Modeling the impact of financial hardship and age on self-rated health and depressive symptoms pre/post the great recession

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ABSTRACT

Stressful life events such as a recession, could be devastating on a macro and micro level. Although there have been a number of articles written examining the health effects of the recession, little is known about age differences in the relationship between financial stressors and health pre and post the 2008 recession. Using the Health and Retirement study, we investigated the relationship between two forms of financial hardships, mental and physical health among middle aged (N = 4403) and older adults) (N = 2709). Our findings indicate that with regard to financial hardships experienced pre/post recessionary periods there are differences by age. Specifically, older adults tend to report having less financial hardship than their younger counterparts. Additionally, reduced medication use due to costs was a significant predictor of poor self-rated health among middle aged participants compared to older adults. These results highlight the selective impact of recessions on certain age groups. They also suggests that economic recessions may also produce short-term procyclical health effects. Future research should focus on the relationship between other sources of financial hardship among middle-aged and older adults pre/post-recession at shorter time intervals.

1. Introduction

The "Great Recession" of 2008 was, considered one of the worst financial crises since the Great Depression of the 1930's. Rapid economic declines along with increased financial hardships, and poor health outcomes are some of the impacts that resulted from this recession (AARP Public Policy Institute, 2008; Catalano et al., 2011; Ruhm, 2003; Wilkinson, 2016). Prior research found a relationship between economic declines and increased risk for poor physical health (Catalano et al., 2011; Margerison-Zilko, Goldman-Mellor, Falconi, & Downing, 2016; Suhrcke & Stuckler, 2012; Wang, Wang, & Halliday, 2017) and mental health (Catalano et al., 2011; Goldman-Mellor, Saxton, & Catalano, 2010; Margerison-Zilko et al., 2016; Ruhm, 2003; Suhrcke & Stuckler, 2012; Wilkinson, 2016).

Although age and socio-economic status (SES) are important risk factors for poor health outcomes, it has received limited attention in the literature as it relates to recessionary periods (House, Kessler, & Herzog, 1990). One potential explanation for why there is less attention to problems faced by older adults during recessions is due to the entitlements available to older persons. It has been suggested that these age-based programs provide advantages (Medicare, Social Security) and

act as a buffer against poor health during an economic downturn and may mitigate the financial and mental health effects of a recession (Margerison-Zilko et al., 2016; Kim & Durden, 2007; and Mays & Hogg, 2015). This would occur primarily because these age restricted programs (i.e. Medicare, Social Security) are unavailable to their middle-aged counterparts. Further, there is a strong likelihood that older adults own their own homes and do not have to worry about financial strain related to mortgage payments during recessions (Mather, 2015).

The "Great Recession" tested both middle-aged and older adults in terms of their ability to navigate an economic downturn. According to Wilkinson (2016) despite the presence of entitlement-based supports, older adults were not protected from the shock of a recession and can still face significant financial stress and worsening mental health outcomes. Findings from the Older Adult Survey (OAS) support Wilkinson's argument and suggest that more than 35% of survey respondents between the ages of 40 and 94 reported experiencing at least one source of "major financial stress" three years post the 2008 recession (Board of Governors of the Federal Reserve System, 2013). Mather (2015) also suggests there is a link between economic recessions and depressive symptoms among older adults; the loss of meaningful functions associated with employment in later life (i.e., employment as a means to keep

older adults physically, mentally, and socially active); and significant declines in retirement savings that are often used to supplement social security payments. Additional studies also found that both middle-aged and older adults are at risk for encountering health and finance-related stressors as they age (Anonymous, 2015; Bosch, 2003; Catalano et al., 2011; Herpolsheimer, 2015; Levy, 2015). Despite both middle-aged and older adults encountering stressors, the amount of stress is often disproportionately encountered by older adults, resulting in negative health outcomes (Hean et al., 2013).

A second argument asserts that despite the presence of assumed advantages, older adults are still at risk for encountering negative short- and long-term outcomes during recessions. Wilkinson (2016) notes that "delays in retirement and job loss" were realities that many older adults faced during the 2008 recession. While the first argument assumes that most older adults are already retired, an important consideration is that delays in retirement and experiencing a sudden job loss later in life can directly impact an older adult's financial situation as they might not be able to afford a sudden reduction in wages or continue working past their anticipated retirement age. Mather (2015) further suggests that the long-term impact of the recession on older adults, includes "changes in wealth and spending patterns, as well as physical and mental health problems that have long-term consequences." Marshall, Thorpe, and Szanton (2017) highlight that an increase in the average life expectancy for older adults means that older adults "will need to manage their financial resources over a longer or extended period of time" (Hill, Kellard, Middleton, Cox, and Pound (2007).

Although middle-aged adults are at a greater risk of experiencing financial hardships related to stress, this does not mean that older adults are immune to encountering financial hardships as well. Some research suggests that both middle-aged and older adults are at risk for encountering health and finance-related stressors (Bosch, 2003; Catalano et al., 2011; Levy, 2015; Marshall, 2015). Each of these stressors can result in negative health outcomes (Hean et al., 2013; Marshall, Kahana, Gallo, Stansbury, & Theilke, 2021; Silinskas et al., 2021). While middle-aged and older adults may face similarities in risk factors leading to poor health outcomes, age-based differences in the relationship between financial hardship and health may not be as clear.

In an effort to identify key mechanisms through which experiences prior, during and post a recession lead to poor health outcomes the use of theoretical frameworks such as materialism and the stress process may be relevant. While the experience of going through "change" is inevitable (i.e., change is built into the life cycle as individuals age) and can prompt potential sources of stress (Pearlin, Menaghan, Morton, & Mullan, 1981), there are times in which abrupt changes arise that further contribute to one's stress level (e.g., sudden relocation, development of acute medical symptoms, unexpected revenue loss). Given that approximately one-half of older adults are deemed "economic [ally] vulnerable" (Gould, Rideaux, Spira, & Beaudreau, 2015) and are at risk for experiencing at least one form of hardship (Marshall & Seeley-Tucker, 2018), it is extremely likely that middle-aged and older adults were experiencing varying levels of stress prior to the 2008 recession. When examined in the context of stress process theory, the Great Recession of 2008 could be viewed as having caused several distinct events at the societal and individual level that ultimately contributed to, or exacerbated, any pre-existing sources of stress for both middle and older age groups during this period of economic hardship. It may also be argued that middle aged adults are less materialistic in their value orientation, exhibiting post-materialistic values (Inglehart, 1981) endorsed after WW2, while older adults may exhibit greater materialism fostered by living through insecure times such as the Great Depression. Accordingly, the economic stressors of the great recession would have greater impact on the middle aged who may experience new social insecurity more acutely than their more senior counterparts (Fieulaine & Apostolidis, 2015).

While the literature has identified both the protections for and vulnerabilities of older adults, there is a dearth of literature that provides insight into how age differences and specific personal stressors in the midst of a widespread stressful life event (i.e., recession) impact health outcomes. Using the stress process framework, our paper identifies financial hardship as a secondary stressor that affects one's health over time and with increasing age. Sweet, Nandi, Adam, and McDade (2013) report that the presence of financial strain (e.g., personal debt, home foreclosures) is a strong predictor for experiencing mental health difficulties (e.g., general psychological distress, mental disorders, and suicidal ideation). The authors further submit that psychosocial factors, inclusive of stress and its mental health implications (e.g., development of depression and anxiety), have been linked to physical health outcomes (e.g., disease processes, influencing health behaviors). The main research question this paper attempts to answer is, how does financial hardship impact the health of middle age and older adults pre/post the great recession of 2008?

The prior literature examining age differences and financial hardship have three limitations: 1) most control for age as a confounder, rather than using stratification as an effect modifier (Chi & Tucker-Seeley, 2013; Kirsch & Ryff, 2016); 2) use a composite score or index of financial hardship (Martin and Dwyer (2021) and; 3) studies are cross-sectional and do not follow participants over time (pre/post-recession) (Mulia, Zemore, Murphy, Liu, & Catalano, R, 2014). The purpose of our study is to use a nationally representative sample of adults in late life to 1) investigate whether specific financial hardship indicators are differentially associated with self-rated health and depressive symptoms and; 2) determine whether the association between specific indicators of financial hardship and self-rated health and depressive symptoms vary by age. With the growing number of older adults, it is important to examine these differences in the context of a major stressful life event, such as a significant recession. Findings should offer a more tailored approach to prevention and intervention.

2. Methods

2.1. Data and sample

Data from the Health and Retirement Study (HRS) years 2006–2014 were used for this study. HRS is a nationally representative study of individuals age 50 years and older conducted by the Institute for Social Research (ISR) at the University of Michigan with support from the National Institute on Aging. This study was designed to investigate the experience of persons as they advance from work to retirement, with an emphasis on economic well-being and health. The HRS data are collected every two years via a multi-stage area probability sampling scheme that is representative of the non-institutionalized US population of adults 50 years and older with over-sampling for African Americans, Hispanics, and Florida residents. HRS data also includes psychosocial information obtained from participants each biennial wave of the HRS. The psychosocial questionnaire includes a random sample of 50% of the core panel of participants who completed the face-to-face interview (Smith et al., 2013). Only the same participants from waves 2006, 2010, and 2012 were included in the study sample. For additional information describing HRS in greater detail, please refer to Heeringa & Connor, 1995; Juster & Suzman, 1995.

2.1.1. Study sample

This was a longitudinal study focused on individuals aged 50 years and older who completed the core and psychosocial questionnaire in 2006, 2010 and 2014 of the HRS. Participants were included if they were 50 years or older in 2006, did not have a proxy respondent for the study period, and did complete the psychosocial survey in those years. Our sample included observations of respondents if they had complete information on all analytics variables for a specific timepoint during the study period, years 2006, 2010, or 2014. Our final sample consisted of middle-aged respondents between the ages of 50–64 (N = 4403) and older adults ages 65 and older (N = 2709) for an overall analytic sample

of N = 7188.

2.1.2. Measures

2.1.2.1. Exposures. In order not to obscure the unique contribution of each financial hardship variable, we examined the variables individually, rather than as an index of both variables. Financial hardship was operationalized using two common indicators: *1) difficulty paying bills and; 2) reduced medication use due to cost.* Difficulty paying bills was measured using the following question: "How difficult is it for you/your family to meet monthly payments on your/your family's bills?" This item is on a 5-point scale (1 = Not at all difficult to 5 = Completely difficult). Reduced medication use due to cost was measured by asking, "Have you ended up taking less medication than was prescribed for you because of cost?" with a possible answer of yes or no. The recession and recovery periods were defined as 2010 and 2014, respectively. They were included as dummy variables for each period; the pre-recession (2006) was defined as the reference category.

2.1.2.2. Outcome. We examined two different outcome variables for these analyses; self-rated health and depressive symptoms. Self-Rated Health was measured on a 5-point scale in the HRS using a single question: "In general, how would you say your health is: excellent, very good, good, fair or poor?" Self-rated health was reverse coded so higher values indicated better health (1-Poor, 2-Fair, 3-Good, 4-Very Good, 5-Excellent). Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale (CES-D) 8-scale (ranges 0 to 8), where higher values indicated more frequent depressive symptoms and worse mental health (Radloff, 1977).

2.1.2.3. Covariates. A number of covariates known to influence secondary stressors in later life were included in the analyses to isolate the independent effect of poor health outcomes. Demographic variables included gender, race (White, Black/African American, other), education (less than high school, high school, greater than high school), marital or partnered status (yes-no), employment status – working for pay (yes-no), median income, median wealth, other non-housing wealth, health insurance (Medicare, Medicaid, private plan, other) and a count of chronic conditions (heart conditions: such as heart attack, coronary heart disease, angina, congestive heart failure, or other heart problems; stroke; cancer of any kind-excluding skin, lung disease-such as chronic bronchitis or emphysema-excluding asthma; high blood pressure; arthritis or rheumatism and; psychiatric or emotional, nervous problems).

2.1.3. Statistical analyses

The statistical approach consisted of building more complex models starting with just the financial variables, adding the pre/recession/recovery effects, and then models including an interaction with the recession variable and each financial hardship variable. Outcomes were modeled with linear general estimating equations assuming an unstructured correlation structure for modeling clusters of observations for the same participant over the 3 timepoints. All analyses were conducted in Stata version 14.

Model 1: $Y_{i,t} = \beta_0 + \beta_{DPB}*DPB_{i,t} + \beta_{RMU}*RMU_{i,t} + \beta_X*X_i + \beta_Z*Z_{i,t} + \varepsilon_{i,t}$

Model 2: $Y_{i,t} = \beta_0 + \beta_{DPB}*DPB_{i,t} + \beta_{RMU}*RMU_{i,t} + \beta_{Res}*Res_{i,t} + \beta_{Rec}*Rec_{i,t} + \beta_X*X_i + \beta_Z*Z_{i,t} + \varepsilon_{i,t}$

Model 3: $Y_{i,t} = \beta_0 + \beta_{DPB}*DPB_{i,t} + \beta_{Res}*Res_{i,t} + \beta_{Rec}*Rec_{i,t} + \beta_{DPBxRes}*DPB_{i,t}*Res_{i,t} + \beta_{DPBxRec}*DPB_{i,t}*Rec_{i,t} + \beta_X*X_i + \beta_Z*Z_{i,t} + \varepsilon_{i,t}$

Model 4: $Y_{i,t} = \beta_0 + \beta_{RMU}*RMU_{i,t} + \beta_{Res}*Res_{i,t} + \beta_{Rec}*Rec_{i,t} + \beta_{RMUxRes}*RMU_{i,t}*Res_{i,t} + \beta_{RMUxRec}*RMU_{i,t}*Rec_{i,t} + \beta_X*X_i + \beta_Z*Z_{i,t} + \varepsilon_{i,t}$

where $Y_{i,t}$ is the outcome for participant i at time t (1-2006-reference,

2–2010 recession, 3–2014 -recovery). Difficulty paying bills (DBP) and reduced medication use due to cost (RMU) are our financial hardship measures. X_i are time-invariant covariates for person *i* including gender, race (white, African American, other) and education categorized as less than high school, high school or GED completed, and more than high school. $Z_{i,t}$ are time-varying covariates for person *i* at time *t* including continuous age, marital status (married/partner vs. not), confirmed health care coverage (Medicare, Medicaid, or private coverage vs. not), working status (working for pay vs not), and chronic conditions questions including high blood pressure, heart conditions, stroke, arthritis, cancer, diabetes, lung disease and psychological conditions. The Rand imputed variables for income, total wealth (excluding IRA), and non-housing wealth in terms of thousands of dollars were also included as time-varying covariates ($Z_{i,t}$). All self-reported health models included CES-D as a time-varying covariate and all CES-D models included self-reported health as a time-vary covariate.

Multiple sensitivity analyses were conducted to determine whether estimates were sensitive to assumptions of the main analyses. We examined the non-linear relationship (versus the linear relationship assumed) between difficulty paying bills and each outcome by treating difficulty paying bills as a 5-level categorical variable with "Not at All" as the reference category. We also ran alternative models to test correlation assumptions. Based on the question, we either only allowed for one respondent from a household to be included in calculations to exclude household correlation or we clustered at the household level rather than the individual. We also ran the main models that excluded individuals with missing timepoints to see if attrition was substantially impacting our results.

3. Results

Table 1 presents the final sample at baseline (N = 7112) with an additional 76 survey participants who contributed responses for the GEE models for later years (2010, 2014) but not in 2006. Thirty-eight percent of the sample were under age 65 years and 62% of sample were 65 years or older at baseline (2006). The majority were women (59%), had a high school diploma or GED (55%), and were married (65%). Almost everyone (94%) had health insurance coverage. The most frequent prevalent chronic conditions were arthritis, high blood pressure, and heart problems. Median income was $39,400/year, non-housing wealth $77,000 and median total wealth (excluding IRAs) was $192,200. At baseline, 9% of the sample reported reduced medication use, and those who reported that their difficulty paying bills was "Not at all" or "Not very" difficult (39% and 32%, respectively).

The older cohort (those 65 years old and older) were more likely to be men, white, have less than a high school education, and be single. As expected, those 65 years or older were more likely to have Medicare coverage, not be working for pay, and more likely to have any chronic condition except a psychological condition. While the older cohort's median income was lower ($32,500 vs. $58,000), their wealth tended to be higher. Those in the younger cohort (50–64 years old) reported higher financial hardship on both measures.

Table 2A presents results of the effect of financial hardship on self-rated health for all ages and Table 2B presents the results of the effect of financial hardship on self-rated health between middle aged and older adult groups. Table 2A suggests a significant relationship between reduced medication use and self-rated health. Here the recessionary period is significantly different (p < 0.01) compared to the pre-recession period but the recovery period is not significant (p = 0.9) and baseline is not significantly different. When looking at interaction models, the effect of difficulty paying bills is similar between recession and recovery, and both are significantly lower than the pre-recession. Reduced medication use due to cost is not significantly different between periods. Accordingly, the effect of reduced medication use during the recession (−0.08) does seem smaller than the pre-recession (−0.16) and recovery periods (−0.15).

Table 1
Characteristics at baseline.

Characteristics	Total (N = 7112)		50-64 at Baseline (2006) (N = 4403)		65 and older at Baseline (2006) (N = 2709)	
Age, mean (SD)	68.1	10.0	74.3	7.1	57.9	4.0
CESD, mean (SD)	1.42	1.94	1.40	1.89	1.45	2.01
SRH, mean (SD)	3.21	1.09	3.12	1.07	3.35	1.11
Income[a], mean (SD)	$ 66.2	$ 201.9	$ 53.0	$ 132.1	$ 87.9	$ 279.0
Income[a], median [IQR]	$ 39.4	[20.5, 74.6]	$ 32.5	[18.0, 57.1]	$ 58.0	[29.7, 101.9]
Wealth[a], mean (SD)	$ 443.0	$ 1083.7	$ 462.8	$ 1112.6	$ 410.9	$ 1034.5
Wealth[a], median [IQR]	$ 192.2	[57.6, 446.0]	$ 203.0	[64.5, 475.2]	$ 172.0	[45.0, 413.5]
Non-housing W[a], mean (SD)	$ 340.8	$ 1034.3	$ 352.9	$ 1043.2	$ 321.3	$ 1019.4
Non-housing W[a], median [IQR]	$ 77.0	[10.0, 303.0]	$ 82.6	[10.0, 309]	$ 70.0	[10.0, 289.0]
Male, n %	2934	41%	1866	42%	1068	39%
Race, n %						
White	5936	83%	3768	86%	2168	80%
Black/African American	896	13%	519	12%	377	14%
Other	280	4%	116	3%	164	6%
Education, n %						
Less than HS	1283	18%	961	22%	322	12%
HS or GED	3945	55%	2464	56%	1481	55%
Greater than HS	1884	26%	978	22%	906	33%
Marriage Status, n %						
Married/Living as	4602	65%	2671	61%	1931	71%
Not Married	2510	35%	1732	39%	778	29%
Health Insurance[b], n %						
Medicare Coverage, n %	4530	64%	4275	97%	255	9%
Medicaid Coverage, n %	419	6%	284	6%	135	5%
Private Plan Coverage, n %	4621	65%	2537	58%	2084	77%
Some Confirmed Coverage, n %	6706	94%	4367	99%	2339	86%
Working Status, n %						
Work for pay	2554	36%	817	19%	1737	64%
Not Working for pay	4557	64%	3585	81%	972	36%
Chronic Conditions, ever						
High Blood Pressure	3906	55%	2680	61%	1226	45%
Heart problems	1639	23%	1271	29%	368	14%
Stroke	498	7%	392	9%	106	4%
Arthritis	4141	58%	2895	66%	1246	46%
Cancer	1055	15%	844	19%	211	8%
Lung Disease	643	9%	456	10%	187	7%
Psych	988	14%	518	12%	470	17%
Medication Rationing, n %	661	9%	339	8%	322	12%
Difficulty paying bills, mean (SD)	1.99	1.00	1.87	0.95	2.19	1.03
Not at all, n%	2768	39%	1965	45%	803	30%
Not very, n%	2287	32%	1366	31%	921	34%
Somewhat, n%	1540	22%	823	19%	717	26%
Very, n%	384	5%	194	4%	190	7%
Completely Difficult, n%	133	2%	55	1%	78	3%

[a] In Thousands of Dollars.
[b] Not mutually exclusive.

When we stratified the sample by age, there are some differences (Table 2B). Comparing the main effect models (model 1 &2) among older adults, reduced medication use is not a significant predictor for poor self-rated health. The interaction between difficulty paying bills during the recovery vs pre-recession period where the effect during the recovery period was notably smaller than the pre-recession period which was statistically significant. Table 2B also suggests there is a trend

Table 2A
The effect of financial hardship on self-rated health for all ages.

Models	Panel A: All Ages			
	Effects [95% CI] on SRH*			p-values
Model 1: Financial Main Effects				
Difficulty Paying Bills	−0.07 [-0.09, −0.06]			<0.01
Reduction in Medication Use	−0.13 [-0.18, −0.08]			<0.01
Model 2: No Interactions				
Difficulty Paying Bills	−0.07 [-0.09, −0.06]			<0.01
Reduction in Medication Use	−0.13 [-0.18, −0.08]			<0.01
Recession vs Pre-Recession	0.04 [0.01, 0.06]			<0.01
Recovery vs Pre-Recession	0.00 [-0.03, 0.03]			0.90
Model 3: Difficulty Paying Bills	Pre-Recession	Recession	Recovery	
Effect of Difficulty Paying Bills During …	−0.09 [-0.11, −0.07]	−0.05 [-0.08, −0.03]	−0.06 [-0.08, −0.04]	*<0.01, 0.03
Model 4: Reduction in Medication Use	Pre-Recession	Recession	Recovery	
Effect of Reduction in Medication Use During	−0.16 [-0.23, −0.10]	−0.08 [-0.16, −0.00]	−0.15 [-0.23, −0.06]	*0.08, 0.74

All models control for socio-demographic factors.
*Interaction coefficient p-values (Recession vs. Pre, Recovery vs. Pre).

in the effect of difficulty paying bills and reduced medication use due to cost which became smaller over time.

Also in Table 2B, those who were between ages 50–64 years, both financial hardship measures were significantly correlated with self-rated health, however, the recession and recovery period effects were not (model 2). The interaction effect of difficulty paying bills during the recession vs. pre-recession period was statistically significantly smaller in the recessionary period. There was also a trend for reduced medication due to cost whereby the effect was higher during the pre-recessionary and recovery periods and lower during the recession.

Table 3 provides results of all financial hardship recession models for CESD. In the main effects model (model 2), both the recession and the recovery period are significantly different than the pre-recession period. In terms of the main recessionary effect, recovery is similar to the recessionary period. The interaction between difficulty paying bills and time period (model 3), the difficulty paying bills effect is similar across time periods and the interaction terms are not significant. In the reduced medication interaction model (model 4), the effect of reduced medication use is significantly smaller in the recession versus the pre-recession period (p = 0.04). The recovery effect is similar to the recessionary period, but not significantly different when compared to the pre-recession period.

Among older adults, all the main effect models are significant, and the interaction between difficulty paying bills and time period is significant between the recessionary period and the pre-recession. The estimate for the difficulty paying bills effect for the recovery period is similar to the pre-recession period. Although the reduced medication use due to costs interactions for the older cohort are not significant at the 0.05 level, the trend is similar to the difficulty paying bills effects. The reduced medication use due to costs is higher in the pre-recession and recovery periods and lower during the recession.

For the younger 50–64yr old cohort, the main effects model recovery period effect is not significantly different than the pre-recession. For both models, the interactions are not statistically significant and the effects were similar except for reduced medication use in the recovery vs

Table 2B
The effect of financial hardship on self-rated health comparing middle and older ages.

Models	Panel B: 65 Years or Older				Panel C: 50–64 Years Old			
	Effects [95% CI] on SRH*			p-values	Effects [95% CI] on SRH*			p-values
Model 1: Financial Main Effects								
Difficulty Paying Bills	−0.07 [−0.09, −0.04]			<0.01	−0.07 [-0.10, −0.05]			<0.01
Reduction in Medication Use	−0.04 [-0.11, 0.03]			0.24	−0.21 [-0.28, −0.14]			<0.01
Model 2: No Interactions								
Difficulty Paying Bills	−0.07 [−0.09, −0.04]			<0.01	−0.08 [-0.10, −0.05]			<0.01
Reduction in Medication Use	−0.04 [-0.11, 0.03]			0.23	−0.21 [-0.28, −0.15]			<0.01
Recession vs Pre-Recession	0.07 [0.03, 0.10]			<0.01	−0.01 [-0.06, 0.03]			0.55
Recovery vs Pre-Recession	0.02 [-0.03, 0.06]			0.43	−0.05 [-0.11, 0.02]			0.14
Model 3: Difficulty Paying Bills	Pre-Recession	Recession	Recovery		Pre-Recession	Recession	Recovery	
Effect of Difficulty Paying Bills During	−0.09 [−0.11, −0.06]	−0.06 [-0.09, −0.03]	−0.03 [-0.07, 0.00]	*0.16, 0.01	−0.10 [-0.13, −0.07]	−0.04 [-0.07, −0.01]	−0.09 [-0.12, −0.05]	*<0.01, 0.39
Model 4: Reduction in Medication Use	Pre-Recession	Recession	Recovery		Pre-Recession	Recession	Recovery	
Effect of Reduction in Medication Use During	−0.08 [-0.17, 0.01]	0.05 [-0.11, 0.12]	−0.04 [-0.17, 09]	*0.21, 0.59	−0.26 [-0.35, −0.16]	−0.15 [-0.25, −0.04]	−0.24 [-0.35, −0.12]	*0.09, 0.76

All models control for all socio-demographic factors.
*Interaction coefficient p-values (Recession vs. Pre, Recovery vs. Pre).

Table 3A
The effect of financial hardship on depressive symptoms for all ages.

Models	Panel A: All Ages			
	Effects [95% CI] on CESD*			p-values
Model 1: Financial Main Effects				
Difficulty Paying Bills	0.22 [0.18, 0.25]			<0.01
Reduction in Medication Use	0.38 [0.27, 0.49]			<0.01
Model 2: No Interactions				
Difficulty Paying Bills	0.21 [0.18, 0.25]			<0.01
Reduction in Medication Use	0.38 [0.27, 0.49]			<0.01
Recession vs Pre-Recession	−0.14 [-0.19, −0.09]			<0.01
Recovery vs Pre-Recession	−0.17 [-0.23, −0.12]			<0.01
Model 3: Difficulty Paying Bills	Pre-Recession	Recession	Recovery	
Effect of Difficulty Paying Bills During …	0.24 [0.19, 0.28]	0.18 [0.13, 0.23]	0.21 [0.16, 0.27]	*0.67, 0.17
Model 4: Reduction in Medication Use	Pre-Recession	Recession	Recovery	
Effect of Reduction in Medication Use During	0.48 [0.32, 0.64]	0.29 [0.12, 0.46]	0.31 [0.09, 0.53]	*0.04, 0.50

All models control for all socio-demographic factors.
*Interaction coefficient p-values (Recession vs. Pre, Recovery vs. Pre).

the pre-recession (0.18 vs 0.45). The impact of financial hardship is consistent over time for this cohort, perhaps with some more relief during the recovery period.

3.1. Sensitivity analyses

Using difficulty paying bills as a 5-point scale, the effect increased consistently (constant difference in slope) between levels and the differences were similar to the linear effect size. All difficulty categories were significant predictors and their CI's were mostly overlapping, fitting with linear assumptions. By including only one person from a household there was little change to the models. Estimates were very similar between models, and though standard errors were consistently

slightly larger in the single respondent models, it did not change the significance. The alternative specification of household clustering instead of individual clustering, had no impact on estimates or standard errors. When only including subjects that participated at all 3 timepoints with complete data (n_>65 = 2006; n < 65 = 1814) results were also very similar to the main models results. There were only small changes in effect sizes and there were no changes with regards to statistical significance.

4. Discussion

Among a sample of middle-aged and older adults using the Health and Retirement Study, we investigated whether specific financial hardship indicators are related to health (e.g. depressive symptoms and self-rated health) and whether this relationship varies by age. Despite older adults being at an increased risk for encountering financial hardship (Population Reference Bureau, 2015; Bosch, 2003; National Council on Aging, 2016; Anonymous, 2021), our findings indicate that older adult participants reported experiencing less financial hardship during the pre-recessionary periods. These findings did not support our original hypothesis in which we theorized that financial hardship is a secondary stressor and that over time, with increasing age, it negatively affect one's health. However, it should be noted that economic recessions have historically produced, at the very least, short-term procyclical health effects (Miller, Page, Stevens, & Filipski, 2009; Ruhm, 2003; Suhrcke and Stuckler, 2012). Ruhm (2003) offers one potential explanation for these findings by suggesting that increases in leisure time, termed "non-market time", during economic recessions create opportunities for individuals to engage in activities that promote health (e.g., exercising).

Over an eight-year period, older participants reported less difficulty paying their bills during the recession and engaged in more medication adherence. Findings from this sample align with Wilkinson's (2016) observation that subjectivity is a key factor in how one interprets his, her or their financial situation. Wilkinson (2016) goes on to state that although the Great Recession was an event with objective indicators that have been used to determine how individuals were impacted (e.g., loss of income, savings, and/or investments), subjective perceptions provide insights into how one is really interpreting their financial situation. For example, if an individual believes that other people are also going through financial strain, then the individual is more likely to understate their own financial situation. Wilkinson (2016) further emphasizes this point by quoting work by Szanton et al. (2008) who suggest that on

Table 3B

The effect of financial hardship on depressive symptoms comparing middle and older ages.

Models	Panel B: 65 Years or Older				Panel C: 50–64 Years Old			
	Effects [95% CI] on CESD*			p-values	Effects [95% CI] on CESD*			p-values
Model 1: Financial Main Effects								
Difficulty Paying Bills	0.19 [0.15, 0.23]			<0.01	0.24 [0.19, 0.30]			<0.01
Reduction in Medication Use	0.40 [0.25, 0.55]			<0.01	0.36 [0.19, 0.51]			<0.01
Model 2: No Interactions								
Difficulty Paying Bills	0.18 [0.14, 0.23]			<0.01	0.25 [0.19, 0.30]			<0.01
Reduction in Medication Use	0.40 [0.25, 0.55]			<0.01	0.36 [0.20, 0.52]			<0.01
Recession vs Pre-Recession	−0.10 [-0.16, −0.04]			<0.01	−0.14 [-0.23, −0.05]			<0.01
Recovery vs Pre-Recession	−0.19 [-0.28, −0.11]			<0.01	−0.03 [-0.15, 0.09]			0.67
Model 3: Difficulty Paying Bills	Pre-Recession	Recession	Recovery		Pre-Recession	Recession	Recovery	
Effect of Difficulty Paying Bills During …	0.20 [0.14, 0.25]	0.12 [0.06, 0.18]	0.24 [0.16, 0.32]	*0.04, 0.35	0.27 [0.20, 0.34]	0.25 [0.18, 0.32]	0.20 [0.12, 0.28]	*0.63, 0.12
Model 4: Reduction in Medication Use	Pre-Recession	Recession	Recovery		Pre-Recession	Recession	Recovery	
Effect of Reduction in Medication Use During	0.49 [0.27, 0.71]	0.20 [-0.02, 0.43]	0.47 [0.16, 0.78]	*0.053, 0.90	0.45 [0.22, 0.68]	0.38 [0.14, 0.63]	0.18 [-0.13, 0.49]	*0.68, 0.15

All models control for all socio-demographic factors.

*Interaction coefficient p-values (Recession vs. Pre, Recovery vs. Pre).

measures of financial well-being there is a subset of individuals who may report that they have a sufficient amount of income when "by an objective measure, they do not."

One way of interpreting these findings is through Pearlin et al.'s (1981) stress process model, which considers internal feelings of mastery and self-worth as a part of the process by which stress is mitigated or maintained. For example, if participants held a subjective view that equally distributed the impact of the recession, rather than feeling particularly impacted, then it is likely that their self-concept remained intact leading to greater feelings of mastery and self-worth. Thus, it is possible that the interaction between the recession buffer and financial hardship is closely tied to the perception that everyone is having a difficult time with the recession and that the hardship is not due to personal failure and incompetence, which may have reduced participants' stress levels, and to some degree, reduced the negative impact of financial hardship.

Another potential explanation for this difference in experience by age may be adults above the age of 65 did not experience the full impact of the recession and termed their experience as a "kinder [and] gentler" experience (Taylor, Morin, Parker, Cohn, & Wang, 2009). Our findings indicated that reduced medication use among participants who were 65 and older was not a significant predictor of poor self-rated health. Perhaps older adults who were healthier are more likely to reduce medication use when facing financial hardships. However, this was not the case among participants between the ages of 50–64. We theorize that the reduced medication use significance between age groups is likely tied to the availability of Medicare coverage and benefits. This finding is also consistent with Wilkinson's (2016) study suggesting that adults over 65 have access to resources such as Medicare and Social Security. Nevertheless, we would be remiss if we did not mention that despite suggestions that the American social support system is less robust, and contributes to systematically reducing resources (Bezruchka, 2009; Mays et al., 2015), the magnitude of the Great Recession did induce more coverage for displaced and unemployed workers in addition to more health insurance coverage.

Even with the prospect of additional coverage, Taylor et al. (2009) highlighted that individual's between the age of 50 and 64 are "at or near the peak of their earnings potential and net worth" and "[they] are also at the brink of retirement, if they haven't already stopped working." Further, Wilkinson (2016) notes that during the recession this age cohort "experienced greater financial strain and faced significant investment losses." It is outside of the scope of this paper to discuss the recession experiences of these two age cohorts (i.e., 50–64 and 65+) during

retirement in-depth, but it is notable that in a survey conducted by Taylor et al. (2009) 75% of participants in the 50–64 age cohort reported that the recession would impact their ability "to take care of their financial needs in retirement." This would likely provide an increase in stress and could provide an explanation for this cohort's reported higher financial hardship.

5. Limitations

This study also has several limitations. First, the use of secondary data. While the availability of HRS data sets were instrumental in the development and execution of this study, the use of secondary data placed natural restrictions on our ability to acquire additional data from study participants that might have assisted in explaining some of our findings (i.e., reduced medication use significance between age groups). Instead, we were only able to theorize about the reasons for the significance between age groups based on similar findings from the literature that suggested a difference in recession experiences for middle-aged and older adults. Second, because the HRS collects data every two years, we were only able to measure current situation versus past two years. Current situation may underestimate financial hardship experienced between interviews. A recent study examining trends in financial hardship suggests that most older adults experience financial hardship intermittently – in and out for short periods of time Anonymous (2021). During the recession of 2008, there were procyclical effects in which older adults did not experience as much financial hardship as their middle-aged counterparts. These procyclical effects heavily influenced our findings, but we were unable to provide in-depth insight into the full impact of age-related recession differences as this was outside the scope of our research. Third, our analysis strategy accounts for correlation between observations for the same individual. However, we could not account for correlation between household members or study design/weight factors in addition to accounting for correlation between observations. While the sensitivity analyses provide some evidence that our model specifications are robust, it is possible that our results may be biased due to not being able to account for all correlation structures and study design variables.

6. Conclusion

A recession like any other stressful life event may cause a significant impact to one's finances and financial situation. Despite these limitations, our research on financial hardship, depressive symptoms, and self-

rated health pre/post-recession highlights the impact of recessions and the importance for certain age groups. Although our findings conflicted with our original hypothesis, we have contributed to the existing body of literature on financial hardship by examining this phenomenon by age. Our findings confirm that not everyone is impacted in the same way. Future research should focus on the relationship between other sources of financial hardship among middle-aged and older adults pre/post-recession at shorter time intervals as this might shed light on how older adults were better able to mitigate stress related to the recession, even when encountering financial hardship.

Finally, we ask what does the current pandemic, another stressful life event, mean for individuals 50 and up? According to the AARP Public Policy Institute (2008), while older adults are less likely to experience disproportionate job loss during severe recessions relative to their middle-aged counterparts, there is a greater impact on their ability to deposit funds into individual retirement accounts (IRAs) and 401(k) plans as a means of supplementing Social Security. Given the uptick in unemployment over the past year, the pandemic is a concerning obstacle for older adults who are nearing retirement as they might not be able to accumulate a sufficient amount of savings to live on post-retirement. While we will not know the full ramifications of the pandemic until later, future studies should consider if subjective perceptions factor into how individuals view of their situations. The financial impact of the pandemic on middle-aged and older adults is undeniably a concern, but we should be careful to consider how future participants might be underreporting their true experiences and future research in this area is warranted.

Author statement

Gillian L. Marshall: conceptualization, methodology, writing original draft preparation, funding acquisition; Bailey Ingram: methodology, formal analysis; Jasmine Major: writing original draft preparation; Eva Kahana: Review and editing; Kim Stansbury: writing original draft preparation, review and editing.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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