Association of negative financial shocks during the Great Recession with depressive symptoms and substance use in the USA: the CARDIA study

Samuel Longworth Swift ,[1] Tali Elfassy,[2] Zinzi Bailey,[3] Hermes Florez,[2] Daniel J Feaster,[2] Sebastian Calonico,[4] Steve Sidney,[5] Catarina I Kiefe,[6] Adina Zeki Al Hazzouri[4]

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[1]Center for Healthcare Equity in Kidney Disease, University of New Mexico, New Mexico, Albuquerque, USA
[2]Public Health Sciences, University of Miami, Miami, Florida, USA
[3]Sylvester Cancer Center, University of Miami, Miami, Florida, USA
[4]Columbia University, New York, New York, USA
[5]Kaiser Permanente Norther California Division of Research, Oakland, California, USA
[6]Quantitative Health Sciences, UMass Medical School, Worcester, Massachusetts, USA

Correspondence to
Samuel Longworth Swift, Center for Healthcare Equity in Kidney Disease, University of New Mexico, 901 University Blvd SE, Albuquerque, NM 87131-1466, USA; samswift@salud.unm.edu

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ABSTRACT

Background The Great Recession of 2008 was marked by large increases in unemployment and decreases in the household wealth of many Americans. In the 21st century, there have also been increases in depressive symptoms, alcohol use and drug use among some groups in the USA. The objective of this analysis is to evaluate the influence of negative financial shocks incurred during the Great Recession on depressive symptoms, alcohol and drug use.

Methods We employed a quasi-experimental fixed-effects design, using data from adults enrolled in the Coronary Artery Risk Development in Young Adults (CARDIA) study. Our financial shock predictors were within-person change in employment status, income and debt to asset ratio between 2005 and 2010. Our outcomes were within-person change in depressive symptoms score, alcohol use and past 30-day drug use.

Results In adjusted models, we found that becoming unemployed and experiencing a drop in income and were associated with an increase in depressive symptoms. Incurring more debts than assets was also associated with an increase in depressive symptoms and a slight decrease in daily alcohol consumption (mL).

Conclusion Our findings suggest that multiple types of financial shocks incurred during an economic recession negatively influence depressive symptoms among black and white adults in the USA, and highlight the need for future research on how economic recessions are associated with health.

INTRODUCTION

During the Great Recession in the USA, the unemployment rate increased by 130%,[1] as an estimated 20% of the population experienced income shocks,[2] and median family income decreased by 4.1% overall.[3] There were also decreases in median household wealth by 44%[4] and increases in the per cent of persons having negative home equity from 5.6% to 8.1%.[5] At the same time, the 21st century in the USA has also been marked by increases in mortality related to 'diseases of despair' such as suicide, alcohol and drug use.[6] Mirroring these increases in mortality, survey data show increases in persons reporting depression,[7] alcohol use[8] and drug use.[8]

The relationship between recessions and depression has been explored[9–14]; however, most prior studies were conducted in samples of older adults or have focused on single shocks such as unemployment, changes in wealth or financial strain. The literature on the relationship between recessions, alcohol[15–22] and drug use[23 24] is scarce and mixed. Recession-related shocks to employment and housing were associated with increases in total alcohol consumption in some studies[15–18] and with decreases in other studies.[19–21] The few studies on recessions and drug use suggested associations between unemployment,[23 24] negative shifts in wealth[23] and increases in drug use behaviours.

Informed by previous research, the objective of this study is to evaluate the associations of a wide array of negative financial shocks during the Great Recession—specifically unemployment, loss of income and a change in debt to asset ratio, with within-person changes in depressive symptoms, alcohol use and past 30-day drug use. We used data from the ongoing Coronary Artery Risk Development in Young Adults (CARDIA) study, which provides a cohort of black and white American adults who were at the peak of their earning years during the Great Recession. We used a fixed-effects design[25] leveraging a natural experiment introduced by a recession and allowing for stronger inferences to be drawn using observational data.

METHODS

Study population

The CARDIA study is a multisite prospective cohort study. In 1985–1986, 5114 black and white adults aged 18–30 years were recruited into this study from four field centres: The University of Alabama at Birmingham, The University of Minnesota, Northwestern University and Kaiser Permanente in Oakland, California. Participants then returned for in-person clinic visits and interviews from 1985 to 1986 to the present with follow-up visits in 1987, 1990, 1992, 1995, 2000, 2005, 2010 and 2015. Details of the study design are described elsewhere.[26] In brief, participants were recruited using a stratified random sampling design, so that balanced samples of black, white, male and female participants were recruited from each study site, with a goal of recruiting 5000 participants. Participants were recruited by telephone in areas that had 90% household telephone coverage in 1985 (Birmingham, Chicago and Oakland), while investigators made additional attempts to recruit

via household visits made in Minneapolis where there was 70% telephone coverage in 1985. Of participants found to be eligible for the study in 1985, response rates varied by study sites from 36% in Birmingham to 64% in Oakland.[26] The study was Instituional Review Board approved at each field centre, in accordance with human subject principles embodied in the Declaration of Helsinki. The authors of this manuscript have no competing interests to declare.

Predictors and associated analytical samples

We included three predictors: employment status, income and debt to asset ratio. We used the year 2005 study visit as our pre-recession examination and the year 2010 study visit as our post-recession examination, as the year 2005 is the closest to the 2008 pre-recession time and the year 2010 is the closest to the 2008 post-recession time. Since the collection of employment and income data began in study years 1990–1991, our pre-recession period leveraged data beginning as early as 1990 to increase the likelihood that any changes in the economic predictors (eg, unemployment or loss of income) were due to the recession itself. We restricted our analytical samples to include only persons who showed stable financial well-being in the years leading up to the recession (1990–2005). To ensure a stable pre-recession financial trajectory, we required that persons in the employment and income samples had at least three measures of employment and income in the pre-recession period. These exclusions were critical to ensure that the shocks incurred by participants in our samples were truly due to the recession (exogenous) as participants in these samples had never incurred these types of shocks in absence of the recession. A flow chart detailing the exclusion and inclusion criteria of each analytical sample is shown in figure 1. In the following sections, we describe each financial shock, the analytical sample associated with it and how we constructed its status pre-recession/post-recession.

Employment status

Beginning with the year 1990 study visit, at which 4352 of the original 5114 CARDIA participants attended, participants were asked the following series of yes/no questions: 'Are you working full time', 'are you working part time' and 'are you unemployed or laid off'. We limited our analytical sample to persons with three or more measures of employment status, who had been employed 'full time' from 1990 until 2005, defined as our pre-recession period, and who had employment data pre-recession and post-recession, resulting in a final analytical sample of 1307 participants (figure 1). We defined a negative shock to employment status as a shift from 'full time' employment status at pre--recession (1990–2005) to 'part time' or 'unemployed' at post-recession (2010).

Income

At the year 1990 study visit, at which 4352 of the original 5114 CARDIA participants attended, participants reported their pre-tax household income for the past 12 months from all sources. Income was recorded in brackets as follows: US$0–US$2500, US$2500–US$8500, US$8500–US$14 000, US$14 000–US$20 500, US$20 500–US$30 000, US$30 000–US$42 500, US$42 500–US$62 500, US$62 500–US$75 000 and US$75 000+. In 2005, an additional higher category US$100 000+ was added. The income category midpoint was chosen as the participant's income for each given exam year, based on prior literature.[27 28] For consistency with prior years, year 2005 US$100 000+ income category was bottom coded as US$75 000+. We limited our analytical sample to persons with three or more measures of income, who had unchanging or increasing income (ie, no income drops) during the pre-recession period, and had income measured pre-recession and post-recession, resulting in a final analytical sample of 1563 participants (figure 1). We defined a negative shock to income as any decrease in income reflected in a drop in income bracket from pre-recession (1990–2005) to post-recession (2010). Adjusting for inflation can artificially create drops in income when income remained in the same bracket, so we used nominal and not real definitions for income at each time point, in line with our prior research in this sample.[29 30] Since the time period of interest was relatively short (2005–2010), it is unlikely that using nominal terms biased our findings.

Debt to asset ratio

Unlike employment and income, the collection of data on debts and assets did not begin until the year 2000 visit, at which 3672 of the original 5114 CARDIA participants attended. Participants reported debts and assets via questionnaire in study years 2000, 2005, and 2010. For debt, participants were asked 'what is the total family debt in your household from things such as credit card charges, medical or legal bills, and loans from banks or relatives?' For assets, participants were asked, 'suppose you needed money quickly, and you cashed in all of your family's

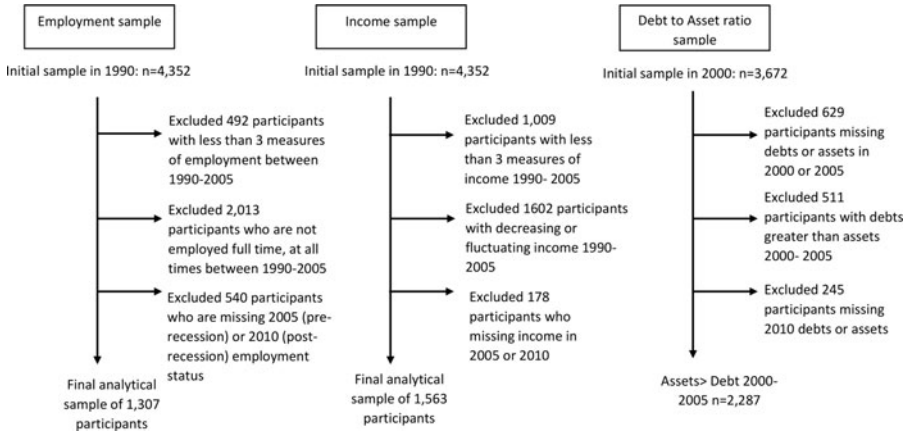

Figure 1 Flow chart detailing the construction of the analytical samples.

checking and savings accounts, and stocks and bonds, and real estate (including your principal home). If you added up what you got, how much would this amount to?' Responses were recorded in brackets and bracket mid-point categories were selected at every given year. For each given year, the debt to asset ratio was calculated by dividing the total household debt by the total household asset, in accordance with previous literature.[31] We limited our analytical sample to persons with measures of debts and assets at both visits pre-recession and at post-recession, and who had assets greater than or equal to debts during the pre-recession period, resulting in a final analytical sample of 2287 participants (figure 1). We defined a negative shock in debt to asset ratio if the ratio changed from less than or equal to 1 (ie, debts≤assets) at pre-recession (2000 and 2005) to a ratio greater than 1 (ie, debts>assets) at post-recession (2010). A diagram detailing the study design, and definition of our three financial shocks is shown in figure 2.

Outcomes

Depressive symptoms

Depressive symptoms were measured using the Center for Epidemiological Studies Depression scale (CES-D) instrument, which includes 20 items and ranges from 0 to 60 (higher means more symptoms of depression).[32] Examples of CES-D items include 'during the past week, I was bothered by things that don't usually bother me' and 'during the past week, I felt that my life had been a failure'. Participants were asked to score how much of the time they felt this way on a scale ranging from 'rarely of none of the time' to 'some or all of the time'. A change in depressive symptoms was defined as the within-person difference in score between 2005 (pre-recession) and 2010 (post-recession), analysed as a continuous outcome variable.

Alcohol use

Participants reported the total amount of alcohol (in mL) they consume per day on average, per the following question: 'on average, how much beer, wine or liquor do you drink on average per day'. A change in average amount of alcohol consumed (in mL) was defined as the within-person difference in total amount consumed between 2005 and 2010, analysed as a continuous outcome variable. In several cases, distributions for the change in average amount of alcohol consumed were slightly skewed due to outliers, and thus we removed extreme observations from each sample which fell out of the range of 98% (<1% and >99%) of the distribution in order to meet the normality assumption for these models. This resulted in 50 exclusions from the employment sample, 32 exclusions from the income sample and 103 exclusions from the debt to asset ratio sample.

Participants also reported the number of days they binge drank within the past month, per the following question: 'during the past 30 days, on how many days did you have more than five drinks on one occasion?' As such, binge drinking was present when the reported number of days binge drinking was greater than 0. A change in binge drinking status between 2005 and 2010 was treated as a binary outcome variable.

Past 30-day drug use

We combined a series of questions asking 'during the last 30 days, on how many days did you use ___' followed by lists of substances including marijuana, cocaine or crack, stimulants or amphetamines, and non-prescription use of opioids, both pharmaceutical and illicit. We only included substances specified as used outside of a prescription, and thus capturing drug misuse. We defined 'past 30-day use' as present when any substance was reported. A change in past 30-day drug use status between 2005 and 2010 was treated as a binary outcome variable.

Covariates

Participants reported time-invariant covariates, including age, sex and race/ethnicity (white, black). Participants also reported the following time-variant covariates, including health insurance status (yes vs no), marital status (married or living together, single, or divorced) and current smoking status (current, former or never smoker). We calculated a change in status of the time-variant covariates between 2005 and 2010. Our choice of time-variant covariates was based on prior literature[33–35] and their relationship with financial shocks, depression and substance misuse.

Statistical analysis

We described select time-variant and -invariant characteristics across categories of the three financial shock predictors at pre-recession (ie, in 2005). Next, we examined the unadjusted within-person change in depressive symptoms and daily amount of alcohol consumed between 2005 and 2010, across categories of the three financial shock predictors. Then, we used a fixed-effects approach to examine the associations between our three financial shock predictors (shock to employment status, income and debt to asset ratio) and the within-person change in each of our outcomes between study years 2005 and 2010, thus capturing times of pre- and

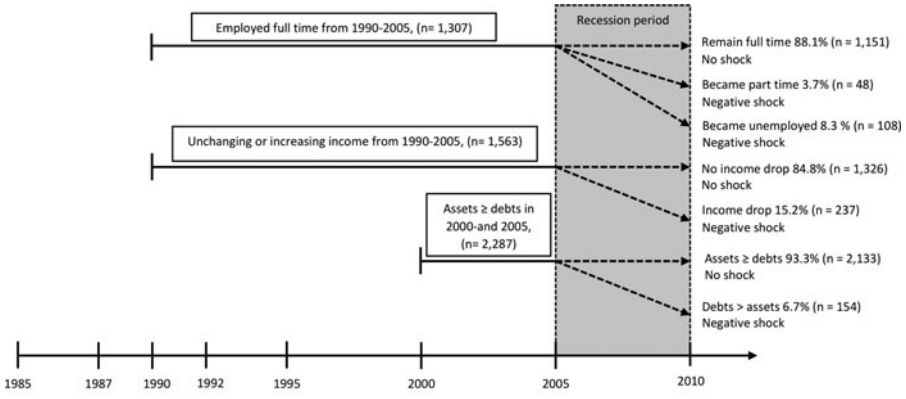

Figure 2 Conceptual framework for the study design and construction of our three financial shock predictors.

post-recession. Depressive symptom scores and amount of alcohol consumed were treated as continuous outcomes in linear fixed-effects models, whereas binge drinking and past 30-day drug use were treated as binary outcomes in logistic regression fixed-effects models. Similar to a case-crossover design, in the fixed-effects design, each participant acts as their own control, and thus measured and unmeasured time-invariant confounding introduced by time-invariant (ie, fixed) covariates is inherently controlled for.[25] As such, we controlled only for a small set of time-variant covariates, including marital status, insurance status and smoking status. A small number of participants (<1%) were missing data on covariate characteristics, and we used a listwise case deletion strategy in our fixed-effects models. Additionally, because we designed our sample such that we only included participants with stable pre-recession financial trajectory, we performed a sensitivity analysis in which we did not make such restriction. We also repeated all of our analyses using a secondary economic predictor, large income drops and large increases in debts, which we defined as a shift of two or more brackets in income or debts, in line with prior literature.[29 30]

RESULTS

In 2005, persons included in all three samples were more likely to be white, male, have higher income, married, non-smokers and insured (table 1). Among participants who were employed full time before the recession, 8.3% became unemployed and 3.7% became employed part time, while the remaining 88.2% did not experience a shock to their employment status during the Great Recession (figure 2). Among participants who had upward or unchanging income trajectories at pre-recession, 15.2% sustained an income drop during the Great Recession. Finally, among those who had more asset than debt at pre-recession, 6.7% had a negative shock such that their debts became greater than their assets.

Table 2 displays the results of the fixed-effects analysis for the associations between the financial shocks and our continuous outcomes of depressive symptoms and amount of alcohol consumed. Compared with those who remained employed, persons who experienced a negative shock and became unemployed had, on average, 2.0 points higher CES-D score (β=2.0, 95% CI 0.7 to 3.2), adjusted for time-variant covariates. We observed no association between becoming part-time employed and depressive symptoms (β=−0.1, 95% CI −1.9 to 1.8). Similarly, compared with those who did not experience an income drop, those with income drops had, on average, 1.1 points higher CES-D score (β=1.1, 95% CI 0.1 to 2.1), adjusted for time-variant covariates. Finally, compared with those whose assets remained greater than their debts, persons whose debts became greater than their assets had, on average, 1.5 points higher CES-D score (β=1.5, 95% CI 0.4 to 2.7), adjusted for time-variant covariates.

A shock to debt to asset ratio was also associated with daily amount of alcohol consumed. Compared with those who did not experience a shock, those whose debts became greater than their assets drank, on average, 3.5 mL of alcohol less per day (β=−3.5, 95% CI −5.8 to −1.3). We observed no association between the other financial shock predictors and amount of alcohol consumed.

Overall, we found no statistically significant associations between any of the predictors and binge drinking and past 30-day drug use (table 3). However, the point estimates for the ORs suggested a decrease in binge drinking and an increase in past 30-day drug use associated with a negative shock to employment, income and debt to asset ratio.

Table 1 Distribution of participant characteristics and negative financial shocks across categories of financial status in 2005

	Financial status in 2005 (pre-recession)*		
	Full-time employed n=1307	No income drops n=1563	Assets≥debts n=2287
Characteristics in 2005			
Age, mean (SD)	45.5 (3.5)	45.5 (3.5)	45.5 (3.5)
Black, n (%)	542 (45.9)	582 (37.2)	882 (38.6)
Female n (%)	556 (42.5)	836 (53.5)	1272 (55.6)
Household income >US$75 000, n (%)	778 (60.3)	1069 (68.4)	1246 (54.5)
Married, n (%)	896 (68.6)	1199 (76.7)	1553 (70.1)
Divorced, n (%)	221 (16.9)	159 (10.2)	347 (15.2)
Single, n (%)	185 (14.2)	200 (12.8)	338 (14.8)
Current smoker, n (%)	163 (12.5)	190 (12.2)	345 (15.1)
Former smoker, n (%)	242 (18.5)	315 (20.2)	473 (20.7)
Never smoker, n (%)	893 (68.3)	1046 (66.9)	1452 (63.5)
Current health insurance n (%)	1216 (93.0)	1473 (94.2)	2082 (91.0)
CES-D score, mean (SD)	7.6 (6.3)	8.0 (6.9)	8.2 (7.1)
Amount of alcohol consumed (mL), mean (SD)	11.10 (19.9)	10.9 (17.9)	11.5 (23.2)
Binge drinking, n (%)	290 (22.2)	324 (20.7)	485 (21.2)
Past 30-day drug use, n (%)	123 (9.4)	151 (9.7)	280 (12.2)
Negative financial shocks in 2010, n (%)			
Unemployed, n (%)	108 (8.3)	157 (10.0)	272 (11.9)
Part-time employed, n (%)	48 (3.7)	170 (10.9)	273 (11.9)
Income drop, n (%)	229 (17.5)	237 (15.2)	390 (17.1)
Debts>assets, n (%)	110 (8.4)	113 (7.2)	154 (6.7)

*By design, the financial shock predictors are made stable (ie, advantageous) during the pre-recession time (1990–2005)—details in the ''Methods' section. 'The year 2005 pertains to pre-recession time and 2010 pertains to post-recession time.
CES-D, Center for Epidemiological Studies Depression scale.

Table 2 Associations of negative financial shocks with within-person change in depressive symptoms and daily amount of alcohol consumed between 2005 and 2010, using a linear fixed-effects model

	Change in CESD score between 2005 and 2010		Change in daily amount of alcohol consumed between 2005 and 2010	
	β	95% CI	β	95% CI
Shock in employment status (n=1307)				
Become unemployed	**2.0***	**(0.7 to 3.2)**	−1.6	(−4.3 to 1.1)
Become part-time employed	−0.2	(−2.0 to 1.6)	−1.1	(−4.8 to 2.5)
Remain full-time employed	Ref	–	Ref	–
Shock in income (n=1563)				
Income drop	**1.1***	**(0.1 to 2.1)**	−0.4	(−2.2 to 1.3)
No income drop	Ref	–	Ref	–
Shock in debt to asset ratio (n=2287)				
Debts>assets	**1.5***	**(0.4 to 2.7)**	**−3.5***	**(−5.8 to −1.3)**
Debts≤assets	Ref	–	Ref	–

Data in bold are significant at *p<0.05.
Models are adjusted for time-variant marital status, insurance status and smoking status.
CESD, Center for Epidemiological Studies Depression scale.

Table 3 Associations of negative financial shocks with within-person change in binge drinking and past 30-day drug use between 2005 and 2010

	Binge drinking		Past 30-day drug use	
	OR	95% CI	OR	95% CI
Shock in employment status (n=1307)				
Become unemployed	0.7	(0.3 to 2.1)	1.7	(0.4 to 6.3)
Become part-time employed	0.2	(0.0 to 2.3)	0.5	(0.1 to 2.8)
Remain full-time employed	Ref	–	Ref	–
Shock in income (n=1563)				
Income drop	0.5	(0.2 to 1.1)	1.8	(0.7 to 4.8)
No income drop	Ref	–	Ref	–
Shock in debt to asset ratio (n=2287)				
Debts>assets	0.8	(0.4 to 1.8)	1.1	(0.4 to 3.2)
Debts≤assets	Ref	–	Ref	–

Models are adjusted for time-variant marital status, insurance status and smoking status.

When we repeated our analyses without restricting to participants with stable pre-recession financial status, our results remained overall similar in direction and magnitude, with the exception that the associations between income and CES-D score and debt to asset ratio and CES-D score were both attenuated (online supplemental tables 2 and 3). When we repeated our analysis evaluating large income shocks and large increases in debts, our results again remained overall similar in direction and magnitude (online supplemental tables 4 and 5).

DISCUSSION

We provide evidence that among persons who are at the peak of their earning years (mean age: 45 years), negative shocks to financial well-being during the Great Recession were associated with greater depressive symptoms and a slight decrease in alcohol consumption. These associations, especially those relating negative shocks in debt to asset ratio with depressive symptoms and alcohol use, have not been previously demonstrated. Furthermore, previous research has not examined these various types of financial shocks and outcomes within the same sample, contributing to a more detailed understanding of the complex relationships between different aspects of financial well-being, depression and substance misuse during economic recessions.

Associations between financial shocks and increases in depressive symptoms or mental health problems have been previously observed.[9–14 36] In seminal work, Ruhm[37] noted that suicide (an outcome associated with depressive symptoms) was an exception to the procyclic nature of recessions, meaning that during recessions, suicide rates increased while mortality from other causes of death decreased. Three studies found associations between recession-related unemployment and increases in depressive symptoms in samples from the USA[9] and several European countries.[11 12] Consistent with our findings, two other studies have also found associations between negative shifts in wealth (similar to our debt to asset ratio) and increases in depressive symptoms.[13 14] Our findings build on this literature by consistently showing worsening of depressive symptoms across different financial shocks. Our findings on alcohol use behaviours are consistent with some previous studies[19–21] while inconsistent with others.[15–18] Examining trends in mortality and national surveys, prior work suggested that recessions may be beneficial to health through decreased leisure time and resources to take part in risky behaviours, such as alcohol use.[37] Our results support this claim.

To our knowledge, this is the first time that associations between financial shocks and decreases in alcohol use are demonstrated in this type of sample. Most prior studies on the recession and alcohol are cross sectional,[15 17–20] in a geographically limited sample[16] or examining area-level predictors instead of individual-level predictors.[22] The magnitude of change in depression symptoms was substantial as it marked a mean shift in depressive symptoms of approximately 2 units for persons who became unemployed and for persons who experienced a negative shock in debt to asset ratio, elevating depressive symptoms close to the CES-D cutoff of 16 for clinical depression.[32] Our results also showed that a negative shock in debt to asset ratio was associated with decreases in amount of alcohol consumed—which has not been shown using a predictor related to debts and assets earlier. However, as 4 mL is a relatively slight decrease in alcohol consumption, this finding may not be clinically significant. Still, we believe this result adds to the literature on how some aspects of recessions, in this case debt to asset ratio, may actually be procyclic for health, as past research suggests.[19–21 37]

There are several limitations to this study. We do not have information on the reason for the negative shock in the financial predictors experienced during the Great Recession, which would enhance our ability to infer that these shocks were truly due to the recession. To address this issue, we only included participants who had stable financial well-being in the years leading up to the recession, making it less likely that these persons would have experienced a shock to their financial status in absence of the Great Recession. While this approach resulted in a large number of exclusions from our data set (online supplemental table 1), still, our study sample was about 40% black and 50% women, enhancing the generalisability of our findings. When we repeated our analyses without those exclusions, results were overall similar, as can be seen in online supplemental tables 2 and 3. Another important limitation is that the data for income, debts and assets were collected in brackets rather than actual dollar amount. For this reason, we could not differentiate between small and larger changes resulting in a shift in brackets. To address this limitation, we conducted a sensitivity analysis evaluating large shifts in income and debts, where participants experienced income drops or increases in debts greater than or equal to two brackets. The results of these sensitivity analyses were similar in magnitude and direction, which can be seen in online supplemental tables 4 and 5, and the average size of the shifts can be seen in online supplemental table 6. Finally, in the fixed-effects model for binary outcomes (past 30-day drug use and presence of binge drinking), persons who had the same outcome status both before and after the recession were 'differenced out' of the model, which reduces the sample size of these analyses. Given that pre-recession/post-recession changes in the outcomes of binge drinking and drug use were relatively rare in our cohort, the absence of statistical associations may be related to lack of statistical power. We recommend that future research examine these outcomes higher risk samples.

Despite those limitations, there are several important strengths of our study. We build on previous literature by evaluating three different financial shocks in one sample. By using the debt to asset ratio rather than an indicator of debts or assets alone, we account for phenomena such as larger credit limits allotted to persons with more assets. Another very important strength of our study is the use of the fixed-effects design, which strengthens the inferences we can make about our findings. In a fixed-effects design, a

type of quasi-experimental design, participants serve as their own control. Therefore, measured fixed (time-invariant) covariates such as age, sex, race and unmeasured fixed covariates such as IQ and childhood socioeconomic status are inherently controlled for. To further account for confounding, we adjusted for time-variant covariates (change in smoking behaviour, change in marital status and change in health insurance status) with known relationships with depression and substance misuse.[33–35] While in the USA, health insurance is often employer based and may thus represent an underlying mechanism, public options were available to some persons during the Great Recession. Furthermore, in our samples, employment and health insurance were not highly correlated ($r<0.21$ for all three samples). For these reasons, we adjusted for time-variant health insurance status in our fixed-effects models. A key assumption of a fixed-effects design is that the predictor is truly exogenous, which is why the exclusions we made to our samples are important for meeting this assumption. While this exclusion created a sample with higher wealth, our results were mostly consistent in our sensitivity analysis without these exclusions. The approach we used to select the samples, which was based on the stability of the pre-recession financial trajectory, enhanced our ability to infer that these shocks were truly due to the recession. Taken together, these strengths allow for stronger inference of the results than would have been possible with other designs.

In conclusion, our results support that the way in which recessions influence health is multifaceted. Given the potential of macroeconomic conditions to increase depressive symptoms for large numbers of people, we believe these results are important for both clinical and population health considerations. With regard to the results around shifts in debt to asset ratio and alcohol use, we recommend future research into the procyclic aspects of recessions, and why financial shocks may be protective against certain risky behaviours, and the larger implications of these findings.

What is already known on this subject

- Shocks to financial well-being incurred during economic recessions, such as loss of income or becoming unemployed, may be related to increased depression. However, this relationship has been less explored using other measures of financial well-being such as debt to asset ratio. Furthermore, less is known regarding the relationship between financial shocks and risky health behaviours such as substance misuse during economic recessions.

What does this study adds

- We found that shocks to multiple indicators of financial well-being during the 2008 recession (eg, becoming unemployed, a drop in income and incurring more debts than assets) were associated with increased depressive symptoms, while incurring more debts than assets was associated with a slight decrease in daily alcohol use. These findings emphasise the importance of examining multiple domains of financial well-being as each can have pervasive impacts on health behaviors and outcomes, and thus may inform social policy and research related to economic recessions.

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Contributors SLS did the analysis and drafted the manuscript, and DJF and AZAH reviewed the code and assisted with the analysis. TE, ZB, HF, SC, SS and CIK all provided a critical review of the manuscript.

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ORCID iD

Samuel Longworth Swift http://orcid.org/0000-0001-5858-8247

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