HOW DOES DEBT SHAPE HEALTH OUTCOMES FOR OLDER AMERICANS?

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Abstract

This study explores the association between debt burdens and health at older ages. It examines a range of physical and mental health measures and assesses how they may be shaped by the debt held by older adults. It compares health outcomes for older adults with and without debt. It also explores whether the amount or type of debt modifies the debt-health nexus. To address the likely endogeneity of debt and health, the study employs marginal structural models, developed specifically as an identification strategy in the presence of possible endogeneity, alongside population-averaged models that allow us to compare outcomes for populations with and without debt without having to rely on unverifiable assumptions regarding the underlying population distribution, as is the case with random- and fixed-effects models. Data for this study come primarily from the *Health and Retirement Study*, and the sample is limited to respondents ages 55 and older from the 1998 through 2016 survey waves.

The paper found that:

- Carrying any debt has a negative effect on a range of health outcomes, including objective and subjective physical and mental health outcomes. The more debt one carries the more detrimental it is for older adults' health.
- The type of debt matters: while secured debt has a limited, if any, negative impact on health outcomes, unsecured debt has a substantial negative impact on health.
- Although both marginal structural models and population-averaged models consistently show a significantly negative impact of debt on health, the estimated magnitudes are generally somewhat smaller in population-averaged models, arguably providing for a bound of estimates of the debt-health relationship.

The policy implications of the findings are:

- Policymakers should consider designing policies that promote the prudent use of debt and discourage carrying large debt burdens, especially unsecured debt, into retirement as this would help promote better health outcomes for older Americans.
- Limiting the use of expensive, primarily unsecured, debt can directly contribute to enhancing private retirement savings, thereby reducing older Americans' dependency on Social Security benefits as their primary source of retirement security.

Introduction

Over the past several decades, the share of older Americans carrying debt and their level of indebtedness has increased substantially (e.g., Butrica and Karamcheva 2018, 2020; Butrica and Mudrazija 2016, 2020; Fichtner 2019; Lusardi, Mitchell, and Oggero 2018). The reasons behind this trend are numerous and include policies encouraging homeownership, the proliferation of credit cards, and an explosion in the costs of medical care and higher education. Consequently, most types of debt have increased over time (Lusardi, Mitchell, and Oggero 2020).

Although debt, if used judiciously, can improve financial well-being, excessive debt can have deleterious effects. This is particularly true at older ages when substantial debt burdens can make retirees less financially resilient to various shocks common in later life, such as a catastrophic health event or the death of a spouse. Many older adults today are increasingly vulnerable to both personal financial shocks and fluctuations in the economy – particularly those ages 70 and older for whom indebtedness has increased dramatically over time (Butrica and Mudrazija 2020). More than half of baby boomers report struggling financially following a shock, compared with only about a third of the pre-boomer generation (Pew Charitable Trusts 2015a).

Beyond its impact on financial security, research increasingly suggests that debt and its related financial strain may have direct negative effects on health. In particular, studies tie financial strain and indebtedness to poorer mental health outcomes, such as depression and other common mental disorders (Drentea and Reynolds 2012; Fitch et al. 2011; Meltzer et al. 2013), and to elevated stress levels and hypertension (Leung and Lau 2017; Sweet et al. 2013). One's inability to make loan payments is associated with a range of negative health outcomes, including a higher prevalence of suicidal ideation and depression, and poorer subjective health and health-related behaviors (Turunen and Hiilamo 2014).

The literature, however, cannot explain the causal pathway linking poor health with debt (Richardson, Elliott, and Roberts 2013). Moreover, we have a very limited understanding of how health might vary by the type, level, and duration of debt. Some research, for example, suggests that non-collateralized debt, such as credit card debt, might be more correlated with adverse health than collateralized debt, such as mortgages, and that negative health outcomes may disappear at low debt levels (Hojman, Miranda, and Ruiz-Tagle 2016). Higher mortgage

debt has been linked to a higher incidence of hypertension and more depression but appears to have no impact on subjective well-being (Leung and Lau 2017). Relative to short- and medium-term debt, long-term debt might be associated with poorer health outcomes (Clayton, Liñares-Zegarra, and Wilson 2015). Although the debt-health link has received some scholarly attention, few studies focus on its relationship at older ages. In the context of various debt risks associated with advanced age and the difficulty that older adults face responding to financial challenges (i.e., their limited incomes and inability to work more), this is an important gap in our knowledge.

Building on insights from the literature, this study advances our understanding of the association between debt burden and health at older ages. It examines a range of physical and mental health measures and assesses how they may be shaped by the debt held by older adults. It compares health outcomes of older adults with and without debt. It also explores whether the amount or type of debt modifies the debt-health nexus. To address the likely endogeneity of debt and health, the study employs marginal structural models, developed specifically as an identification strategy in the presence of possible endogeneity, alongside population-averaged models.

Our findings show that, in general, carrying any debt has a negative effect on health outcomes, and the more debt one carries the more detrimental it is to health. However, the type of debt matters: secured debt has little or no negative impact on health outcomes, while unsecured debt has a substantial negative impact on health. Moreover, the negative effects of debt on health outcomes vary in severity by the health condition. For example, carrying any debt consistently has one of the largest negative effects on having a work-limiting condition. For those with debt, however, the amount of debt consistently has the largest negative effect on limitations in the instrumental activities of daily living (IADLs). While many of the findings are consistent between the marginal structural and population-averaged models, the negative effects of debt on health conditions are generally somewhat smaller in the population-averaged models. Thus, we can think of our findings as representing bounds of the effects of debt on health outcomes.

Previous Literature

Trends in Debt

Total household debt in the United States was $15 trillion in the first half of 2021, an increase of nearly $700 billion over the past year, setting yet another record in overall debt and increasing at the fastest clip since 2007 (Federal Reserve Bank of New York 2021). Mortgages accounted for well over two-thirds of the total debt ($10.4 trillion). Compared with the same period one year ago, mortgages increased by $666 billion, followed by auto loans ($72 billion), and student loans ($30 billion), whereas home equity lines of credit and credit card balances experienced a decline (by $53 billion and $30 billion, respectively) (Federal Reserve Bank of New York 2021). Looking over a longer time horizon and relative to disposable income, household debt has been declining in the aftermath of the Great Recession, returning to levels last recorded in the early 2000s (Butrica and Mudrazija 2020; Peter G. Peterson Foundation 2020). At almost 100 percent of disposable income, however, the level of household debt is still substantially higher than prior to the 1990s. Compositionally, mortgages dominate household debt accounting for 70 percent of the total, followed by student debt (11 percent), auto loans (10 percent), and credit card debt (5 percent) (Federal Reserve Bank of New York 2021). The main compositional change over the past two decades has been the rise of student debt and decline in credit card debt.

Among adults ages 65 and older, the share carrying any debt has increased from 37.8 percent in 1989 to 61 percent in 2016, with the average and median amounts of debt increasing over the same period by a factor of three and four, respectively, and reaching levels of about $87,000 and $31,000 (Li 2019). And although the debt burden of older adults, as measured relative to their income (12.4 percent) and assets (9 percent), is moderate in comparison to younger adults, the trend in debt burden has been decisively upward over the recent few decades (Li 2019), and each successive cohort of older adults carries a larger relative (and absolute) debt burden. For example, baby boomers born 1954 to 1965 had a median debt-to-assets ratio at ages 56-61 that was almost six times higher (23 percent) than the cohort born 1931 to 1941 when they were the same age (Fichtner 2019). More generally, the fact that the U.S. population has increased its debt holdings at the same time that it is aging and that every successive cohort is more indebted than the previous one (e.g., Pew Charitable Trusts 2015b; Fichtner 2019; Collinson, Rowey, and Cho 2020), suggests an important impact of cohort effects on the increase

in debt in the United States. This has been true despite the temporary deleveraging during and in the immediate aftermath of the Great Recession (Federal Reserve Bank of New York 2021), when period effects briefly dominated over the long-term cohort trends. Other than economic downturns, however, period effects may have strengthened further observed cohort effects as the rising cost of education, healthcare, and, albeit less uniformly, real estate, coupled with easier access to secured and unsecured credit, created circumstances favorable for the expansion of debt. In this context, it is not surprising that 43 percent of persons ages 51-61 report that they feel overindebted (de Bassa Scheresberg and Lusardi 2014), and bankruptcies among older adults are increasing at a fast clip (Li 2019; Thorne et al. 2018).

Secured debt, primarily as it relates to mortgages and residential debt more generally, is an even more important component of total debt among older than among younger adults. In fact, residential loans account for four out of every five dollars of debt held by households headed by an older adult (Li 2019). With the growth in property prices outpacing income growth, increased availability of mortgages, and other changes such as favorable tax treatment of mortgages, coupled with the shift in mortgage lending toward older adults, debt held by older Americans increased substantially over the past couple of decades, in contrast to a moderate decline among young adults (Brown et al. 2019; Butrica and Karamcheva 2018, 2020; Butrica and Mudrazija 2016, 2020). Indeed, the share of elderly households with residential debt more than doubled and the average amount of such debt owed more than quadrupled between 1989 and 2016 (Li 2019). Simultaneously, however, younger adults are more likely to carry higher debt burdens into their older years than preceding generations as real estate prices have increased and down payments have decreased as a share of property values (Lusardi and Mitchell 2013; Stanford Center on Longevity 2018).

Beyond residential debt, unsecured debt also plays a role in the increased debt burden of older adults. Credit card debt continues to be the most important such debt, with more than a third of older adult households reporting to have it and the average balance reaching $2,400 in 2016, compared to only a fifth of older adults and an average balance of less than $1,000 in 1989 (Li 2019). After declining to a minimum of only 0.4 percent of older adults who held student debt of just around $2,300 on average in 2001, student loans expanded at a fast clip in the run up to and the aftermath of the Great Recession, fluctuating at levels of 2.1-2.7 percent of elderly households that report them, with balances of $12,000-$16,000 (Li 2019). Some estimates

suggest that persons ages 60 and older may have held as much as $67 billion in student debt as of 2015, much of it for their children's or grandchildren's education (Consumer Financial Protection Bureau 2017). Other types of unsecured debt, such as medical debt or payday loans, are also on the rise among older adults. For example, 11 percent of Americans born 1928 to 1945 and 21 percent of those born 1946 to 1964 reported having medical debt, with median amounts of $500 and $1,200, respectively (Pew Charitable Trusts 2015b). In one survey, one in five adults ages 51-61 reported using payday loans or pawnshops at some point within the previous five years (de Bassa Scheresberg and Lusardi 2014).

Linking Debt to Health and Well-being

Over the past couple of decades, research has established a strong link between debt and health and well-being. In particular, a range of studies linked financial strain and indebtedness to poor mental health outcomes, primarily depression and other common mental disorders (Drentea and Reynolds 2012; Fitch et al. 2011; Meltzer et al. 2013; Selenko and Batinic 2011; Song et al. 2020). Recent research further suggests a link between cognitive health and debt, although even people with higher cognitive ability can be adversely impacted by the increasing complexity of financial products (Angrisani, Burke, and Kapteyn 2020). Physical health shows a somewhat less clear link with debt. While higher debt is associated with elevated stress levels and hypertension (Drentea and Raynolds 2012; Hamilton et al. 2019; Leung and Lau 2017; Song et al. 2020; Sweet et al. 2013), evidence is more limited for other measures of physical health. However, research on the negative impacts on health of financial shocks brought on by the Great Recession suggest that physical health can deteriorate in response to such shocks (Boen and Yang 2016; Choi 2009), suggesting that at least those instances of increased indebtedness that represent a financial shock (e.g., due to unexpected repairs, unexpected medical bills etc.) may follow a similar pattern. Similarly, being unable to make loan payments on time is associated with a range of negative health outcomes, including a higher prevalence of suicidal ideation and depression, as well as poorer subjective health and health-related behaviors (Turunen and Hiilamo 2014). Beyond health and financial well-being, the research also finds that debt negatively impacts life satisfaction more generally (Greenberg and Mogilner 2020; Kim and Chatterjee 2019).

The implications of debt on health and well-being, however, likely differ by the characteristics of debt. High debt burdens negatively affect physical and mental health (e.g., Sweet et al. 2013). However, the type of debt might be more important than the amount of debt for health and subjective wellbeing (Greenberg and Mogilner 2020). Indeed, with respect to wellbeing, a substantial number of studies suggest that, unlike secured debt, unsecured debt has a strong negative impact on depression and well-being (Hojman, Miranda, and Ruiz-Tagle 2016; Lusardi, Mitchell, and Oggero 2018; Zurlo, Yoon, and Kim 2014). Student debt has been found to be negatively related to health, including self-rated health and psychological problems (Kim and Chatterjee 2019), as well as life satisfaction (Greenberg and Mogilner 2020) and subjective well-being (Archuleta, Dale, and Spann 2013; West, Shanafelt, and Kolars 2011), while credit card debt has been found to have negative effects on mental health, particularly for people in the middle of the income distribution (Hodson, Dwyer, and Neilson 2014), and with lower subjective wellbeing (Bell et al. 2014). Secured debt, however, appears to be linked to negative health outcomes only at substantially high levels of debt, such as when the mortgage loan to home value (LTV) ratio is at or above 80 percent, and, even then, not with a full range of physical health outcomes (Leung and Lau 2017). Yet, even for unsecured debt, the level of debt matters to some extent, as the empirical evidence suggests that the negative impact on depression and wellbeing is tempered as debt levels decline (Hojman, Miranda, and Ruiz-Tagle 2016). One study, for example, found no negative impact on subjective wellbeing once credit card balances dropped below $2,500 (Bell et al. 2014).

Ultimately, however, the literature largely fails to explain the causal pathway linking poor health with debt (Richardson, Elliott, and Roberts 2013), and we still have a limited understanding of how health might vary by the type, level, and duration of debt. The knowledge gaps are particularly large when it comes to older adults who have not received much scholarly attention, yet are at a particularly high risk of poor health as well as at an elevated risk of being unable to respond to financial shocks by changing their behavior, such as working longer.

Data and Methods

Data and Variables

To assess the possible impact of financial strain on older adults' health, we use data from the *Health and Retirement Study* (HRS), which collects detailed information on older adults'

health status and behaviors as well as their debt, income, and assets. Health information includes data on functional limitations and medically diagnosed health conditions, cognition, self-reported health status, and behaviors such as smoking, drinking, and exercising. Information on income and assets, mortgage debt, credit card balances, and other debt allows us to measure indebtedness and financial strain, including the debt level and debt-to-assets ratio, as well as to distinguish key sources of secured and unsecured debt. Our analytic sample is limited to HRS respondents aged 55 and older from the 1998 through 2016 survey waves. In supplementary analysis, we also use restricted geographic HRS identifiers to merge information on county-level differences in unemployment rates (from the Local Area Unemployment Statistics produced by the Bureau of Labor Statistics) and estimated housing value (using information from the American Community Survey (ACS) for 2010 and later, and computing it for earlier years using the 2010 ACS values alongside the Federal Finance Housing Agency experimental county-level housing price indices and changes in those indices). These local data allow us to account for the possible impact of differences in local conditions, such as unemployment and the cost of living, on the relationships we analyze.

Our outcome variables of interest include multiple subjective and objective health indicators covering different aspects of physical and mental health. They include death (coded as one if a person died at any point between two successive survey waves), fair or poor self-rated health, poor mental health (coded as one if a respondent reported experiencing at least two symptoms of depression in the week prior to the interview),[1] two or more doctor-diagnosed health conditions,[2] doctor-diagnosed memory disease, work-limiting health condition (coded as one if a respondent reports that health limits the kind or amount of paid work),[3] any limitation in

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[1] The symptoms include feeling 1) depressed, 2) lonely, 3) sad, 4) everything an effort, 5) having a restless sleep, 6) could not get going, 7) feeling happy, and 8) enjoyed life. As the last two items are positive, they are coded as one in the absence of a respondent reporting that she/he felt happy or enjoyed life during the reference period.
[2] The conditions include: 1) high blood pressure or hypertension, 2) diabetes or high blood sugar, cancer or a malignant tumor of any kind except skin cancer, 3) chronic lung disease except asthma such as chronic bronchitis or emphysema, 4) heart attack, 5) coronary heart disease, angina, congestive heart failure, or other heart problems, 6) stroke or transient ischemic attack, 7) emotional, nervous, or psychiatric problems, and 8) arthritis or rheumatism.
[3] Because of issues with coding of this variable that affect several waves of data collection prior to 2006, we limit the analysis of this indicator to 2006 and later.

the activities of daily living (ADL),[4] any limitation in the instrumental activities of daily living (IADL),[5] and being obese (coded as one if body mass index is equal or greater than 30).

Our main predictor of interest is debt, for which we use multiple measures. Our basic measure of debt records whether a respondent reported any debt (as opposed to none). We also distinguish individuals who reported having secured debt (primary and secondary mortgage or home loan) relative to those without any debt, and those who reported having unsecured debt (such as credit card balances, medical debts, life insurance policy loans, loans from relatives) relative to those without any debt. Furthermore, we use total assets to create additional indicators of total, secured, and unsecured debt-to-assets ratios of 30 percent and 80 percent, respectively.[6] We also control for a range of demographic and socioeconomic characteristics of interest including age, sex, race and ethnicity, nativity, census division of current residence, relationship status, household size, having multiple living children, having multiple living siblings, education, work status of respondent and spouse, and homeownership.

Analytical Approach

We begin by analyzing trends in the share of older Americans who carry debt and the value of their debt overall and by its type (secured versus unsecured). Because debt itself is not concerning if people can service their debt, we next analyze trends in older adults' degree of leverage to gauge whether they have more debt than what can be covered by their liquid (or financial) assets. Once we established the trends in older Americans' indebtedness, we then examine how carrying debt, the types of debt, and level of debt, are associated with various health conditions.

While prior studies have determined that indebted individuals tend to have relatively poor health, establishing a causal link between the two has been more challenging given their endogenous nature. To address this issue, we use marginal structural modeling, an identification strategy common in epidemiologic research that is increasingly applied to social science (e.g., Do, Wang, and Elliott, 2013). This two-stage process first estimates the probability that each

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[4] Includes the following ADLs: bathing, dressing, eating, getting in and out of bed, and walking across a room.
[5] Includes the following IADLs: using the phone, managing money, taking medications, shopping for groceries, and preparing hot meals.
[6] In supplementary analyses, we also use the measures of strictly secured and unsecured debt and debt ratios (by excluding observations where a respondent reports having both types of debt), examining different cutoffs for debt-to-assets ratio (ranging from 5 percent to 70 percent), and using a lagged value of debt.

subject is treated (e.g., holds debt) and then derives related inverse-probability-of-treatment weights that are used in a regression model to estimate the treatment-outcome link. Weighting the data in this way breaks the association between the time-dependent confounder and the outcome (McCulloch 2015). The weights are calculated in the following way:

$$IPTW_{it} = \prod_{t=0}^{T} \frac{\Pr(D_t = d \mid \bar{D}_{t-1}, X_0)}{\Pr(D_t = d \mid \bar{D}_{t-1}, X_0, \bar{X}_{t-1})}$$

where t denotes time and i denotes person, $D_t = d$ denotes being indebted, and X is a vector of time-invariant and time-dependent confounders including our outcome variables. Subscript 0 represents baseline values and t-1 represents one-period lags, while overbars denote covariate history up to time t for time-variant confounders. Using this approach, we can account for time-dependent confounding (Fewell et al., 2004; Seuring et al., 2018). This is an important consideration since it is plausible and even likely that prior debt affects, for example, whether an older adult (or her/his partner) works or not, and the failure to account for this could bias our estimates.

Additionally, we fit a population-averaged model, which allows us to compare outcomes for populations with and without debt (or, more precisely, for an average person with debt relative to an average person without debt) as opposed to a more traditional approach (e.g., a random-effects model) where we would be making a hypothetical comparison of health outcomes for the same person with and without debt. Although the results of these different models are often similar, since our goal is to compare populations with and without debt (and, alternatively, with different types of debt), we prefer the population-averaged model. As our outcomes of interest are binary, we will estimate the following general model:

$$\Pr(H_{it} \mid D_{it}, X_{it}) = \alpha + \beta^* D_{it} + X_{it}\gamma$$

where H_{it} represents our health outcomes of interest, D_{it} represents debt variables, which are our key predictors of interest, and X_{it} represents a vector of relevant demographic and socioeconomic controls. Important to note is that this model specifies only a marginal distribution rather than assuming a fully specified distribution of the population. Because models such as random- and fixed-effects models rest on essentially unverifiable assumptions regarding the underlying distribution, which can lead to biased inference, population-averaged

models may represent an appealing alternative and a better approximation of the truth in some circumstances (Hubbard et al. 2010). Given our interest in the impact of a key predictor, debt, on health outcomes, and the average model effects, our analysis seems to fit the requirements necessary for preferring a population-averaged modeling approach over a mixed (i.e., fixed and random effects) model approach. Overall, then, we use two distinct approaches to assess the causal link of health and debt, each with unique analytical advantages.

Results

Descriptive Results

As other studies have found, our analysis shows that older adults are increasingly likely to carry debt and are increasingly indebted (Figure 1). Between 1998 and 2016, the proportion carrying any debt increased from 43.1 to 57.1 percent. Among those holding debt, the median value increased over the same period from $40,145 to $62,784. The biggest run-up in debt occurred between 1998 and 2008 when the share of older adults with debt increased 26 percent and the median value increased 66 percent (Table 1). In contrast, between 2010-2016, the share with debt increased only 1 percent and the median value declined 5 percent. Interestingly, much of the overall increase in the percentage of older Americans with debt is driven by unsecured debt, while much of the overall increase in the levels of debt is driven by secured debt. Older adults today are much more likely to carry unsecured debt, such as credit card debt, than they were nearly two decades ago. And while the amount of unsecured debt they carry increased 36 percent, the amount of secured debt they carry increased 64 percent.

Not only have older adults become more indebted, but they have also become increasingly leveraged (Table 2). In 1998, the typical older adult with debt held 17.2 times more debt than assets. By 2016, this had increased to 24.9. The share of older adults with debt-to-assets ratios of at least 30 percent increased from 33.8 to 44.9 percent and the share with debt-to-assets ratios of at least 80 percent increased from 8.8 to 15.1 percent.

Against this backdrop, we consider how the prevalence of health conditions varies by whether older adults have debt and what kind of debt they hold (Table 3). Compared with older adults who have *any debt*, we find that those with any *secured debt* are *less* likely to have health conditions and those with any *unsecured debt* are *more* likely to have health conditions. The prevalence of health conditions is even lower among older adults with *strictly secured debt*, and

even higher among those with *strictly unsecured debt*. Finally, older adults with *no debt* are, in most cases, more likely to have health conditions than those with *any debt*. At first glance, this is contrary to what we might expect. However, consider that those without debt include older adults who have paid off their debt as well as those who cannot afford debt. Looking more closely at older adults without debt, those with low incomes are significantly more likely to have health conditions and those with high incomes are significantly less likely to have health conditions.

For the most part, these same patterns exist for all the health conditions that we examine. The one exception is for obesity (BMI >= 30), where older adults with *any debt* are more likely than those *without debt*, regardless of household income, to be obese.

Differences by debt (not accounting for income) in the prevalence of health conditions are largest for death, followed by any IADL limitations, memory disease, any ADL limitations, fair or poor health, and work-limiting health condition. For example, IADL limitations are 3 times more likely among those with strictly unsecured debt (18.7 percent) compared to those with strictly secured debt (6.0 percent). In contrast, the prevalence of two or more health conditions, obesity, and poor mental health vary significantly less by debt. For example, having two or more health conditions is 1.3 times more likely for those with strictly unsecured debt (70.4 percent) compared to those with strictly secured debt (53.1 percent).

The prevalence of health conditions also varies by how indebted older adults are and their source of debt (Table 4). Among those with debt-to-assets ratios of more than 30 and 80 percent, health conditions are least likely for those with strictly secured debt and most likely for those with strictly unsecured debt. Additionally, those with debt-to-assets ratios less than 30 and 80 percent are significantly less likely to have health conditions than their counterparts who are more leveraged in any debt. Finally, and in general, health conditions are also more prevalent among those whose who are highly leveraged (i.e., debt-to-assets ratios of 80 percent or more).

Inferential Results

The results from marginal structural models of health and debt in Table 5 show strong support for the notion that having any debt is predictive of various health outcomes ranging from death and self-rated poor health to poor mental health, doctor diagnosed health conditions, work limitations, ADL and IADL limitations, and obesity. The association of debt with memory-

related disease (that is, Alzheimer's and related dementias) is marginally statistically significant, whereas with all other outcomes it is highly statistically significant, and the magnitude ranges from 9 percent higher odds of death to 30 percent higher odds of having two or more doctor-diagnosed health conditions. Results from the population-averaged regressions are consistent with the ones from the marginal structural models, although the magnitude is generally smaller (ranging between 3 and 17 percent higher odds of negative health outcomes). In the case of death and memory disease, our estimates do not reach thresholds of statistical significance.

Conditional on having any debt, higher levels of debt relative to assets—equal or greater than 30 percent and, even more so, equal or greater than 80 percent—are more detrimental to health outcomes. In the marginal structural model, the odds of having two or more health conditions, for example, increases from 30 percent for those with any debt to 33 percent for those with debt-to-assets ratios of 30 percent or higher and to 47 percent for those with debt-to-assets ratios of 80 percent or higher. In the population-averaged model, the odds of being diagnosed with two or more health conditions increases from 12 percent for those with any debt to 21 percent for those with debt-to-assets ratios of 80 percent and higher. There is no consistent difference between results from the marginal structural models and population-averaged models.

Focusing on the results in Table 6, we find no consistent evidence of the negative impact of secured debt on health. Indeed, marginal structural model results largely suggest that having secured debt has no significantly different impact on health than not having secured debt, except for doctor-diagnosed health conditions (14 percent higher odds relative to those with no debt) and obesity (22 percent higher odds). Although similar in magnitude, however, results from population-averaged regressions are mostly statistically significant, suggesting that secured debt may still exert a moderate negative impact across a range of various health measures. Conditional on having any secured debt, higher levels of debt are associated with larger negative impacts on various health outcomes, with the largest being for ADL and IADL limitations (63 percent higher odds of having any such functional limitation if secured debt to assets is greater than 80 percent).

Turning to the results for unsecured debt (Table 7), we generally find it much more detrimental for health than secured debt. Unlike the results for secured debt, both marginal structural model and population-averaged regression results unequivocally suggest a negative impact of debt on health. In the marginal structural models, the magnitudes range from 9 percent

higher odds of dying to 43 percent higher odds of being diagnosed with at least two health conditions, and in the population-averaged models the magnitudes range from 12 percent higher odds of obesity to 28 percent higher odds of reporting a work-limiting health condition. Memory-related disease is the only outcome that is not statistically significantly associated with the unsecured debt across both types of models, whereas death is not significantly associated with unsecured debt in the population-averaged model only. Conditional models of unsecured debt generally follow the same pattern of higher levels of debt being more strongly associated with negative health outcomes, and the magnitudes being somewhat larger in the marginal structural models than the population-averaged models. The only differences are model estimates for death.

Sensitivity Analysis

In addition to the main results presented above in Tables 1-3, we conduct a series of sensitivity analyses to examine whether and to what extent different modeling choices may have impacted the observed results. First, we repeat the analysis using population-averaged models on lagged values of debt, which more clearly corresponds to the sequence of events where debt precedes health outcome. The results, however, show very little substantive difference between the two model specifications, suggesting that the observed impact of debt on health in the same period is unlikely to be spurious (Table 8).

Next, we test whether limiting our measures of secured and unsecured debt to strictly secured and unsecured debt, that is, secured debt in the absence of unsecured debt and vice versa, impacts the estimates (Table 9). While differences between the negative impacts of secured and unsecured debt on health become even clearer and more apparent, the differences are overall limited in magnitude and do not change the inference from the main analysis in any substantial way.

In Table 10, we further test whether limiting the main analysis to older adults below age 85 has any substantive impact on the results since, due to selective survival, the oldest old may be in better health irrespective of the socioeconomic circumstances that they face (e.g., Angel, Mudrazija, and Benson, 2015), which could bias downward our estimates of the impact of debt on health. The results remain largely unchanged, with the only somewhat substantive difference being that the estimate of the impact of any debt on being diagnosed with a memory-related

disease becomes statistically insignificant, whereas in the analysis that includes the oldest old adults it was marginally statistically significant.

Finally, in Table 11 we also test the possibility that applying a stricter definition of secured debt related to its level relative to assets may reveal that high levels of such debt (relative to no debt) are detrimental for health. This conjecture finds partial support in the results. Focusing on health outcomes that were not statistically significantly associated with secured debt in the main models, we find a general gradient of increasing magnitude and statistical significance as secured debt burdens increase for outcomes ranging from two or more doctor diagnosed memory disease and work-limiting health conditions to having any IADL limitation. In other cases, including fair or poor self-rated health and having any ADL limitation, there is still a gradient but it is smaller in magnitude and does not reach statistical significance. Finally, for outcomes including poor mental health and death, we find no evidence suggesting a link with secured debt regardless of the degree of leverage.

Additionally, using restricted geographic identifiers, we estimated models from the main analysis controlling for local economic conditions (i.e., county-level unemployment rates and housing prices). The results of these models remain essentially unchanged.[7]

Discussion

The dramatic rise in older Americans' indebtedness over the past couple of decades has been well documented. While policymakers have been concerned about the implications of this trend on older adults' economic well-being, particularly regarding their ability to weather financial and health shocks, much less attention has been paid to the deleterious effects that debt can have on older adults' health outcomes. This study advances our understanding of the association between debt burden and health at older ages by examining a range of physical and mental health measures and assessing how they may be shaped by the debt held by older adults.

Our findings show that, in general, carrying debt has a negative effect on older Americans' health outcomes, and the more debt one carries the more detrimental it is for their health. However, the type of debt matters: while secured debt has little or no negative impact on health, unsecured debt has a negative impact on a broad range of health outcomes, including objective and subjective measures of physical and mental health. Moreover, the negative effects

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[7] These results are not shown in the working paper but are available on request.

of debt on health vary in severity by the health condition. For example, carrying any debt consistently has one of the largest negative effects on having a work-limiting condition. For those with debt, however, the amount of debt consistently has the largest negative effect on having an IADL limitation. Because many of our findings are consistent using different estimation strategies and sensitivity tests, they provide bounds of the effects of debt on health outcomes.

Adverse health events become more likely as people age. Our study, however, suggests that carrying high debt, particularly unsecured debt, increases the odds of experiencing negative health events for older adults. Thus, it is even more important than previously understood that policymakers consider designing policies that promote the prudent use of debt and discourage carrying large debt burdens, especially unsecured debt, into retirement. These policies would help promote better health outcomes for older Americans, which would limit their health expenditures and improving their quality of life. Furthermore, limiting the excessive use of expensive (primarily unsecured) debt that does not help build assets (i.e., home purchases) or increase the ability to work or perform other necessary tasks more efficiently (i.e., vehicle purchases) can directly contribute to enhancing private retirement savings, thereby reducing older Americans' dependency on Social Security benefits as their primary source of retirement security.

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Figure

Figure 1. *Percentage of Adults Ages 55 and Older with Debt and Median Value of Debt, by Year*
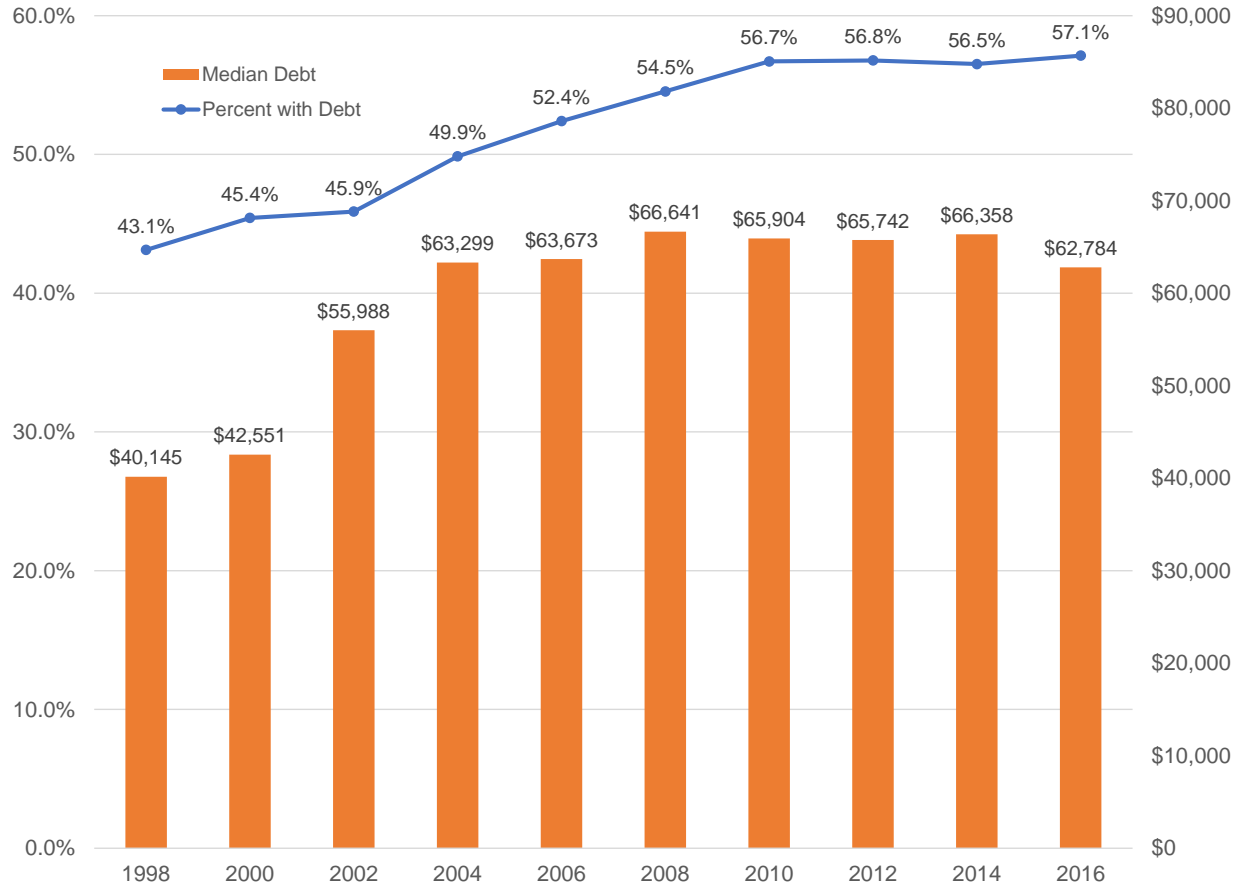
Source: HRS, 1998-2016; authors' calculations.

Tables

Table 1. *Percentage of Adults Ages 55 and Older with Debt and Median Value of Debt, by Year*

Year	Any		Secured		Unsecured	
	Pct with Debt	Median Value	Pct with Debt	Median Value	Pct with Debt	Median Value
1998	43.1	40,145	30.7	61,762	23.9	4,632
2000	45.4	42,551	32.3	65,801	26.0	4,387
2002	45.9	55,988	34.1	76,983	24.7	6,998
2004	49.9	63,299	37.1	86,620	27.9	6,663
2006	52.4	63,673	39.0	97,382	29.9	6,242
2008	54.5	66,641	40.4	99,377	32.8	7,015
2010	56.7	65,904	40.5	103,876	35.7	6,925
2012	56.8	65,742	40.2	104,092	35.1	6,574
2014	56.5	66,358	39.8	106,173	35.1	6,370
2016	57.1	62,784	39.6	101,501	35.1	6,278
Change 98-08	26.5%	66.0%	31.2%	60.9%	37.5%	51.4%
Change 10-16	0.7%	-4.7%	-2.1%	-2.3%	-1.4%	-9.3%
Change 98-16	32.5%	56.4%	28.8%	64.3%	47.2%	35.5%

Source: HRS, 1998-2016; authors' calculations.

Table 2. *Percentage of Adults Ages 55 and Older with Debt and Median Value of Debt, by Year*

Year	Median Debt to Assets	Pct with Debt to Assets >= 30%	Pct with Debt to Assets >= 80%
1998	17.2	33.8	8.8
2000	17.2	35.1	9.4
2002	18.8	37.6	9.7
2004	21.1	40.0	10.4
2006	20.0	38.6	10.9
2008	22.5	41.6	12.7
2010	25.2	45.1	17.1
2012	27.8	47.6	18.8
2014	26.3	46.6	17.0
2016	24.9	44.9	15.1
Change 98-08	30.8%	23.0%	44.2%
Change 10-16	-1.2%	-0.6%	-11.5%
Change 98-16	44.3%	32.8%	71.7%

Source: HRS, 1998-2016; authors' calculations.

Table 3. *Percentage of Adults Ages 55 and Older with Health Conditions in 2016, by Whether They Have Debt*

	Death	Fair or Poor Health	Poor Mental Health	Two or More Health Conditions	Memory Disease	Work-limiting Health Condition	Any ADL Limitations	Any IADL Limitations	BMI >= 30
Any debt	3.0	23.3	29.0	60.8	2.4	33.3	12.7	11.0	39.9
Secured debt	2.4	18.4	23.9	56.7	1.7	26.7	9.2	7.6	38.1
Unsecured debt	3.4	28.4	32.8	65.7	2.8	40.1	15.7	14.1	43.7
Strictly secured debt	2.4	15.2	22.9	53.1	1.8	22.4	7.9	6.0	33.6
Strictly unsecured debt	4.5	34.6	40.5	70.4	4.0	48.3	20.5	18.7	43.9
No debt	7.9	30.5	31.5	66.1	4.9	41.4	20.0	18.4	31.9
No debt - low income	12.0	49.3	46.6	75.5	7.9	57.7	33.1	30.4	33.8
No debt - middle income	6.8	22.7	25.3	65.8	3.8	37.1	14.3	13.8	32.2
No debt - high income	2.0	11.7	17.0	46.1	1.5	18.5	7.2	4.8	26.6

Source: HRS, 1998-2016; authors' calculations.

Table 4. *Percentage of Adults Ages 55 and Older with Health Conditions in 2016, by Their Debt to Assets*

	Death	Fair or Poor Health	Poor Mental Health	Two or More Health Conditions	Memory Disease	Work-limiting Health Condition	Any ADL Limitations	Any IADL Limitations	BMI >= 30
Any debt to assets >= 30%	3.0	27.8	31.0	63.9	2.6	35.6	14.8	13.0	47.2
Secured debt to assets >= 30%	2.7	23.6	27.1	59.2	2.1	30.7	12.4	10.0	45.1
Unsecured debt to assets >= 30%	3.9	41.5	44.8	77.4	4.3	51.3	22.3	21.6	53.3
Strictly secured debt assets >= 30%	2.6	21.4	25.6	57.3	2.3	25.2	11.3	7.9	42.7
Strictly unsecured debt to assets >= 30%	4.3	41.6	45.6	77.5	4.5	52.3	22.7	23.2	52.5
Any debt to assets < 30%	3.0	18.0	25.7	57.4	1.9	29.5	9.5	8.3	33.5
Any debt to assets < 30% - low income	8.1	43.7	41.1	78.1	6.1	56.8	26.8	25.1	32.4
Any debt to assets < 30% - middle income	3.0	19.3	27.5	63.7	1.6	35.0	9.9	8.5	38.8
Any debt to assets < 30% - high income	1.4	7.9	18.4	42.5	0.9	13.7	3.4	2.6	26.8
Any debt to assets >= 80%	3.7	39.3	42.3	74.1	3.7	48.2	22.5	20.2	55.0
Secured debt to assets >= 80%	4.0	34.1	38.3	68.8	2.6	42.8	19.8	15.0	53.3
Unsecured debt to assets >= 80%	3.5	43.9	47.2	79.5	4.3	53.8	25.1	23.4	56.7
Strictly secured debt assets >= 80%	3.6	34.4	40.3	70.8	3.7	38.1	20.5	15.0	49.6
Strictly unsecured debt to assets >= 80%	3.6	43.7	46.8	79.8	4.6	54.1	25.0	24.3	56.1
Any debt to assets < 80%	2.9	19.3	25.5	57.9	1.9	29.4	9.9	8.7	36.9
Any debt to assets < 80% - low income	7.7	43.5	44.0	76.0	5.6	57.9	26.0	24.4	35.8
Any debt to assets < 80% - middle income	3.0	20.9	26.8	62.8	1.9	34.0	10.4	9.2	41.1
Any debt to assets < 80% - high income	1.1	8.9	17.6	45.0	0.8	13.5	3.8	2.6	31.5

Source: HRS, 1998-2016; authors' calculations.

Table 5. *Marginal Structural and Population-Averaged Models of Health Outcomes on Any Debt and Any Debt Relative to Assets*

	Marginal structural model			Population-averaged model		
	Any debt	Any debt-to-assets>=30%	Any debt-to-assets>=80%	Any debt	Any debt-to-assets>=30%	Any debt-to-assets>=80%
Death	1.09**	1.30***	1.34***	1.03	1.34***	1.44***
N	158019	72403		158019	72403	
Fair or poor health	1.15***	1.39***	1.59***	1.10***	1.30***	1.39***
N	157897	72370		157897	72370	
Poor mental health	1.21***	1.29***	1.42***	1.13***	1.22***	1.29***
N	145638	68143		145638	68143	
Two or more health conditions	1.30***	1.33***	1.47***	1.12***	1.11***	1.21***
N	149160	69711		149160	69711	
Memory disease	1.09+	1.21**	1.31**	1.06	1.24***	1.25*
N	157885	72366		157885	72366	
Work-limiting health condition	1.26***	1.31***	1.41***	1.17***	1.28***	1.36***
N	85687	42443		85687	42443	
Any ADL limitation	1.22***	1.41***	1.63***	1.16***	1.28***	1.43***
N	157885	72358		157885	72358	
Any IADL limitation	1.19***	1.42***	1.65***	1.15***	1.36***	1.61***
N	157869	72355		157869	72355	
BMI>=30	1.28***	1.36***	1.55***	1.08***	1.13***	1.12***
N	155816	71593		155816	71593	

Notes: Any debt relative to assets measures are conditional on having any debt. *** p<0.001; ** p<0.01; * p<0.05; + p<0.1
Source: HRS, 1998-2016; authors' calculations.

Table 6. *Marginal Structural and Population-Averaged Models of Health Outcomes on Secured Debt and Secured Debt Relative to Assets*

	Marginal structural model			Population-averaged model		
	Secured	Secured debt-to-assets>=30%	Secured debt-to-assets>=80%	Secured	Secured debt-to-assets>=30%	Secured debt-to-assets>=80%
Death	1.10	1.30***	1.30**	1.02	1.31***	1.33*
N	134495	51315		134495	51315	
Fair or poor health	0.98	1.43***	1.54***	1.05*	1.35***	1.30***
N	134389	51295		134389	51295	
Poor mental health	1.00	1.31***	1.44***	1.08***	1.24***	1.27***
N	123600	48355		123600	48355	
Two or more health conditions	1.14**	1.36***	1.47***	1.10***	1.11***	1.14***
N	126710	49547		126710	49547	
Memory disease	1.18	1.19+	1.20	1.13*	1.18+	1.04
N	134387	51296		134387	51296	
Work-limiting health condition	1.10	1.41***	1.45***	1.08*	1.34***	1.35***
N	71225	29717		71225	29717	
Any ADL limitation	1.07	1.45***	1.63***	1.14***	1.30***	1.30***
N	134385	51288		134385	51288	
Any IADL limitation	1.07	1.48***	1.63***	1.10**	1.38***	1.45***
N	134373	51286		134373	51286	
BMI>=30	1.22***	1.38***	1.60***	1.11***	1.13***	1.10**
N	132603	50767		132603	50767	

Notes: Secured debt relative to assets measures are conditional on having any secured debt. *** p<0.001; ** p<0.01; * p<0.05; + p<0.1
Source: HRS, 1998-2016; authors' calculations.

Table 7. *Marginal Structural and Population-Averaged Models of Health Outcomes on Unsecured Debt and Unsecured Debt Relative to Assets*

	Marginal structural model			Population-averaged model		
	Unsecured	Unsecured debt-to-assets>=30%	Unsecured debt-to-assets>=80%	Unsecured	Unsecured debt-to-assets>=30%	Unsecured debt-to-assets>=80%
Death	1.09**	1.67***	1.55**	1.03	1.71***	1.62***
N	128199	42585		128199	42585	
Fair or poor health	1.22***	1.79***	2.11***	1.16***	1.43***	1.48***
N	128088	42563		128088	42563	
Poor mental health	1.30***	1.50***	1.65***	1.20***	1.34***	1.30***
N	117581	40088		117581	40088	
Two or more health conditions	1.43***	1.45***	1.64***	1.19***	1.27***	1.39***
N	120381	40934		120381	40934	
Memory disease	1.08	1.50***	1.83**	1.05	1.36**	1.54***
N	128073	42556		128073	42556	
Work-limiting health condition	1.38***	1.49***	1.75***	1.28***	1.42***	1.54***
N	69191	25949		69191	25949	
Any ADL limitation	1.28***	1.65***	1.94***	1.22***	1.45***	1.52***
N	128081	42556		128081	42556	
Any IADL limitation	1.25***	1.73***	1.93***	1.24***	1.53***	1.66***
N	128066	42554		128066	42554	
BMI>=30	1.38***	1.36***	1.50***	1.12***	1.17***	1.14***
N	126309	42087		126309	42087	

Notes: Unsecured debt relative to assets measures are conditional on having any unsecured debt. *** p<0.001; ** p<0.01; * p<0.05; + p<0.1
Source: HRS, 1998-2016; authors' calculations.

Table 8. *Population-Averaged Models of Health Outcomes on Lagged Values of Debt and Debt Relative to Assets*

	Any debt	Any debt-to-assets>=30%	Any debt-to-assets>=80%	Secured	Secured debt-to-assets>=30%	Secured debt-to-assets>=80%	Unsecured	Unsecured debt-to-assets>=30%	Unsecured debt-to-assets>=80%
Death	1.02	1.23***	1.35***	0.98	1.22**	1.35**	1.04	1.30**	1.25*
N	146217	70038		124644	50574		117017	40842	
Fair or poor health	1.08***	1.23***	1.34***	1.02	1.28***	1.31***	1.13***	1.33***	1.40***
N	146106	70002		124552	50553		116918	40818	
Poor mental health	1.09***	1.20***	1.28***	1.06**	1.19***	1.25***	1.13***	1.39***	1.36***
N	135265	66090		115045	47815		107747	38576	
Two or more health conditions	1.11***	1.10***	1.14***	1.10***	1.07**	1.10**	1.16***	1.21***	1.22***
N	138225	67452		117662	48862		110059	39290	
Memory disease	0.94	1.17*	1.14	0.98	1.09	1.12	0.93	1.32*	1.35*
N	146099	69997		124552	50554		116909	40811	
Work-limiting health condition	1.11***	1.32***	1.54***	1.03	1.38***	1.56***	1.20***	1.45***	1.52***
N	79709	41263		66718	29724		63240	24796	
Any ADL limitation	1.07***	1.25***	1.35***	1.02	1.30***	1.31***	1.13***	1.31***	1.36***
N	146150	70018		124583	50560		116957	40829	
Any IADL limitation	1.09***	1.37***	1.47***	1.03	1.38***	1.44***	1.15***	1.47***	1.58***
N	146138	70012		124578	50560		116945	40823	
BMI>=30	1.05***	1.11***	1.12***	1.07***	1.11***	1.13***	1.09***	1.13***	1.16***
N	144290	69246		123004	50031		115401	40359	

Notes: Debt relative to assets measures are conditional on having a particular type (any, secured, or unsecured) of debt.   *** p<0.001; ** p<0.01; * p<0.05; + p<0.1
Source: HRS, 1998-2016; authors' calculations.

Table 9. *Marginal Structural Models of Health Outcomes on Strictly Secured and Strictly Unsecured Debt and Debt Relative to Assets*

	Secured debt	Secured debt-to-assets>=30%	Secured debt-to-assets>=80%	Unsecured debt	Unsecured debt-to-assets>=30%	Unsecured debt-to-assets>=80%
Death	1.04	1.27***	1.47*	1.05	1.72***	1.38*
N	112997	29818		106701	21088	
Fair or poor health	0.88	1.38***	1.52***	1.23***	1.82***	2.03***
N	112900	29807		106599	21075	
Poor mental health	0.85*	1.27***	1.48***	1.30***	1.53***	1.67***
N	103299	28055		97280	19788	
Two or more health conditions	1.01	1.31***	1.46***	1.41***	1.60***	1.68***
N	105939	28777		99610	20164	
Memory disease	1.10	1.12	1.25	0.99	1.59***	2.03***
N	112900	29810		106586	21070	
Work-limiting health condition	1.04	1.31***	1.45***	1.38***	1.55***	1.75***
N	58001	16494		55967	12726	
Any ADL limitation	0.97	1.46***	1.73***	1.23***	1.76***	2.06***
N	112898	29802		106594	21070	
Any IADL limitation	0.97	1.35***	1.54***	1.20***	1.80***	1.97***
N	112887	29801		106580	21069	
BMI>=30	1.09	1.34***	1.70***	1.34***	1.41***	1.63***
N	111341	29506		105047	20826	

Notes: Strictly secured (unsecured) debt measure excludes individuals who have unsecured (secured) debt alongside secured (unsecured) debt. Debt relative to assets measures are conditional on having a particular type (strictly secured or strictly unsecured) of debt. *** p<0.001; ** p<0.01; * p<0.05; + p<0.1
Source: HRS, 1998-2016; authors' calculations.

Table 10. *Marginal Structural Models of Health Outcomes on Debt and Debt Relative to Assets for Adults Younger Than 85*

	Any debt	Any debt-to-assets>=30%	Any debt-to-assets>=80%	Secured	Secured debt-to-assets>=30%	Secured debt-to-assets>=80%	Unsecured	Unsecured debt-to-assets>=30%	Unsecured debt-to-assets>=80%
Death	1.08**	1.34***	1.38***	1.19	1.38***	1.34**	1.10**	1.60***	1.59***
N	144574	70691		122031	50477		115360	41479	
Fair or poor health	1.16***	1.39***	1.60***	0.94	1.44***	1.55***	1.25***	1.79***	2.13***
N	144478	70660		121949	50457		115275	41459	
Poor mental health	1.21***	1.30***	1.42***	0.99	1.31***	1.44***	1.31***	1.51***	1.64***
N	135185	66751		113924	47669		107617	39185	
Two or more health conditions	1.30***	1.33***	1.47***	1.17***	1.36***	1.47***	1.44***	1.45***	1.64***
N	138316	68279		116661	48837		110044	40009	
Memory disease	1.03	1.23**	1.32**	1.11	1.24*	1.18	1.03	1.53**	1.84**
N	144481	70658		121959	50458		115275	41454	
Work-limiting health condition	1.26***	1.31***	1.42***	1.07	1.42***	1.47***	1.40***	1.50***	1.76***
N	79795	41469		65902	29254		63614	25290	
Any ADL limitation	1.23***	1.42***	1.65***	1.05	1.47***	1.65***	1.32***	1.65***	1.95***
N	144460	70648		121939	50450		115262	41452	
Any IADL limitation	1.21***	1.44***	1.69***	1.10	1.51***	1.67***	1.28***	1.68***	1.96***
N	144451	70646		121934	50449		115253	41450	
BMI>=30	1.30***	1.37***	1.56***	1.21***	1.39***	1.61***	1.40***	1.38***	1.49***
N	142611	69894		120370	49935		113707	40991	

Notes: Debt relative to assets measures are conditional on having a particular type (strictly secured or strictly unsecured) of debt. *** $p<0.001$; ** $p<0.01$; * $p<0.05$; + $p<0.1$.
Source: HRS, 1998-2016; authors' calculations.

Table 11. *Marginal Structural Models of Health Outcomes on Secured Debt Relative to Assets, Various Debt Cutoff Points*

	Any secured debt	Secured debt>=5% assets	Secured debt>=10% assets	Secured debt>=20% assets	Secured debt>=30% assets	Secured debt>=40% assets	Secured debt>=50% assets	Secured debt>=60% assets	Secured debt>=70% assets	Secured debt>=80% assets
Death	1.10	1.15	1.23	1.35	1.41	1.30	1.44	1.04	1.06	1.15
N	134495	128042	121852	112025	104948	99613	95363	91896	89164	87192
Fair or poor health	0.98	0.97	0.98	1.03	0.99	1.01	1.03	1.17	1.44+	1.53+
N	134389	127936	121749	111925	104851	99519	95271	91806	89075	87105
Poor mental health	1.00	1.01	1.02	1.07	1.10	0.99	1.01	1.11	1.28	1.29
N	123600	117561	111717	102471	95807	90789	86780	83519	80910	79037
Memory disease	1.18	1.31	1.40	1.57	1.50	1.84+	2.20*	2.23*	2.58*	2.78*
N	134387	127936	121750	111926	104851	99517	95270	91803	89071	87101
Work-limiting health condition	1.10	1.11	1.14+	1.25*	1.31*	1.36*	1.44*	1.62**	1.87**	1.91**
N	71225	67820	64601	59177	55090	52008	49521	47442	45707	44400
Any ADL limitation	1.07	1.04	1.11	1.19	1.15	1.21	1.31	1.22	1.37	1.44
N	134385	127934	121749	111928	104852	99518	95270	91803	89074	87103
Any IADL limitation	1.07	1.09	1.16	1.26+	1.25	1.46*	1.75**	1.58*	1.57+	1.63+
N	134373	127922	121737	111917	104841	99507	95259	91792	89063	87092

Notes: Reference category across all secured debt measures is no debt. Each higher cutoff point results in a more select sample of respondents by their level of secured debt; respondents with a secured debt below the cutoff point are omitted from consideration. *** p<0.001; ** p<0.01; * p<0.05; + p<0.1.
Source: HRS, 1998-2016; authors' calculations.

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