze utilization alongside changes in health and well-being. To our knowledge this is one of the first papers to directly study the impact of retirement on health care utilization, which is arguably the most important factor in estimating the fiscal impact arising from the link between retirement and health.[7] Second, we perform a detailed analysis of the dynamics of postretirement health and well-being by estimating the impact of retirement in the short run and the long run. Using this approach, we find new evidence of long-run effects for objective health outcomes that are not apparent by only looking at the average effects. Previous studies have only analyzed average effects and in doing so have only found improvements in subjective measures of health and could not demonstrate the evolution of health effects. Finally, this paper examines a broader array of health and well-being outcomes and covers a longer period of time than

[4]They find that elderly retirees who were given a part-time job performing park maintenance reported higher perceived health and life satisfaction relative to controls. Although this study shows benefits from work, the study environment is not necessarily representative of the impacts of retirement of the full population.

[5]See for instance Kerkhofs and Lindeboom (1997); Kerkhofs, Lindeboom, and Theeuwes (1999); and Dave et al. (2008).

[6]The instrumental variable results that better account for endogeneity suggest no significant effects on chronic conditions.

[7]Coe and Zamarro (2015a) also have a working paper investigating this question in the United States and Europe; Caroli, Lucifora, and Vigani (2016) have a working paper investigating this question for Europe; and Dang (2017) investigates this question for Vietnam.

previous studies. The larger sample (with additional years of the HRS) allowed us to estimate the dynamics of postretirement health and also estimate the average impact of retirement more precisely. These contributions both provide new evidence on utilization and the evolution of health benefits and use new evidence to clear up differing findings in past studies.

## 3 | DATA AND METHODOLOGY

We use data from the HRS, a biennial survey constructed to be representative of Americans over the age of 50. Our HRS data span the period between 1992 and 2014. The survey began with an initial cohort of individuals and their spouses in 1992, and subsequent cohorts were added to keep the sample representative of the target population. We keep the original HRS cohort; the Children of the Depression and War Babies cohorts, which entered the sample in 1998; the Early Baby Boomer cohort, which entered the sample in 2004; and the Mid Baby Boomer cohort, which entered the sample in 2010. Most of the variables used in our analysis come from the RAND version (version P) of the HRS, a cleaned dataset containing a subset of variables from the raw survey. However, the life satisfaction variables and the eligibility ages for defined benefit (DB) pension plans are merged in from the raw HRS. All of our analysis is performed at the person-wave level and utilizes the respondent-level weights provided in the RAND dataset.

It is important to define retirement carefully for our analysis. We begin by selecting a sample of individuals who report at least 20 years of work experience in the wave in which their cohort first entered the survey (hereafter referred to as the baseline wave).[8] Thus, our analysis excludes career homemakers, for whom retirement status might not be very meaningful. In each wave, the RAND HRS classifies individuals as either working full time, working part time, retired, partially retired, disabled, unemployed, or not in the labor force.[9] We define retirement as a transition from working full or part time to full or partial retirement. We drop observations with a labor force status that is missing, unemployed, disabled, or out of the labor force, as well as subsequent waves for these individuals. We also drop individuals who shift from retirement to nonretirement at any point during the sample period.[10] Individuals who are retired throughout the sample period are retained as long as they have a valid retirement date in the RAND data in their baseline wave.[11] We drop individuals whose first wave of retirement occurred before the age of 50. Table 1 summarizes the sample selection process starting with the original RAND HRS dataset and showing the observations remaining after applying each sample selection restriction.

The HRS includes several summary measures of physical and mental health that are updated in each wave. The first health measure we use is a self-reported health status, ranging from 1 (*poor health*) to 5 (*excellent health*). Although self-reported health measures can be problematic due to potential reporting bias, they have an advantage of providing a measure of overall health and have been shown to be correlated with mortality.[12] The second is an index containing the number of major health conditions that the respondent has ever reported out of a possible eight that are included in the survey, including high blood pressure, diabetes, cancer, chronic lung disease, heart problems, stroke, psychiatric problems, and arthritis. This index provides an objective measure of an individual's health. The drawback of this objective measure is that any set of specific diseases will be an incomplete measure of overall health. The final summary measure is a mental health score based on the Center for Epidemiologic Studies Depression (CESD) scale. It is the sum of six indicators of negative sentiments during the past week plus two indicators for failing to report positive sentiments. The

[8]We drop individuals who did not respond, or who responded via proxy, in the baseline wave.

[9]The HRS asks individuals about labor force and retirement status in several places during the survey. The RAND version of the HRS consolidates these into a summary labor force status. According to the codebook, the labor force status variable "attempts to pull information from several sources, and sort through the discrepancies. Working and retirement take precedence in its derivation." Individuals who report working full time (at least 35 hr per week for at least 36 weeks per year) are always coded as working full time. Individuals who report working part time but mention being retired are classified as partly retired. Individuals who are working part time but do not mention being retired are coded as working part time. Individuals who report not working but looking for work are coded as unemployed. Individuals who report not working and not looking for work, and who mention retirement, are coded as retired. Those who are not working and not looking for work, and do not mention retirement, are coded as either disabled (if they mention disability) or not in the labor force.

[10]Maestas (2010) shows that "unretirement" is quite common and is generally planned, although some individuals who are "unretired" do so because they realized that retirement reduced their happiness.

[11]Retirement dates are used to compute the time since retirement for individuals who have been retired throughout the sample. Within this subset of individuals, we drop those whose reported retirement date is after the end date of their baseline interview. If retirement year is available but retirement month is missing, we set the retirement month to June. Results do not meaningfully change if we omit these individuals.

[12]See Coe and Zamarro (2011) for a useful discussion.

**TABLE 1** Sample selection

| Restriction | Remaining sample size | |
|---|---|---|
| | Person-waves | Individuals |
| Initial RAND HRS | | 37,495 |
| Drop AHEAD cohort | | 29,048 |
| Drop if nonresponse or proxy response in baseline wave | | 24,481 |
| Drop if <20 years work in baseline wave | | 16,949 |
| Convert to person-wave | 157,473 | 16,949 |
| Drop individuals after they are out of labor force or disabled even once | 126,008 | 15,524 |
| Drop individuals after they have missing labor force status even once | 91,293 | 15,524 |
| Drop anyone who leaves retirement (baseline retirement definition) | 80,517 | 14,314 |
| Drop anyone who has been retired through entire sample and does not provide retirement date (baseline retirement definition) | 78,801 | 13,972 |
| Drop anyone who retired before age 50 (baseline retirement definition) | 76,688 | 13,453 |
| Drop observations with zero sampling weight | 69,787 | 12,543 |
| Drop observations under age 50 | 69,773 | 12,541 |
| Drop observations with missing right-hand-side variables | 65,304 | 12,480 |
| Drop observations with missing values or singletons for all left-hand-side variables | 63,359 | 10,535 |

negative sentiments are feeling depressed, feeling that everything is an effort, experiencing restless sleep, feeling alone, feeling sad, and being unable to get going, and the positive sentiments are feeling happy and enjoying life.[13]

Next, we study measures of overall life satisfaction. Starting in 2004 (Wave 7), respondents were asked a series of questions about life satisfaction. Studies show that reports of subjective well-being are correlated with objective physiological and psychological measures. Moreover, they are correlated with changes in circumstances and can impact future decisions. Although these measures can be affected by short-term contexts or mood, these fluctuations should average out and only add noise that makes significant findings less likely.[14] In the HRS, respondents are asked to rate their agreement with the following statements:

- "In most ways my life is close to ideal."
- "The conditions of my life are excellent."
- "I am satisfied with my life."
- "So far, I have gotten the important things I want in life."
- "If I could live my life again, I would change almost nothing."

In each case, the scale ranges from 1 (*strongly disagree*) to 7 (*strongly agree*).[15] To impute life satisfaction scores for waves before 2004, we regress each life satisfaction measure on the individual components of the CESD index, a set of dummies for self-reported health, the health care utilization measures, indicators for Medicare and other health insurance coverage, the components of the major health condition index, a set of dummies for each functional limitation index, and dummies for education, race and Hispanic ethnicity, age, marital status, and gender.[16] We substitute the predicted values of the satisfaction variables whenever reported values are missing.[17]

[13]A consistently measured CESD score is only available from Wave 2 onwards.

[14]See Kahneman and Krueger (2006) for a more detailed overview of life satisfaction measures.

[15]In Waves 9–11, the options are *strongly disagree* (1), *somewhat disagree* (2), *slightly disagree* (3), *neither agree nor disagree* (4), *slightly agree* (5), *somewhat agree* (6), and *strongly agree* (7). In Wave 7, the scale is reversed, with 1 corresponding to *strongly agree* and 7 corresponding to *strongly disagree*. We recode the Wave 7 satisfaction variables to make them consistent with the other waves. Also in Wave 7, the "*somewhat agree*"/"*somewhat disagree*" options are replaced with "*agree*"/"disagree." In Wave 8, the scale ranges from 1 (*strongly disagree*) to 6 (*strongly agree*) because a "*neither agree nor disagree*" (corresponding to a score of 4 in the other waves) option is not available. We rescale the Wave 8 responses by multiplying them by 6/5 and subtracting 1/5, a transformation that results in variables that range from 1 to 7.

[16]For the imputations, we use all available observations on the cohorts included in the analysis (provided they meet the sample selection criteria of being present in the baseline wave and having 20 or more years of work in the baseline wave), not just the ones that were retained for the main regressions.

[17]Restricting the sample to observations with nonimputed life satisfaction variables reduces the number of person-wave observations to between 11,512 and 11,570 depending on the life satisfaction measure. We check robustness by re-estimating our regressions using only these observations and get similar qualitative results (see footnote 31).

In addition to the summary health and life satisfaction measures, the HRS includes several objective health measures on functional limitations. The first of these is the number of activities of daily living (ADLs) with which the respondent has difficulty. The ADLs included in the index include bathing, dressing, eating, getting in and out of bed, and walking across a room. The second is the number of instrumental activities of daily living (IADLs) with which the respondent has difficulty. IADLs include managing money, using the phone, and taking medications. The third is the number of mobility limitations the respondent faces, including difficulty with walking one block, walking several blocks, walking across a room, climbing one flight of stairs, and climbing several flights of stairs. The fourth measure is an index of large muscle limitations, with one point added to the index for difficulty with each of the following activities: sitting for 2 hr, getting up from a chair, stooping, kneeling or crouching, and pushing or pulling large objects. Fifth, a gross motor activity limitation index adds one point for difficulty with each of the following: walking one block, walking across a room, climbing one flight of stairs, getting in or out of bed, and bathing. Finally, an index of fine motor activity limitations adds one point for difficulty with each of the following tasks: picking up a dime, eating, and dressing.[18]

Health care utilization variables include hospital or nursing home use; number of hospital nights, nursing home nights, and doctor visits; indicators for whether the respondent used home care or prescription drugs; and the respondent's self-reported out-of-pocket health care spending.[19] In Wave 1, these variables are measured over the past year. In subsequent waves, these variables are measured since the previous interview or in the past 2 years for new respondents.[20] Use of prescription drugs is only available for Waves 2 and beyond, and it is always measured since the last interview (or over the past 2 years for new respondents).

We drop individuals with zero sampling weight or age less than 50 (these are generally spouses who are not within the HRS target population). We also drop observations with any missing explanatory variables and instruments, as well as observations that have missing values or are singletons for all dependent variables. After applying our sample selection rules, we have 63,359 person-wave observations representing 10,535 individuals. Table 2 shows summary statistics for these observations. In the regressions for each dependent variable, we use the subset of those 63,359 observations that has nonmissing values for that dependent variable. We also consider how the impact of retirement varies for different subgroups, including individuals with a high school education or less, individuals with physically demanding jobs, females, individuals of non-White race or Hispanic ethnicity, and singles. Table 2 therefore reports the fraction of the sample with these characteristics. For all the regressions except those involving the health care utilization measures, we divide the dependent variable by its standard deviation so that coefficients represent standard deviation changes in the outcome.

We wish to capture the effect of retirement ($R_{it}$) on our measures of health, well-being, and health care utilization ($H_{it}$). That is, we wish to estimate $\beta$ in the following equation.

$$H_{it} = \alpha + \beta R_{it} + u_{it}$$

Because retirement status is endogenous, we instrument for retirement using variation in eligibility for Social Security and private DB pensions as well as applicability of the Social Security earnings test. Early, but reduced, Social Security benefits are available at age 62. “Full” benefits begin at the full retirement age, which varies between age 65 and 66 for individuals in our sample, depending on their birth cohort. Finally, a person can receive delayed retirement credits until age 70 by postponing the start of Social Security benefits beyond full retirement age. Therefore, for the retired status indicator, our Social Security eligibility instruments are a set of indicators for whether a person-wave observation has reached each of the following age categories: 62, full retirement age, and 70. Our DB eligibility instruments are dummy variables that indicate whether an individual who is covered by a current employer's DB pension (as of the baseline wave) has reached the plan's early retirement age or the normal retirement age.[21] Our measure of “earnings test” is

[18]Consistently measured functional limitation indices are only available for Wave 2 onwards.

[19]We also examined preventative care variables such as mammograms, breast exams, pap tests, prostate exams, flu shots, and cholesterol tests but found no effects of retirement. These results are available by request.

[20]We do not adjust for this difference in reporting periods as it should be absorbed by the wave dummies.

[21]Depending on the baseline wave, an individual may report information on up to three or four current employer-sponsored pension plans. We use information in the RAND HRS to determine whether each plan is a defined benefit (DB), defined contribution (DC), or a combination. Eligibility ages for each DB or combination plan come from the raw HRS. An individual is determined to be eligible for an early (full) retirement if he or she has reached the lowest early (full) eligibility age for any of the DB or combination plans reported. If an individual reports that the plan has no age requirement, the age requirement is coded as zero. We also include an indicator for individuals who are covered by a DB or combination plan but have an unknown eligibility status due to missing data. For some plans, the early retirement age is either above the normal retirement or missing. In these cases, we replace the early eligibility age with the normal eligibility age.

**TABLE 2** Summary statistics

| Variable | Mean | Std. Dev. | Min | Max | Observations |
|---|---|---|---|---|---|
| Endogenous retirement measures | | | | | |
| Retired | 0.52 | 0.50 | 0 | 1 | 63,359 |
| Retired 0–4 years | 0.14 | 0.34 | 0 | 1 | 63,359 |
| Retired 4+ years | 0.38 | 0.49 | 0 | 1 | 63,359 |
| Health insurance controls | | | | | |
| Has Medicare | 0.44 | 0.50 | 0 | 1 | 63,359 |
| Has non-Medicare health insurance | 0.81 | 0.39 | 0 | 1 | 63,359 |
| More than one health insurance plan | 0.06 | 0.23 | 0 | 1 | 63,359 |
| Social Security and pension instruments | | | | | |
| Earnings test | 0.15 | 0.36 | 0 | 1 | 63359 |
| Age ≥ 62 | 0.55 | 0.50 | 0 | 1 | 63,359 |
| Age ≥ Social Security full retirement age | 0.42 | 0.49 | 0 | 1 | 63,359 |
| Age ≥ 70 | 0.28 | 0.45 | 0 | 1 | 63,359 |
| Age ≥ DB early retirement age | 0.24 | 0.43 | 0 | 1 | 63,359 |
| Age ≥ DB full retirement age | 0.19 | 0.39 | 0 | 1 | 63,359 |
| Dependent variables | | | | | |
| Self-reported health | 3.40 | 1.04 | 1 | 5 | 63,338 |
| Number of health conditions | 1.65 | 1.34 | 0 | 8 | 63,357 |
| CESD score | 1.08 | 1.65 | 0 | 8 | 56,817 |
| Life close to ideal | 4.92 | 1.06 | 0.56 | 7 | 55,624 |
| Excellent life conditions | 4.94 | 1.11 | −0.68 | 7 | 55,623 |
| Satisfied with life | 5.45 | 1.02 | 0.79 | 7.32 | 55,621 |
| Gotten important things in life | 5.47 | 0.94 | 1 | 9.26 | 55,624 |
| Change nothing in life | 4.43 | 1.13 | 0.31 | 7 | 55,622 |
| ADLs with some difficulty | 0.15 | 0.57 | 0 | 5 | 58,612 |
| IADLs with some difficulty | 0.06 | 0.31 | 0 | 3 | 58,607 |
| Mobility limitations | 0.73 | 1.19 | 0 | 5 | 58,609 |
| Large muscle limitations | 0.99 | 1.20 | 0 | 4 | 58,604 |
| Gross motor limitations | 0.26 | 0.75 | 0 | 5 | 58,613 |
| Fine motor limitations | 0.11 | 0.38 | 0 | 3 | 58,612 |
| Hospital stay | 0.20 | 0.40 | 0 | 1 | 63,304 |
| Nursing home stay | 0.01 | 0.11 | 0 | 1 | 63,329 |
| Hospital nights | 1.52 | 7.10 | 0 | 300 | 63,173 |
| Nursing home nights | 0.47 | 10.10 | 0 | 1005 | 63,305 |
| Doctor visits | 8.32 | 14.18 | 0 | 900 | 62,067 |
| Used home care | 0.04 | 0.20 | 0 | 1 | 63,327 |
| Used prescription drugs | 0.77 | 0.42 | 0 | 1 | 58,592 |
| Out-of-pocket medical expenses | 1650.00 | 5510.00 | 0 | 810120 | 63,359 |
| Demographics | | | | | |
| Age | 64.14 | 8.52 | 50 | 93 | 63,359 |
| High school or less | 0.49 | 0.50 | 0 | 1 | 63,359 |
| Physically demanding job | 0.56 | 0.50 | 0 | 1 | 63,359 |
| Missing physically demanding job | 0.15 | 0.36 | 0 | 1 | 63,359 |
| Female | 0.45 | 0.50 | 0 | 1 | 63,359 |
| Nonwhite and/or Hispanic | 0.21 | 0.41 | 0 | 1 | 63,359 |
| Missing Race | <.01 | 0.02 | 0 | 1 | 63,359 |
| Single | 0.22 | 0.42 | 0 | 1 | 63,359 |
| Missing Marital Status | <.01 | 0.02 | 0 | 1 | 63,359 |

*Note.* Data are unweighted. The life satisfaction variables include imputed values that fall outside the 1–7 range.

an indicator that takes on a value of 1 during a given wave if the individual is in the age range that would be subject to the earnings test for worker benefits. Prior to 2000, the earnings test applied to workers under the age of 70. In 2000 and later, the earnings test applied to workers under their full retirement age.

Variation in eligibility for Social Security and DB pensions presents a plausible set of instruments for understanding how retirement influences health and well-being. With these instruments, we are picking up the effect of voluntary retirements around the age thresholds that we instrument for. Of course, if the effects of retirement differ at different ages outside the window that we study, our model would not capture these. Furthermore, there is no reason to believe that discrete age thresholds should directly influence health outcomes beyond the standard linear and quadratic trends in age that are included in the specifications. Two possible exceptions to this are the dummy for full retirement age and the dummy for full DB pension eligibility. For around 45.3% of our sample, Social Security full retirement age is 65. In addition, many individuals are covered by a DB plan with an early or full retirement age of 65. Because 65 is also the threshold for Medicare eligibility, reaching that age could directly affect health care utilization and health. We address this issue by controlling for Medicare as well as other insurance coverage and number of insurance plans in our regressions.[22] This approach allows us to use the full retirement age threshold as an excluded instrument for the subset of individuals whose full retirement age is greater than 65. Our first stage regressions show that these instruments are strong predictors of individual retirement behavior.

The Social Security earnings test is also a plausible instrument as it effectively forces beneficiaries who earn above a certain threshold to defer part or all of their benefit. Although any foregone benefits are received at a later date, with a relatively generous actuarial adjustment, evidence shows that most people view the earnings test as a tax on work.[23]

Using instrumental variables regression, we estimate the following regression:

$$H_{it} = \beta_0 + \beta_1 \widehat{R}_{it} + \beta_2 X_{it} + \nu_i + \eta_t + \epsilon_{it},$$

where the dependent variable represents measures of health, life satisfaction, and utilization. $X_{it}$ is a set of controls for age, age squared, and indicators of Medicare or health insurance coverage and $u_i$ and $n_t$ represent individual and wave fixed effects. The first stage regression is

$$R_{it} = \alpha_0 + \alpha_1 Z_{it} + \alpha_2 X_{it} + u_i + n_t + e_{it},$$

where $R_{it}$ is an indicator for whether an individual is retired at time $t$ and $Z_{it}$ is the set of instruments outlined above.

These regressions in which the key explanatory variable is a dummy for retired status are similar to previous studies and only capture the average effect of retirement on health. We extend upon previous studies by also examining the dynamics of health after retirement. To do so, we estimate specifications in which the postretirement period is divided into two subperiods.[24] The first subperiod comprises the first 1 or 2 waves of the survey in which a person reports being retired, and it indicates that the individual has been retired for roughly 0–4 years.[25] The second subperiod includes all postretirement waves beyond the second and indicates that the individual has been retired for more than 4 years. This group includes people who have been retired between 3 and 19 waves (from 4–6 to 36–38 years); however, less than 1% of the sample has been retired for more than 13 waves (24–26 years). For individuals who have been retired throughout the sample, the subperiod indicators are assigned based on the number of months elapsed between the reported retirement date and the interview date. A potential issue with estimating the long-term effects of retirement is survivor bias. That is, the least healthy individuals may not survive to 4+ years past retirement. We check for robustness to survivor bias by re-estimating our regressions on only the subset of individuals who survive to 4+ years past retirement. These results are discussed in Section 4.2.

When instrumenting for the two phases of retirement—0–4 years retired and 4+ years retired—our instruments include additional indicators for being 4 years beyond each of the Social Security and DB threshold ages.[26] We expect that being beyond a threshold will increase the probability of being retired 0–4 years, but being 4 years beyond a threshold will decrease the probability of being retired 0–4 years. Similarly, being 4 years beyond the thresholds should

[22]The other health insurance coverage indicator takes on the value of 1 if the individual is covered by Medicaid, CHAMPUS/VA, other (non-Medicare) government plan, current or former employer-sponsored plan, or other private plan. It is set to zero if the individual is covered by none of these kinds of insurance. The other government plan category is available for the first two waves only.

[23]See Shoven and Slavov (2014a, 2014b) for the actuarial calculations of the gains to delaying retirement. Friedburg (2000) and Song and Manchester (2007) study the labor supply consequences of the earnings test.

[24]We considered different specifications for capturing the dynamics of effects over time, including a model with three subperiods. The results show similar trends across different specifications.

[25]Note that we do not know the exact date that a person retires. Given that waves are 2 years apart, we know that if a person is working in one wave and then not working the next that they have been retired 0–2 years. Similarly, if they report retired status for 2 waves we know they have been retired 2 to 4 years.

[26]Note that the indicators are highly correlated. Multicollinearity is not a concern because we are interested in predicting retirement status overall and are not concerned with interpreting the individual coefficients in the first stage regressions.

increase the probability of being retired four or more years. We also include an additional earnings test indicator that takes on a value of 1 for individuals who are under the threshold ages plus 4 years. The indicators included in each first-stage regression are shown in Table 3.

## 4 | RESULTS

### 4.1 | Main findings

Table 3 shows the results of the first-stage regressions associated with the second-stage self-reported health outcome.[27] We report standard errors clustered at the household level in parentheses, and all regressions use the respondent-level weights provided with the HRS. The coefficients in the first-stage regressions have the expected signs. As shown in the first column, reaching the Social Security early or late retirement thresholds and reaching the DB early or full retirement age increase the probability of being retired. Being subject to the earnings test has a positive coefficient as expected but is not statistically significant. The middle column shows that hitting the early or full retirement thresholds for Social Security or DBs and being subject to the earnings test are all associated with increases of the probability of being retired for 0–4 years. Being 4 years beyond the Social Security thresholds, the full DB threshold, or the earnings test threshold is all associated with a decrease in the probability of having been retired for 0–4 years. Finally, the last column shows that being four or more years beyond the Social Security eligibility or the DB eligibility thresholds is all associated with an increase in the chances of being retired four or more years. For the first two regressions (the retired status indicator and the 0- to 4-year indicator), the coefficient on age is positive and the coefficient on age-squared is negative, indicating that the probability of retirement increases with age at a decreasing rate.

One unanticipated result is that the sign on age-squared is reversed in the regression for the 4+ years indicator. We suspect that this is a compositional effect. As noted above, a potential issue with the long-run results is that individuals in the sample may not survive to 4+ years after retirement. Moreover, our sample also includes individuals who never retire. Thus, as age increases, the composition of the sample is likely to shift towards those who never retire. As also noted above, we check robustness by running specifications where the sample is restricted to individuals who are observed four or more years beyond retirement. In these specifications, the coefficient on age becomes positive for all three regressions. These results are not shown but are available upon request.

The $F$ statistics for the excluded instruments are greater than 10 in all cases and exceed the Stock and Yogo (2005) critical values, which suggest that the instruments explain significant variation in retirement status and there will not be biased or inconsistent results due to weak instruments.[28]

Table 4 shows the results for general health outcomes. For each outcome, we present the OLS estimates first for reference. For self-reported health, a higher value is associated with good health, whereas for the number of health conditions and CESD score, higher values are associated with worse health. The OLS estimates show that retirement is associated with no significant change in self-reported health or CESD score and a statistically significant increase in the number of health conditions with which the respondent has been diagnosed. This negative effect is consistent with past literature that does not account for endogeneity.

The IV estimates are substantially different, showing that retirement improves self-reported health on average (by 0.158 of a standard deviation), with the significant improvements occurring four or more years beyond retirement. Whereas Coe and Lindeboom (2008) and Neuman (2008) both find average increases in subjective health, Coe and Lindeboom (2008) found that reported good health faded in the period after retirement. Our results are consistent with small effects in the period of 0- to 4-year postretirement but suggest that long-run effects four or more years out drive the relationship between retirement and increases in self-reported health. This provides new evidence that improvements take time to occur postretirement. IV estimates show no statistically significant effect of retirement on the number of health conditions with which the respondent has been diagnosed. An examination of the individual health conditions that make up the index suggests that retirement has no statistically significant relationship with any of them.[29] These results are similar to previous studies that use the HRS. Unlike Coe and Lindeboom (2008) and Neuman

[27]First-stage regressions for the other second-stage outcomes, each of which uses the set of observations with nonmissing values for the outcome, are similar and available upon request.

[28]See Bound et al. (1995); Staiger and Stock (1997); and Stock and Yogo (2005) for a discussion of weak instruments.

[29]Results for the individual components are not shown but are available upon request.

**TABLE 3** First-stage regressions

| | Retired | | Retired 0–4 years | Retired 4+ years |
|---|---|---|---|---|
| Age ≥ 62 | 0.148*** (0.0135) | Age ≥ 62 | 0.0558*** (0.0190) | 0.0801*** (0.0146) |
| Age ≥ Social Security full retirement age | −0.0191 (0.0128) | Age ≥ 66 | −0.126*** (0.0215) | 0.162*** (0.0175) |
| Age ≥ 70 | 0.0254*** (0.00649) | Age ≥ Social Security full retirement age | 0.0490** (0.0218) | −0.0820*** (0.0164) |
| Age ≥ DB early retirement age | 0.0290** (0.0142) | Age ≥ Social Security full retirement age + 4 | −0.120*** (0.0163) | 0.108*** (0.0146) |
| Age ≥ DB full retirement age | 0.168*** (0.0142) | Age ≥ 70 | −0.0346*** (0.0110) | 0.0540*** (0.00964) |
| | | Age ≥ 74 | −0.0593*** (0.00631) | 0.0335*** (0.00647) |
| | | Age ≥ DB early retirement age | 0.0912*** (0.0160) | −0.0757*** (0.00988) |
| | | Age ≥ DB early retirement age + 4 | 0.0689*** (0.0180) | 0.0303** (0.0134) |
| | | Age ≥ DB full retirement age | 0.0627*** (0.0199) | 0.0651*** (0.0121) |
| | | Age ≥ DB full retirement age + 4 | −0.140*** (0.0203) | 0.160*** (0.0153) |
| Earnings test (age < max age)[a] | 0.0127 (0.0101) | Earnings test (age < max)[a] | 0.0484*** (0.0162) | −0.0252* (0.0131) |
| | | Earnings test + 4 (age < max + 4)[a] | −0.0249* (0.0131) | 0.00621 (0.0116) |
| Age | 0.00243*** (0.000648) | Age | 0.00425*** (0.000767) | −0.00256*** (0.000569) |
| Age squared | −2.91e-06*** (1.89e-07) | Age squared | −2.93e-06*** (1.88e-07) | 4.67e-07** (1.94e-07) |
| Medicare | 0.208*** (0.0101) | Has Medicare | 0.0480*** (0.0136) | 0.157*** (0.0105) |
| Non-Medicare health insurance | −0.0414*** (0.00556) | Non-Medicare health insurance | −0.0430*** (0.00699) | 0.00136 (0.00542) |
| More than one health insurance plan | −0.0430*** (0.00724) | More than one health insurance plan | −0.0271*** (0.00809) | −0.0139** (0.00594) |
| Observations | 63,338 | Observations | 63,338 | 63,338 |
| *F* statistic for excluded instruments | 143.95 | *F* statistic for excluded instruments | 109.13 | 126.58 |

*Note*. Standard errors clustered by household in parentheses. All regressions include wave dummies, individual fixed effects, and use respondent-level weights.

[a]Max is defined as 70 before 2000 and normal retirement age in 2000 or later.

***$p < 0.01$. **$p < 0.05$. *$p < 0.1$.

**TABLE 4** Impact of retirement on summary health measures

| Variables | Self-reported health (5 = *excellent*, 1 = *poor*) OLS | IV | Number of health conditions OLS | IV | CESD score OLS | IV |
|---|---|---|---|---|---|---|
| | Average effect | | | | | |
| Retired | −0.0167 (0.0147) | 0.158** (0.0620) | 0.0828*** (0.0120) | −0.00704 (0.0493) | −0.0123 (0.0178) | −0.288*** (0.0821) |
| Age | −0.00173 (0.00152) | −0.00295* (0.00158) | 0.000440 (0.00104) | 0.00107 (0.00108) | −0.000581 (0.00201) | 0.00163 (0.00215) |
| Age squared | −1.45e-06*** (4.28e-07) | −5.05e-07 (5.44e-07) | 1.74e-06*** (4.13e-07) | 1.26e-06*** (4.77e-07) | 4.68e-06*** (5.11e-07) | 3.07e-06*** (7.16e-07) |
| Has Medicare | 0.0343*** (0.0131) | −0.00704 (0.0186) | 0.0257** (0.0104) | 0.0469*** (0.0141) | −0.0245 (0.0168) | 0.0373 (0.0233) |
| Has non-Medicare HI | −0.00670 (0.0115) | 0.000675 (0.0117) | 0.0213** (0.00932) | 0.0175* (0.00964) | −0.00691 (0.0140) | −0.0186 (0.0145) |
| > 1 HI plan | 0.0355** (0.0146) | 0.0445*** (0.0148) | −0.0133 (0.0126) | −0.0179 (0.0130) | −0.0413** (0.0181) | −0.0545*** (0.0187) |
| | Postretirement dynamics | | | | | |
| 0–4 years | −0.0212 (0.0146) | 0.0808 (0.0628) | 0.0790*** (0.0117) | 0.0333 (0.0533) | −0.0107 (0.0179) | −0.226*** (0.0808) |
| 4+ years | 0.0152 (0.0197) | 0.256*** (0.0695) | 0.110*** (0.0179) | −0.0801 (0.0605) | −0.0253 (0.0227) | −0.278*** (0.0870) |
| Age | −0.00162 (0.00152) | −0.00201 (0.00159) | 0.000535 (0.00104) | 0.000532 (0.00111) | −0.000613 (0.00201) | 0.00106 (0.00215) |
| Age squared | −1.53e-06*** (4.29e-07) | −1.18e-06** (5.62e-07) | 1.68e-06*** (4.13e-07) | 1.64e-06*** (4.96e-07) | 4.71e-06*** (5.10e-07) | 3.50e-06*** (7.19e-07) |
| Has Medicare | 0.0257* (0.0135) | −0.0350* (0.0206) | 0.0185* (0.0105) | 0.0672*** (0.0160) | −0.0212 (0.0169) | 0.0366 (0.0257) |
| Has non-Medicare HI | −0.00683 (0.0115) | −0.00232 (0.0117) | 0.0212** (0.00931) | 0.0190** (0.00971) | −0.00686 (0.0140) | −0.0160 (0.0145) |
| > 1 HI plan | 0.0360** (0.0146) | 0.0438*** (0.0147) | −0.0129 (0.0126) | −0.0180 (0.0131) | −0.0415** (0.0181) | −0.0524*** (0.0187) |
| Observations | 63,338 | 63,338 | 63,357 | 63,357 | 56,817 | 56,817 |
| Individuals | 10,533 | 10,533 | 10,535 | 10,535 | 9,820 | 9,820 |

*Note*. Outcome variables are divided by their standard deviations so that coefficients represent standard deviation changes. Standard errors clustered by household in parentheses. All regressions include wave dummies, individual fixed effects, and use respondent-level weights. Larger values indicate better health for self-reported health and poorer health for the number of health conditions and CESD score.

***$p < 0.01$. **$p < 0.05$. *$p < 0.1$.

(2008), we find that retirement is also associated with a large and statistically significant reduction in CESD score (of 0.288 of a standard deviation), with larger effects in the long run than in the short run.[30] This finding aligns with the Charles's (2004) finding that retirement significantly improves reports of loneliness and depression, which are two components of the CESD score. The finding is also consistent with Johnston and Lee's (2009) finding that retirement improves mental health as measured by the responses to the general health questionnaire. Our finding extends these previous findings by showing the evolution of this improvement both in the short and in the long run.

We expand further on previous studies by looking more closely at a variety of life satisfaction measures. Table 5 shows the results for these measures. Most of the OLS regressions show small associations between retirement and life satisfaction that are mostly insignificant or marginally significant. In the IV specifications, retirement has a much larger impact on life satisfaction. Retirement increases agreement with the first three life satisfaction statements by around half a standard deviation and increases agreement with the last two statements by over a fifth of a standard deviation. The IV estimates suggest that the impact of retirement is immediate and persists in the long run (in all instances, the magnitude of the effect is larger in the long run). This finding is interesting as the literature on life satisfaction often shows that people return to a set point of well-being or adapt after life changing events, and Horner (2014) suggests that the effects of retirement on subjective well-being fade. Our results, however, suggest that retirement has long lasting benefits to individual well-being.[31]

Table 6 shows the association between retirement and functional limitations. The OLS results suggest that retirement is associated with an increase in functional limitations, but the IV specifications indicate that on average, functional limitations do not significantly increase, large muscle limitations decrease significantly, and mobility and fine motor limitations decrease marginally. In addition, the dynamic regressions tell a more interesting story. Some measures are actually associated with a short-run increase in functional limitations, but that association disappears and all functional limitations indices significantly improve 4 or more years after retirement, by about 0.3 to 0.4 of a standard deviation. Our results provide new evidence that retirement in the US can have positive effects on objective health measures, but these effects take time to occur. (When the sample is restricted to those who survive to 4+ years postretirement, the long-term impact of retirement on functional limitations has weakened statistical significance but the point estimates of all but one of the long-run coefficients from Table 6 remain negative.) Neuman (2008) and Coe and Lindeboom (2008) found largely insignificant causal relationships between retirement and functional limitations. The difference in findings is due to the shorter time frame that they analyzed combined with the fact that it takes time for functional limitations to improve.[32] Moreover, Behncke (2012) analysis of data from England suggests that retirement is associated with increased difficulties in ADL and walking, but the paper only analyzes individuals up to 2 waves postretirement. Her results are consistent with the short-run increases we find. However, the long-run analysis suggests that these measures actually improve from retirement.

Table 7 considers the impact of retirement on health care utilization. Given that we find no adverse health effects of retirement, one may conclude that utilization is not affected. However, previous studies have not directly estimated this relationship.[33] Moreover, measuring utilization directly is useful as it is possible that retirees avoid health decline or see gains through increased use of the medical system. Indeed, the OLS results suggest a positive relationship between retirement and hospitalizations, nursing home use, doctor visits, and home care use on average. However, the IV results show no statistically significant positive effects and some statistically significant reductions in utilization from retirement. On average, hospital stays and prescription drug use decrease upon retirement. The dynamic analysis shows

[30]Coe and Lindeboom (2008) use an indicator for having a CESD score above 5 where we use the continuous score. Both Coe and Lindeboom (2008) and Neuman (2008) only use data up until 2004. Coe and Zamarro (2011) find that retirement is associated with improved depression scores for Europe, but the relationship is statistically insignificant.

[31]As a robustness check, we ran these regressions without any imputed values. The magnitudes of the results were similar in both the short and long run for most of the life satisfaction measures, but only one was statistically significant due to the reduced observations. For the measure of whether one got the important things out of life, the effects are insignificant but negative in magnitude.

[32]Indeed, when we analyze functional limitations with data through only 2004, we do not find significant overall impacts of retirement on functional limitations.

[33]Coe and Zamarro (2015b) have a working paper that analyzes the effect of retirement on utilization and finds that for the United States, retirement leads to a marginally significant but economically large reduction in doctor visits and an insignificant but meaningful reduction in hospital nights. When we limit to the shorter time period they analyze and only use an age 62 instrument as they do, we find a large negative effect of retirement on doctor visits as well and similar insignificant reductions in hospital nights associated with retirement. Caroli, Lucifora, and Vigani (2016) find an increase in utilization upon retirement in Europe, an effect that is greater for individuals who worked longer hours before retirement and suggests that the reduced opportunity cost of time plays a role.

**TABLE 5** Impact of retirement on life satisfaction

| | Life close to ideal | | Excellent life conditions | | Satisfied with life | | Gotten important things | | Change nothing in life | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variables | OLS | IV | OLS | IV | OLS | IV | OLS | IV | OLS | IV |
| | Average effect | | | | | | | | | |
| Retired | 0.0272 | 0.470*** | 0.0362* | 0.569*** | 0.0132 | 0.506*** | 0.0466** | 0.203** | 0.0364* | 0.297*** |
| | (0.0194) | (0.0932) | (0.0189) | (0.0878) | (0.0191) | (0.0884) | (0.0190) | (0.0894) | (0.0200) | (0.0958) |
| Age | 0.00675*** | 0.00331 | 0.00763*** | 0.00348 | 0.00321 | −0.000628 | 0.00325 | 0.00203 | −0.000280 | −0.00230 |
| | (0.00234) | (0.00241) | (0.00227) | (0.00238) | (0.00238) | (0.00248) | (0.00242) | (0.00248) | (0.00239) | (0.00248) |
| Age squared | −6.28e-06*** | −3.72e-06*** | −5.82e-06*** | −2.74e-06*** | −4.75e-06*** | −1.90e-06** | −3.22e-06*** | −2.32e-06*** | −9.77e-07* | 5.28e-07 |
| | (5.71e-07) | (7.76e-07) | (5.54e-07) | (7.55e-07) | (5.65e-07) | (7.65e-07) | (5.41e-07) | (7.38e-07) | (5.58e-07) | (7.71e-07) |
| Has Medicare | 0.146*** | 0.0464* | 0.109*** | −0.0105 | 0.113*** | 0.00217 | 0.0604*** | 0.0252 | 0.0845*** | 0.0261 |
| | (0.0185) | (0.0275) | (0.0182) | (0.0264) | (0.0188) | (0.0263) | (0.0195) | (0.0276) | (0.0187) | (0.0275) |
| Has non-Medicare HI | 0.0900*** | 0.109*** | 0.104*** | 0.127*** | 0.123*** | 0.145*** | 0.125*** | 0.132*** | 0.0209 | 0.0322* |
| | (0.0167) | (0.0175) | (0.0161) | (0.0170) | (0.0168) | (0.0177) | (0.0173) | (0.0178) | (0.0172) | (0.0177) |
| >1 HI plan | 0.0315 (0.0230) | 0.0531** | 0.0650*** | 0.0910*** | 0.0701*** | 0.0942*** | 0.127*** | 0.135*** | 0.181*** | 0.194*** |
| | | (0.0240) | (0.0212) | (0.0221) | (0.0218) | (0.0224) | (0.0221) | (0.0223) | (0.0247) | (0.0254) |
| | Postretirement dynamics | | | | | | | | | |
| 0–4 years | 0.0234 (0.0195) | 0.375*** | 0.0323* | 0.460*** | 0.00780 | 0.444*** | 0.0431** | 0.178** | 0.0358* | 0.287*** |
| | | (0.0913) | (0.0189) | (0.0865) | (0.0191) | (0.0880) | (0.0191) | (0.0891) | (0.0199) | (0.0950) |
| 4+ years | 0.0575** | 0.633*** | 0.0672*** | 0.750*** | 0.0561** | 0.579*** | 0.0736*** | 0.329*** | 0.0413 | 0.300*** |
| | (0.0260) | (0.0979) | (0.0256) | (0.0944) | (0.0259) | (0.0952) | (0.0258) | (0.0998) | (0.0273) | (0.101) |
| Age | 0.00683*** | 0.00445* | 0.00771*** | 0.00478** | 0.00333 | 6.05e-05 | 0.00332 | 0.00247 | −0.000266 | −0.00221 |
| | (0.00234) | (0.00241) | (0.00227) | (0.00238) | (0.00238) | (0.00248) | (0.00242) | (0.00247) | (0.00239) | (0.00248) |
| Age squared | −6.35e-06*** | −4.59e-06*** | −5.88e-06*** | −3.72e-06*** | −4.84e-06*** | −2.42e-06*** | −3.28e-06*** | −2.65e-06*** | −9.88e-07* | 4.56e-07 |
| | (5.74e-07) | (7.94e-07) | (5.55e-07) | (7.66e-07) | (5.67e-07) | (7.87e-07) | (5.41e-07) | (7.47e-07) | (5.60e-07) | (7.84e-07) |
| Has Medicare | 0.138*** | 0.00262 | 0.101*** | −0.0592** | 0.102*** | −0.0179 | 0.0535*** | −0.00727 | 0.0832*** | 0.0251 |
| | (0.0190) | (0.0294) | (0.0189) | (0.0287) | (0.0192) | (0.0295) | (0.0202) | (0.0310) | (0.0195) | (0.0297) |
| Has non-Medicare HI | 0.0900*** | 0.106*** | 0.104*** | 0.123*** | 0.123*** | 0.142*** | 0.125*** | 0.132*** | 0.0209 | 0.0318* |
| | (0.0167) | (0.0175) | (0.0161) | (0.0170) | (0.0168) | (0.0177) | (0.0173) | (0.0178) | (0.0172) | (0.0177) |
| >1 HI plan | 0.0319 | 0.0532** | 0.0654*** | 0.0910*** | 0.0707*** | 0.0936*** | 0.128*** | 0.136*** | 0.181*** | 0.194*** |
| | (0.0230) | (0.0240) | (0.0212) | (0.0222) | (0.0218) | (0.0224) | (0.0221) | (0.0224) | (0.0247) | (0.0254) |
| Observations | 55,624 | 55,624 | 55,623 | 55,623 | 55,621 | 55,621 | 55,624 | 55,624 | 55,622 | 55,622 |
| Individuals | 9,765 | 9,765 | 9,765 | 9,765 | 9,763 | 9,763 | 9,765 | 9,765 | 9,765 | 9,765 |

*Note.* Outcome variables are divided by their standard deviations so that coefficients represent standard deviation changes. Standard errors clustered by household in parentheses. All regressions include wave dummies, individual fixed effects, and use respondent-level weights.

***$p < 0.01$. **$p < 0.05$. *$p < 0.1$.

**TABLE 6** Impact of retirement on functional limitations

| Variables | ADLs with some difficulty | | IADLs with some difficulty | | Mobility limitations | | Large muscle limitations | | Gross motor limitations | | Fine motor limitations | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | IV | OLS | IV | OLS | IV | OLS | IV | OLS | IV | OLS | IV |
| | Average effect | | | | | | | | | | | |
| Retired | 0.0895*** | 0.00931 | 0.0643*** | −0.00518 | 0.0943*** | −0.118* | 0.0981*** | −0.207*** | 0.104*** | −0.0229 | 0.0674*** | −0.116* |
| | (0.0177) | (0.0693) | (0.0162) | (0.0616) | (0.0155) | (0.0674) | (0.0162) | (0.0714) | (0.0167) | (0.0698) | (0.0182) | (0.0674) |
| Age | −0.00837*** | −0.00774*** | −0.0106*** | −0.0101*** | −0.00926*** | −0.00761*** | −0.00253 | −0.000159 | −0.00961*** | −0.00863*** | −0.00989*** | −0.00846*** |
| | (0.00188) | (0.00188) | (0.00192) | (0.00195) | (0.00159) | (0.00169) | (0.00163) | (0.00171) | (0.00177) | (0.00184) | (0.00184) | (0.00188) |
| Age squared | 8.96e-06*** | 8.50e-06*** | 1.08e-05*** | 1.04e-05*** | 8.50e-06*** | 7.28e-06*** | 3.70e-06*** | 1.95e-06*** | 9.59e-06*** | 8.86e-06*** | 7.89e-06*** | 6.84e-06*** |
| | (6.42e-07) | (7.29e-07) | (7.49e-07) | (8.26e-07) | (5.12e-07) | (6.41e-07) | (4.79e-07) | (6.35e-07) | (6.09e-07) | (7.22e-07) | (6.15e-07) | (7.06e-07) |
| Has Medicare | −0.0560*** | −0.0378* | −0.0545*** | −0.0388* | −0.0364** | 0.0117 | −0.0319** | 0.0371* | −0.0526*** | −0.0239 | −0.0407** | 0.000810 |
| | (0.0181) | (0.0227) | (0.0175) | (0.0204) | (0.0147) | (0.0208) | (0.0147) | (0.0208) | (0.0165) | (0.0220) | (0.0178) | (0.0224) |
| Has non-Medicare HI | 0.0275* | 0.0242 | 0.0312* | 0.0283 | 0.0191 | 0.0102 | 0.0107 | −0.00207 | 0.0221 | 0.0168 | 0.00439 | −0.00328 |
| | (0.0160) | (0.0162) | (0.0180) | (0.0180) | (0.0133) | (0.0137) | (0.0128) | (0.0131) | (0.0154) | (0.0157) | (0.0160) | (0.0163) |
| >1 HI plan | −0.00277 | −0.00667 | 0.000947 | −0.00243 | 0.00798 | −0.00237 | −0.00818 | −0.0230 | −0.00265 | −0.00884 | 0.00434 | −0.00459 |
| | (0.0149) | (0.0155) | (0.0151) | (0.0149) | (0.0154) | (0.0157) | (0.0173) | (0.0176) | (0.0149) | (0.0154) | (0.0153) | (0.0156) |
| | Postretirement dynamics | | | | | | | | | | | |
| 0–4 years | 0.0953*** | 0.212*** | 0.0645*** | 0.200*** | 0.101*** | 0.0489 | 0.104*** | −0.0883 | 0.110*** | 0.199** | 0.0722*** | 0.0643 |
| | (0.0180) | (0.0781) | (0.0164) | (0.0743) | (0.0156) | (0.0710) | (0.0162) | (0.0723) | (0.0170) | (0.0797) | (0.0184) | (0.0730) |
| 4+ years | 0.0434* | −0.281*** | 0.0627*** | −0.327*** | 0.0451** | −0.433*** | 0.0497** | −0.340*** | 0.0620*** | −0.409*** | 0.0290 | −0.394*** |
| | (0.0224) | (0.0920) | (0.0232) | (0.0788) | (0.0211) | (0.0810) | (0.0213) | (0.0798) | (0.0220) | (0.0916) | (0.0233) | (0.0837) |
| Age | −0.00849*** | −0.0101*** | −0.0107*** | −0.0126*** | −0.00940*** | −0.00969*** | −0.00266 | −0.00148 | −0.00973*** | −0.0113*** | −0.01000*** | −0.0106*** |
| | (0.00188) | (0.00200) | (0.00194) | (0.00212) | (0.00159) | (0.00172) | (0.00163) | (0.00172) | (0.00178) | (0.00194) | (0.00185) | (0.00197) |
| Age squared | 9.05e-06*** | 1.02e-05*** | 1.08e-05*** | 1.22e-05*** | 8.60e-06*** | 8.79e-06*** | 3.80e-06*** | 2.92e-06*** | 9.68e-06*** | 1.08e-05*** | 7.97e-06*** | 8.40e-06*** |
| | (6.47e-07) | (8.48e-07) | (7.58e-07) | (1.00e-06) | (5.13e-07) | (6.83e-07) | (4.78e-07) | (6.52e-07) | (6.14e-07) | (8.18e-07) | (6.20e-07) | (7.94e-07) |
| Has Medicare | −0.0441** | 0.0412 | −0.0541*** | 0.0485* | −0.0238 | 0.0959*** | −0.0195 | 0.0740*** | −0.0418** | 0.0799*** | −0.0309* | 0.0762*** |
| | (0.0179) | (0.0281) | (0.0170) | (0.0250) | (0.0147) | (0.0240) | (0.0148) | (0.0228) | (0.0162) | (0.0272) | (0.0174) | (0.0261) |
| Has non-Medicare HI | 0.0277* | 0.0318* | 0.0312* | 0.0359* | 0.0192 | 0.0163 | 0.0108 | 0.00241 | 0.0223 | 0.0250 | 0.00451 | 0.00343 |
| | (0.0160) | (0.0165) | (0.0180) | (0.0185) | (0.0133) | (0.0139) | (0.0127) | (0.0131) | (0.0154) | (0.0161) | (0.0160) | (0.0166) |
| >1 HI Plan | −0.00344 | −0.00579 | 0.000924 | −0.00208 | 0.00727 | −0.00302 | −0.00888 | −0.0218 | −0.00326 | −0.00915 | 0.00378 | −0.00419 |
| | (0.0149) | (0.0158) | (0.0151) | (0.0150) | (0.0154) | (0.0159) | (0.0173) | (0.0176) | (0.0149) | (0.0157) | (0.0153) | (0.0158) |
| Observations | 58,612 | 58,612 | 58,607 | 58,607 | 58,609 | 58,609 | 58,604 | 58,604 | 58,613 | 58,613 | 58,612 | 58,612 |
| Individuals | 10,007 | 10,007 | 10,007 | 10,007 | 10,007 | 10,007 | 10,006 | 10,006 | 10,007 | 10,007 | 10,007 | 10,007 |

*Note.* Outcome variables are divided by their standard deviations so that coefficients represent standard deviation changes. Standard errors clustered by household in parentheses. All regressions include wave dummies, individual fixed effects, and use respondent-level weights.

***$p < 0.01$. **$p < 0.05$. *$p < 0.1$.

**TABLE 7** Impact of retirement on medical care utilization

| | Hospital stay | | Nursing home stay | | Hospital nights | | Nursing home nights | |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **OLS** | **IV** | **OLS** | **IV** | **OLS** | **IV** | **OLS** | **IV** |
| | Average effect | | | | | | | |
| Retired | 0.0319*** | −0.106*** | 0.00318* | −0.000841 | 0.524*** | −0.751 | 0.195* | −0.113 |
| | (0.00775) | (0.0340) | (0.00192) | (0.00782) | (0.157) | (0.485) | (0.108) | (0.418) |
| Age | 0.00251*** | 0.00348*** | −0.000678*** | −0.000649*** | 0.0298** | 0.0387*** | −0.0421*** | −0.0399** |
| | (0.000847) | (0.000887) | (0.000220) | (0.000225) | (0.0135) | (0.0138) | (0.0161) | (0.0163) |
| Age squared | 1.47e-06*** | 7.26e-07** | 9.70e-07*** | 9.48e-07*** | 2.18e-05*** | 1.49e-05*** | 5.20e-05*** | 5.04e-05*** |
| | (2.20e-07) | (2.84e-07) | (8.13e-08) | (8.73e-08) | (3.82e-06) | (4.72e-06) | (7.40e-06) | (7.44e-06) |
| Has Medicare | 0.00909 | 0.0417*** | −1.93e-05 | 0.000929 | 0.0743 | 0.375** | −0.160 | −0.0878 |
| | (0.00788) | (0.0109) | (0.00214) | (0.00295) | (0.137) | (0.160) | (0.128) | (0.157) |
| Has non-Medicare HI | 0.0207*** | 0.0148** | 0.00740*** | 0.00723*** | 0.420*** | 0.365*** | 0.241 | 0.228 |
| | (0.00631) | (0.00660) | (0.00201) | (0.00205) | (0.105) | (0.108) | (0.159) | (0.165) |
| >1 HI plan | −0.00483 | −0.0120 | −0.000730 | −0.000937 | −0.165 | −0.231* | −0.0210 | −0.0369 |
| | (0.00944) | (0.00981) | (0.00213) | (0.00217) | (0.129) | (0.137) | (0.228) | (0.227) |
| | Postretirement dynamics | | | | | | | |
| 0–4 years | 0.0326*** | −0.0936*** | 0.00333* | 0.0104 | 0.526*** | −0.151 | 0.184* | 0.660 |
| | (0.00783) | (0.0343) | (0.00197) | (0.00953) | (0.163) | (0.533) | (0.104) | (0.615) |
| 4+ years | 0.0270*** | −0.125*** | 0.00217 | −0.0138 | 0.509*** | −1.486*** | 0.269 | −1.096 |
| | (0.0103) | (0.0376) | (0.00257) | (0.0101) | (0.177) | (0.554) | (0.204) | (0.715) |
| Age | 0.00250*** | 0.00332*** | −0.000681*** | −0.000783*** | 0.0298** | 0.0314** | −0.0418*** | −0.0493*** |
| | (0.000847) | (0.000896) | (0.000220) | (0.000244) | (0.0136) | (0.0142) | (0.0161) | (0.0165) |
| Age squared | 1.48e-06*** | 8.42e-07*** | 9.72e-07*** | 1.04e-06*** | 2.18e-05*** | 2.02e-05*** | 5.19e-05*** | 5.72e-05*** |
| | (2.21e-07) | (2.99e-07) | (8.21e-08) | (1.09e-07) | (3.88e-06) | (5.52e-06) | (7.38e-06) | (9.47e-06) |
| Has Medicare | 0.0104 | 0.0468*** | 0.000252 | 0.00465 | 0.0781 | 0.585*** | −0.180 | 0.193 |
| | (0.00801) | (0.0120) | (0.00215) | (0.00336) | (0.136) | (0.177) | (0.127) | (0.220) |
| Has non-Medicare HI | 0.0207*** | 0.0153** | 0.00741*** | 0.00767*** | 0.420*** | 0.389*** | 0.240 | 0.257 |
| | (0.00631) | (0.00659) | (0.00201) | (0.00207) | (0.105) | (0.108) | (0.159) | (0.163) |
| >1 HI plan | −0.00490 | −0.0119 | −0.000744 | −0.000811 | −0.166 | −0.225* | −0.0199 | −0.0300 |
| | (0.00944) | (0.00976) | (0.00212) | (0.00216) | (0.129) | (0.136) | (0.228) | (0.226) |
| Observations | 63,304 | 63,304 | 63,329 | 63,329 | 63,173 | 63,173 | 63,305 | 63,305 |
| Individuals | 10,531 | 10,531 | 10,533 | 10,533 | 10,525 | 10,525 | 10,532 | 10,532 |

| Variables | Doctor visits | | Home care use | | Prescription drug use | | Out-of-pocket medical expenses | |
|---|---|---|---|---|---|---|---|---|
| | OLS | IV | OLS | IV | OLS | IV | OLS | IV |
| | Average effect | | | | | | | |
| Retired | 0.947*** | −0.343 | 0.00764* | −0.0144 | 0.0115 | −0.100*** | 144.8 | 375.7 |
| | (0.327) | (1.120) | (0.00404) | (0.0155) | (0.00776) | (0.0373) | (93.76) | (376.7) |
| Age | 0.0929*** | 0.102*** | −0.000765* | −0.000610 | 0.00366*** | 0.00453*** | 1.640 | 0.0232 |
| | (0.0264) | (0.0269) | (0.000428) | (0.000436) | (0.000787) | (0.000819) | (9.359) | (10.81) |
| Age squared | 9.35e-06 | 2.44e-06 | 1.38e-06*** | 1.26e-06*** | −1.45e-06*** | −2.09e-06*** | −0.00250 | −0.00126 |
| | (7.24e-06) | (8.49e-06) | (1.29e-07) | (1.51e-07) | (2.37e-07) | (3.12e-07) | (0.00208) | (0.00363) |
| Has Medicare | 0.271 | 0.576* | 0.00176 | 0.00696 | 0.00625 | 0.0315*** | −221.7* | −276.1*** |
| | (0.266) | (0.340) | (0.00400) | (0.00553) | (0.00683) | (0.0105) | (116.9) | (100.2) |
| Has non-Medicare HI | 1.033*** | 0.978*** | 0.00748** | 0.00655* | 0.0150*** | 0.0103* | −154.1 | −144.3 |
| | (0.226) | (0.222) | (0.00352) | (0.00358) | (0.00550) | (0.00578) | (109.4) | (121.3) |
| >1 HI plan | 0.148 | 0.0815 | 0.00173 | 0.000589 | 0.00215 | −0.00330 | 15.48 | 27.37 |
| | (0.249) | (0.258) | (0.00413) | (0.00428) | (0.00813) | (0.00838) | (71.37) | (70.43) |
| | Postretirement dynamics | | | | | | | |
| 0–4 years | 0.973*** | −0.441 | 0.00801* | 0.00314 | 0.0127* | −0.0933** | 163.7* | 475.1 |
| | (0.335) | (1.265) | (0.00414) | (0.0170) | (0.00767) | (0.0375) | (98.74) | (364.2) |
| 4+ years | 0.760* | −0.00844 | 0.00505 | −0.0483** | 0.00141 | −0.0889** | 9.868 | 169.9 |
| | (0.397) | (1.156) | (0.00511) | (0.0193) | (0.0110) | (0.0427) | (93.89) | (377.6) |
| Age | 0.0922*** | 0.104*** | −0.000774* | −0.000850* | 0.00363*** | 0.00448*** | 1.162 | −1.358 |
| | (0.0265) | (0.0270) | (0.000429) | (0.000455) | (0.000786) | (0.000816) | (9.352) | (10.62) |
| Age squared | 9.83e-06 | 1.23e-06 | 1.39e-06*** | 1.43e-06*** | −1.43e-06*** | −2.06e-06*** | −0.00217 | −0.000269 |
| | (7.30e-06) | (9.38e-06) | (1.30e-07) | (1.75e-07) | (2.36e-07) | (3.05e-07) | (0.00207) | (0.00353) |
| Has Medicare | 0.321 | 0.485 | 0.00245 | 0.0164** | 0.00883 | 0.0288** | −185.6* | −219.1* |
| | (0.274) | (0.372) | (0.00399) | (0.00647) | (0.00705) | (0.0114) | (107.4) | (115.6) |
| Has non-Medicare HI | 1.034*** | 0.975*** | 0.00749** | 0.00720** | 0.0150*** | 0.0106* | −153.5 | −140.7 |
| | (0.226) | (0.222) | (0.00352) | (0.00359) | (0.00550) | (0.00577) | (109.3) | (120.3) |
| >1 HI plan | 0.146 | 0.0851 | 0.00169 | 0.000535 | 0.00200 | −0.00288 | 13.58 | 26.80 |
| | (0.249) | (0.256) | (0.00413) | (0.00428) | (0.00813) | (0.00836) | (71.22) | (70.87) |
| Observations | 62,067 | 62,067 | 63,327 | 63,327 | 58,592 | 58,592 | 63,359 | 63,359 |
| Individuals | 10,505 | 10,505 | 10,534 | 10,534 | 10,005 | 10,005 | 10,535 | 10,535 |

*Note*. Standard errors clustered by household in parentheses. All regressions include wave dummies, individual fixed effects, and use respondent-level weights.

***$p < 0.01$. **$p < 0.05$. *$p < 0.1$.

significant decreases in hospitalizations both in the short run and in the long run as well as a statistically significant decrease in the number of hospital nights in the long run, a long-run decrease in use of home care, and short-run and long-run decreases in prescription use. Out-of-pocket spending shows no significant change.[34] These results suggest that regardless of the impact of retirement on health, policies that either delay or hasten retirement are unlikely to have much of a lasting, direct impact on health care costs.[35]

Finally, we examine the average impact of retirement on the health and life satisfaction measures for various subsamples, including individuals with a high school education or less, individuals with physically demanding jobs, women, non-White race or Hispanic ethnicity, and unmarried individuals. We do this by including an interaction between group membership (during the baseline wave) and retirement status in the second-stage regressions. We instrument for both retirement status and its interaction with group membership with the eligibility indicators and their interactions with group membership. Observations with missing values for these characteristics (fractions shown in Table 2) are excluded from the regressions. Our results (not shown but available upon request) suggest that the lower educated group sees smaller gains in most outcomes. However, we find no significant differences in utilization except for smaller out-of-pocket medical spending.[36] Individuals with more physically demanding jobs also experience significantly more health conditions, lower satisfaction, and more mobility restrictions upon retirement relative to those without physically demanding jobs. We find no significant differences in utilization except for a smaller decrease in prescription drugs. This is in line with the findings of Coe and Lindeboom (2008) who find few differences across occupation and education, with greater improvements among white collar workers and more educated individuals. We also look at heterogeneity across gender and race. Females see a significantly larger decrease in number of health conditions, smaller improvements in life satisfaction, and significantly more gross motor limitations relative to men upon retirement. For utilization, women see significantly more nursing home use, fewer doctor visits, less prescription drug use, and lower out-of-pocket spending relative to men upon retirement. Finally, non-White race or Hispanic ethnicity is associated with a larger improvement in CESD scores but smaller improvements in most physical limitations. For utilization measures, non-White or Hispanic groups see no reduction in hospital nights and significantly more prescription drug use than the White group upon retirement.

## 4.2 | Robustness

One potential concern regarding our long-run results could be that they suffer from survivor bias. That is, individuals who survive to four or more years postretirement are likely to be in better health, biasing the results in favor of finding that retirement improves long-run health. To partially address this issue, we re-estimate our results using only individuals who are observed until four or more years after retirement. The results are not qualitatively different from those reported above. That is, retirement is still associated with an overall increase in self-reported health and reduction in depression scores, an increase in all life satisfaction measures, a long-run reduction in most functional limitations, a reduction in hospital use and prescription drug use, and a long-run reduction in home care use. Fewer of our coefficients are statistically significant, however, possibly reflecting the reduction in power that comes from a smaller sample. In addition, many of the functional limitation measures increase on average due to weaker long-run effects.

Another potential concern is that, because we use all available observations for each outcome variable, the differences we find across outcome variables are driven by sample selection. To address this, we re-estimate our results using only observations with no missing values. This results in a sample of 55,044 observations. Again, the results are not substantially different from those reported above.

To test that our results are not driven by the way we define retirement, we re-estimate our results defining partially retired individuals as working. That is, the definition of retirement is based solely on whether an individual is working (either full time or part time), rather than on whether he or she self-identifies as retired. Our results are generally similar. We also estimate the average effects of retirement with the inclusion of individuals who retire and return to work.[37]

[34]Note that utilization changes may also be driven by changes in the type of insurance. We try to alleviate this concern by controlling for Medicare, other insurance, and number of insurance plans. Moreover, when we limit the sample to individuals that maintain employer insurance throughout retirement, we also see no significant or meaningful increases in utilization and marginally significant decreases in average hospitalizations, long-term hospital nights, and long-term use of a nursing home.

[35]For these regressions, we drop individuals with missing subgroup information.

[36]We report here only the interaction term coefficients that are significant at the 5% level.

[37]Under this definition of retirement, we can only estimate average effects as defining time because retirement is problematic for those who unretire.

If these are the individuals for whom retirement does not have beneficial effects, leaving them out could bias our results towards positive findings. However, the average effects remain similar when we include them in the sample. To address a concern that there may be selection into firms that offer DBs with specific retirement ages, we also run the results using only Social Security variables as instruments. Again, the findings remain similar. Finally, we try controlling for a cubic (rather than quadratic) polynomial in age. For most of our health indicators, life satisfaction measures, and utilization outcomes, the coefficients are similar in magnitude with some small drops in significance. This is not surprising because the cubic term soaks up more of the variation in age. Larger disparities are seen in the functional limitations outcomes. Although most of the coefficients are the same sign, the magnitudes and significance diminish substantially. The exceptions are ADLs and IADLs, which now increase overall. The long-run effects are also positive but statistically insignificant.[38]

## 5 | CONCLUSIONS

The question of whether retirement affects health and well-being is important not only when making individual retirement decisions but also when designing public policies that influence retirement behavior. As policymakers consider policies to further lengthen working lives and resolve shortfalls in funding for public retirement programs, it is important to take into account the impact these policies have on the health and well-being of working individuals. Moreover, changes in health due to retirement can also influence health care utilization and therefore the solvency of programs that provide health insurance to the elderly. This paper provides new evidence to address these questions.

Without taking the endogeneity of retirement decisions into account, early studies often find negative impacts of retirement on health and well-being. Indeed, our OLS results confirm these findings. Recent studies correct for selection into retirement. They find that the negative effects of retirement on objective health measures largely disappear and that retirement improves self-reported health. Our IV results also show increases in self-reported health and no negative effects on other measures. In addition, by utilizing more recent data and studying dynamic changes in health outcomes, we find evidence of improvements in long-term health outcomes that have not been found in past studies. This evidence is consistent with the view that health is a stock variable that does not change immediately upon retirement but rather evolves over time. If this view is correct, it is likely that a longer horizon may uncover even more health benefits of retirement. These health improvements are also consistent with other literature that finds healthy lifestyle changes upon retirement. This literature suggests that individuals exercise more, have less work stress, sleep better, reduce smoking, and spend more time preparing food at home (Aguiar & Hurst, 2005; Coe & Zamarro, 2015b; Eibich, 2015; Evenson, Rosamond, Cai, Diez-Roux, & Brancati, 2002 and Insler, 2014).[39]

Finally, consistent with improvements in health during retirement, we provide direct evidence that retirement leads to no statistically significant increase in health care utilization and reductions in some categories. That is, the health improvements that occur after retirement are likely to come without added expenses.

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[38] Results from the robustness checks discussed in this section are not shown but are available upon request.

[39] Using HRS data, we also find a marginally significant increase in vigorous exercise and an insignificant but negative coefficient on smoking. These results align with the literature. We also find a significant increase in the number of people who report drinking, but an insignificant decrease in the number of days people report drinking.

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