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Article

Recession hardships, personal control, and the amplification of psychological distress: Differential responses to cumulative stress exposure during the U.S. Great Recession

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A B S T R A C T

Recessions pose risks to mental health, yet the psychosocial mechanisms involved are less clear. One critical factor may be people's perceived control when faced with multiple recession hardships. Here we test a structural amplification hypothesis by assessing the role of perceived control as a mediator and moderator of the relation between recession shocks and psychological distress. We draw on waves 2 (2004–2006) and 3 (2013–2014) of the Midlife in the United States study (MIDUS), covering 1,739 US adults under age 75 from before and after the Great Recession. Our statistical models reveal that perceived control declines while distress rises in association with a greater accumulation of recession-related hardships. Perceived control partially mediated the recession hardships-distress association,attenuating it by about one-fifth. Further, perceived control modified the association between recession hardships and distress; individuals who reported larger declines in personal control had greater increases in distress, whereas those who experienced hardships but increased their perceived control did not exhibit significant changes in distress levels. Taken together, our findings support the structural amplification hypothesis, whereby an accumulation of recession hardships erode coping resources that would otherwise protect individuals from the mental health effects of stress exposure. Future research is needed to better understand sources of resilience at individual, community, and societal levels to help ameliorate sentiments of powerlessness and lack of perceived control during economic recessions.

1. Introduction

The Great Recession, which began in 2007, was the longest of its kind in the United States since the Great Depression of the 1930s (Grusky, Western, & Wimer, 2011, pp. 3–20). Soaring unemployment rates, combined with a deep housing crisis and plummeting stock portfolios, disrupted the lives of millions of Americans (Kalleberg & Von Wachter, 2017). The consequences of these events for mental health are now clear. A systematic review identified 78 studies that revealed a relationship between recessions and deteriorating mental health (Modrek, Stuckler, McKee, Cullen, & Basu, 2013). One study estimated over 10, 000 excess suicide deaths relative to historical trends during the Great Recession in Europe and North America (Reeves, McKee, & Stuckler, 2014). Other reviews of the literature point to deteriorating mental health among individuals who experience stressors that commonly occur during recessions, such as job loss, housing foreclosure, or asset shocks (Burgard, Ailshire, & Kalousova, 2013; Burgard & Kalousova, 2015; Catalano et al., 2011).

Yet, despite clear evidence of the link between recessions and ill mental health, the nature of the mechanisms involved remain inadequately understood. In their review of existing research, for example, Burgard and Kalousova note a dearth of studies investigating multiple shocks and individual responses over time in order to account for the non-independence of stressful life events (Burgard & Kalousova, 2015). Additionally, there is a critical gap in understanding factors that exacerbate suffering or promote resilience to recession-related hardships, enabling some individuals to thrive while others suffer during macro-economic downturns. One systematic review identified several sociodemographic factors that shape vulnerability and resilience to recessions, but found that very few studies examine the role of psychosocial beliefs in this regard (Glonti et al., 2015). This represents an important limitation given a large literature demonstrating that cognitive resources, such and the sense of personal control, play a key mediating and moderating role in the link between stressful life circumstances and mental health (Lachman & Weaver, 1998; Marmot et al., 1991; Mirowsky & Ross, 2003; Pearlin & Bierman, 2013; Pearlin & Schooler, 1978; Turner, Lloyd, & Roszell, 1999; Whitehead et al., 2016).

Stressful life events lead to poor mental health, in part, by eroding one's sense of personal control (Pearlin & Bierman, 2013), which is defined as "the extent to which one regards one's life chances as being

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under one's own control in contrast to being fatalistically ruled." (Pearlin & Schooler, 1978) Medical sociologists and public health scholars have demonstrated that perceived control is directly associated with better mental health, and that control perceptions mediate the relationship between social stress exposure and psychological distress (Pearlin & Bierman, 2013; Ross & Mirowsky, 2006). Greater perceived control has also been shown to weaken or "buffer" the association between adverse life conditions and psychological problems, in part by incentivizing active and instrumental coping strategies, and also by changing the meaning and thus effects of social stress (Koltai, Bierman, & Schieman, 2018; Krause & Stryker, 1984; Ross & Sastry, 1999). However, notwithstanding a widespread recognition among public heath scholars concerning the centrality of perceived control for health and well-being (Whitehead et al., 2016), as well as a growing emphasis on the sense of control in frameworks designed to foster empowerment and resilience in reports from the World Health Organisation (World Health Organization, 2008, 2017), very little is known about how perceived control may protect individuals from cumulative stress exposures induced by macroeconomic shocks.

On the other end of the same continuum, while personal control promotes resilience, perceptions of powerlessness amplify vulnerability. Powerlessness is the belief that one's actions do not affect one's life chances, and that undesirable outcomes are determined by forces external to one's self (Mirowsky & Ross, 2003). These perceptions, under varying labels, have long been recognized as a broad risk factor in the etiology of poor health and psychological problems (Mirowsky & Ross, 2007; Seeman, Merkin, Karlamangla, Koretz, & Seeman, 2014; Seligman, 1974; Wallerstein, 1992; Wheaton, 1983). Reviews of the literature cite strong and consistent associations between powerlessness and poor mental health, in part in because they tend to evoke feelings of low self-efficacy and self-worth, and because they trigger passive or maladaptive coping responses in the face of stressful life circumstances (Pearlin & Bierman, 2013; Ross & Mirowsky, 2006). Of particular relevance to our study is research that demonstrates a stronger link between stressful life events and distress when individuals report perceptions of powerlessness, and when undesirable events are deemed uncontrollable (Lachman & Weaver, 1998; Ross & Sastry, 1999; Szeltner, Van Horn, & Zukin, 2013). Both of these dynamics likely combine during recessions: macroeconomics shocks are inherently uncontrollable (Mirowsky & Ross, 2003; Ross, Mirowsky, & Pribesh, 2001), and they may set in motion a cascade of undesirable events that trigger perceptions of powerlessness and elevated psychological distress at the individual level.

According to the theoretical framework developed by Ross, Mirowsky, and Pribesh, under certain circumstances, the mediating and moderating dynamics described above may combine to generate a process of "structural amplification," (Ross et al., 2001) which exists when a mediator of the association between stressful conditions and mental health also magnifies that association (Mirowsky & Ross, 2003). In other words, under structural amplification, undesirable life events erode the sense of personal control that would otherwise buffer the effects of those events, increasing perceptions of powerlessness and thus vulnerability to the stressor.

Here, we address gaps in prior recession-related research and test the structural amplification hypothesis by investigating whether a cumulative index of recession-related shocks shape perceptions of personal control, which in turn transmit and magnify the effects of those shocks on psychological well-being. Specifically, we assess whether psychological distress rises in association with an accumulation of recession-related hardships, and whether changes in personal control both mediate and moderate this relationship.

2. Methods

2.1. Source of data

This study utilized longitudinal data from the National Survey of Mid-life in the United States (MIDUS). The first wave (1995/1996) of the MIDUS survey collected data from 7,108 non-institutionalized adults aged 25–74, recruited through national random digit dialing and oversampling of five metropolitan cities in the United States. Follow-up interviews were completed for wave 2 in 2005–2006 and for wave 3 in 2013–2014. Of the sample from wave 2 of the MIDUS, approximately 77% of those eligible (N = 3,294) were re-interviewed.

Our main analyses focus the 2nd and 3rd waves of the MIDUS, reflecting data collected before (2004–2006) and after (2013–2014) the Great Recession in America. While the recession had ended when this latter wave of data were collected, the effect of the downturn had not subsided for many individuals. One study reports an increase in the number of individuals seeking professional help for stress or depression from 9% to 14% between 2010 and 2013 (Szeltner et al., 2013). The same study found that by 2013, 61% of individuals believed their family finances would not recover to pre-recession levels. Drawing on the MIDUS, Forbes and Kreuger recently found higher odds of depression, generalized anxiety, panic, and problematic substance use 3–4 years after recession had ended among those who experienced even a single financial, job-related, or housing impact during the recession (Forbes & Krueger, 2019).

Of the 3,294 original participants for which data were collected at Wave 3, we removed those who were 75 or above, and those with missing data for personal control and psychological distress at waves 2 and 3, resulting in 1,896 valid cases. After removing additional observations with missing values on recession hardships and covariates, our final sample include 1,739 valid cases. We chose 75 as a cut point in order to avoid conflating the mental health effects of recession hardships with those that may result from entering very old age (maximum age in the unrestricted sample is 93). Sensitivity analyses nevertheless shows that our findings remain consistent using the full age range. Inclusion criteria for our sample is shown using a flowchart in Appendix 1.

Given the age range (25–74) of participants in the nationally representative sample collected at wave 1 in 1995, as well as the nearly 20 year gap from wave 1 to wave 3, attrition across waves was anticipated. In order to account for the possibility that non-random attrition processes influenced selection into our sample, we apply inverse probability of attrition (IPA) weights to all regression models (Weuve et al., 2012). We first predicted the probability of sample inclusion at wave 3 using a wide range of Wave 1 observable characteristics, then took the inverse of this probability to generate the final sample weight. We present the logistic regression model used to predict sample inclusion in Appendix 2. Radler and Ryff provide a more comprehensive discussion of attrition processes in the MIDUS (Radler & Ryff, 2010).

2.2. Measuring personal control and mental health

A distinctive feature in wave 3 of MIDUS is a series of questions concerning 18 'undesirable' life events related to the Great Recession, which have been used in recent studies investigating the well-being effects of the economic crisis (Forbes & Krueger, 2019; Kirsch & Ryff, 2016; Wilkinson, Schafer, & Wilkinson, 2019). Respondents were prompted by the following statement: "For each of the following, please tell [the interviewer] whether or not it is something that has happened to you since the recession began in 2008. Since the recession began in 2008 have you …" Responses to each item were code 1 for 'yes' 0 for 'no.' According to Kirsch and Ryff (Kirsch & Ryff, 2016), the MIDUS team derived this set of items from a national survey of unemployed adults conducted by the Heidrich Center for Workforce Development, Rutgers (Szeltner et al., 2013).

The items span recession hardships related to financial circumstances (ie. declared bankruptcy), housing issues (ie. threatened with eviction), and work or labour market stressors (ie. lost a job). Following Kirsch and Ryff and Wilkinson et al. (Kirsch & Ryff, 2016; Wilkinson et al., 2019), we summed "yes" responses to create a composite inventory of recession-related hardships (Cronbach's $\alpha = 0.76$). Similar

checklist inventories of undesirable life events have been used widely in literature on stress and mental health (Kessler, 1997), and simple additive indexes have traditionally been the dominant measurement procedure (Turner & Wheaton, 1995, pp. 29–58). We cap the measure at 10, representing the 99th percentile, in order to avoid producing unstable estimates that would result from extremely small cell sizes (especially in interaction models). For example, of individual that experienced more than 10 hardships in our final sample, 6 individuals report 11 hardships, 3 individuals report 12 hardships, and a total of 4 individuals report 13–15 hardships (maximum was 15). Table 1 presents the distribution of each item.

Distress is measured using the Kessler index (K6) of psychological distress, which asks respondents how much of the time in the past 30 days they have felt: "nervous," "that everything was an effort," "hopeless," "worthless," "restless or fidgety," "so sad nothing could cheer you up," and "hopeless." Response choices are as follows: "none of the time," "a little of the time," "some of the time," "most of the time," and "all of the time." Following standard techniques using the K6, we summed these items to generate an additive index. We then computed a change score that represents changes in distress symptomatology between waves (W3 distress symptoms – W2 distress symptoms).

The sense of personal control was assessed with a validated 12-item composite measure that captures personal control (e.g. I can do just about anything I really set my mind to) and perceived constraints (e.g. What happens in my life is often beyond my control). The index combines items originally developed by Pearlin and Schooler for their personal mastery scale with items developed by Lachman and Weaver that tap the sense of control and perceived constraints (Lachman & Weaver, 1998; Pearlin & Schooler, 1978). This 12-item measure is consistent with Skinner's two-dimensional conceptualization of control (Skinner, 1996), and has been used in recent published research. Responses range from 1 (strongly agree) to 7 (strongly disagree). Following published research using this construct, all 12 items were averaged (Cronbach's $\alpha = 0.87$ in both waves 2 and 3), with higher scores indicating higher perceived control (Kirsch & Ryff, 2016; Morton, Mustillo, & Ferraro, 2014). We then computed a change score that reflects changes in personal control between waves (W3 sense of control – W2 sense of control). To facilitate interpretation, especially in interaction models, we standardized this variable to have a mean of 0 and standard deviation of 1.

Descriptive statistics for all study variables in each wave are presented in Table 2.

Table 1
Recession hardships measured at wave 3 of the Midlife in the United States survey, (ages < 75; N = 1,739).

	N (yes)	Percentage (yes)
Work-related stress		
Lost a job?	246	14.15%
Started new job you did not like?	107	6.15%
Taken job below education/experience?	208	11.96%
Taken additional job?	176	10.12%
Home-related stress		
Missed mortgage or rent payment?	103	5.92%
Threatened with foreclosure/eviction?	76	4.37%
Sold a home for less than it cost you?	80	4.60%
Lost a home to foreclosure?	36	2.07%
Lost a home to something other than foreclosure?	37	2.13%
Family/friends moved in to save money?	218	12.54%
Moved in with family/friends to save money?	73	4.20%
Financial stress		
Declared bankruptcy?	52	2.99%
Missed a credit card payment?	181	10.41%
Missed other debt payments, car/student loans?	87	5.00%
Increased credit card debt?	379	21.79%
Sold possessions to make ends meet?	233	13.40%
Cut back on your spending?	1092	62.79%
Exhausted unemployment benefits?	132	7.59%

Note: Respondents were prompted by the following statement: "For each of the following, please tell [the interviewer] whether or not it is something that has happened to you since the recession began in 2008. Since the recession began in 2008 have you …" Responses to each item were code 1 for 'yes' 0 for 'no.'

2.3. Statistical modeling

We implement ordinary least squares (OLS) regression models to assess within-person change in personal control and psychological distress between waves. The models take the general form:

$$\Delta Control = \beta_0 + \beta_1 Hardships + \beta_2 Z + \varepsilon \quad (1)$$

$$\Delta Distress = \beta_0 + \beta_1 Hardships + \beta_2 \Delta Control + \beta_3 W2Control + \beta_4 Z + \varepsilon \quad (2)$$

Where *ΔDistress* represents changes in psychological distress between waves (Wave 3 score – Wave 2 score). *Hardships* represents our count measure of recession-related hardships (range 0–10). *ΔControl* represents changes in personal control between waves (Wave 3 score – Wave 2 score). *W2Control* is personal control at baseline (Wave 2 score). Z represents a vector of baseline covariates, β_0 is the intercept, and $\varepsilon$the error term. Each β represents the coefficient for change in control (Equation (1)) or psychological distress (Equation (2)) between W2 and W3. Standard errors are clustered at the individual level to adjust for repeated observations.

Our vector of covariates include several factors that may influence exposure to recession hardships as well as mental health. Sex is coded

Table 2
Descriptive statistics for all study variables (N = 1,739.

	Mean/ Percent	Standard Deviation	Min	Max
Recession hardships	2.01	2.22	0	10
Δ Distress	-0.23	2.95	-14	15
Δ Personal control (std)	0.00	1	-4.23	3.51
Wave 2 Personal control	5.63	0.97	1.08	7
Age	60.17	8.28	39	74
Male	45.49%			
Female	54.51%			
Wave 2 Employed	66.24%			
Wave 2 Unemployed	33.76%			
Number of children (W2)				
No children	14.61%			
1 child	12.48%			
2 children	33.87%			
3 or more	39.05%			
Marital status (W2)				
Married	74.47%			
Single	25.53%			
Race/ethnicity				
White	94.71%			
Non-white	5.29%			
Wave 2 household income				
1st quintile	$19,040.66	$12,152.67	$0.00	$36,250.00
2nd quintile	$48,129.44	$6,466.17	$36,700.00	$59,000.00
3rd quintile	$71,367.99	$7,128.91	$59,036.00	$84,500.00
4th quintile	$100,411.00	$10,262.92	$84,750.00	$120,000.00
5th quintile	$183,153.60	$58,286.24	$120,250.00	$300,000.00
Wave 2 resp. education				
Less than high school	2.76%			
High School or GED	22.83%			
Some college	20.01%			
2 year vocational or associates degree	7.65%			
4 year degree or above	46.75%			

0 for men and 1 for women. Age is coded in years at baseline. For race/ethnicity, white respondents (coded 0) with non-white individuals (coded 1). Wave 2 educational attainment is coded as: "less than high school" (0), "high school or GED" (1), "some college" (2), "vocational" (3), "college degree or higher" (4). Wave 2 total household income is measured in quintiles. For marital status at wave 2, we compare "married" respondents (0) with those that are non-married (1), with the latter category including "separated", "divorced", "widowed", and "never married" individuals. Finally, we compared those with "no children" (0) at baseline to those with 1, 2, or 3 or more children.

The analyses unfold in the several stages. In the first step, we regress the change score for personal control on recession hardships, first assessing the bivariate association, and subsequently adjusting for the full range of covariates (Models 1 and 2 in Table 2). This tests whether the number of recession-related hardships one experiences leads to decreases in the sense of control between waves. Next, in Table 3, we assess the bivariate and fully adjusted relationship between recession hardships and distress (Models 1 and 2), and then examine whether controlling for changes in personal control reduces the coefficient for hardships (Model 3).

Finally, in Model 4 of Table 2, we test the structural amplification hypothesis by including an interaction term for *Hardships* × Δ *Control*. To ease interpretation, we present the conditional effect of recession hardships according to changes in personal control in Fig. 3.

Table 3
Association between recession hardships and changes in personal control, (N = 1,739).

	Model 1		Model 2	
	b	Robust S. E.	*b*	Robust S. E.
Recession hardships	-0.011	(0.011)	-0.032**	(0.012)
Age			0.114**	(0.044)
Age squared			-0.001**	(0.000)
Financial Strain at Wave 2			0.057***	(0.013)
Female (ref: male)			0.044	(0.047)
Not employed at wave 2 (ref: employed)			-0.049	(0.054)
Race/ethnicity (ref: white)				
Non-white			0.024	(0.103)
Wave 2 Marital Status (ref: Married)				
Not married/single			0.081	(0.065)
Number of children at Wave 2 (ref: zero children)				
1			0.111	(0.091)
2			0.084	(0.079)
3			0.238**	(0.081)
Respondent Education at Wave 2 (ref: less than high school)				
High School or GED			0.071	(0.122)
Some college			0.154	(0.114)
Vocational			0.161	(0.129)
College degree or above			0.142	(0.114)
Income Quintile at Wave 2 (ref: bottom quintile)				
2nd			0.076	(0.078)
3rd			0.168*	(0.075)
4th			0.162+	(0.084)
5th			0.184*	(0.079)
Constant	-0.086**	(0.032)	-3.847**	(1.284)
R-squared	0.001		0.0506	

Standard errors clustered at the individual level.
***p < 0.001, **p < 0.01, *p < 0.05, + p < 0.10.
All models estimated using OLS and weighted by the inverse probability of attrition.
Changes in personal control are between waves 2 and 3 of the Midlife in the United States survey.
Recession hardships are measured at wave 3.

3. Results

Before proceeding with our main analyses, we present forest plots reflecting results from 18 separate regression models that estimate that association between individual recession-related hardships and the sense of control (Fig. 1) and psychological distress (Fig. 2). Starting with Fig. 1, most individual hardships are associated with decreases in the sense of control, but many of these associations do not differ from zero at the p < 0.05 level. Having sold possessions to make ends meet (b = -0.256; 95% CI = -0.447 to -0.066), increasing credit card debt (b = -0.226; 95% CI = -0.371 to -0.082), and having family move in (b = -0.259; 95% CI = -0.447 to -0.071) are all associated with significant declines in personal control at common statistical thresholds.

Fig. 2 shows similar results insofar as most recession hardships are associated with increases in distress, but not significantly so. When distress is positioned as the outcome, having cut back on spending (b = 0.711; 95% CI = 0.306 to 1.117), and having family move in (b = 1.087; 95% CI = 0.022 to 2.151) are associated with increased in psychological distress between waves 2 and 3 at the p < 0.05 level. It should also be noted that many of the hardships share similar or larger point estimates, yet have larger confidence intervals, likely due in part to smaller cell sizes for some of these items.

3.1. Recession-related hardship and distress: personal control as a mediating factor

Our main analyses begin by examining the association between recession-related hardships and the sense of personal control, as this represents the first path in the structural amplification model. Model 1 in Table 3 tests the unadjusted association between the number of financial hardships on reports and changes in sense of control between waves 2 and 3. Model 1 in Table 3 indicates that the count of recession hardships is not significantly associated with decreases in personal control when left unadjusted. However, after adjusting for baseline covariates in Model 2, each additional recession hardship is associated with a -0.032 (p < 0.01) standard deviation decline in the sense of personal control. The shift in significance from models 1 to 2 may reflect heterogeneous effects of recession hardships on personal control in the population, with the average unadjusted association masking marked variation in response patterns. The adjusted results in model 2 support the hypothesis exposure to recession-related stressors erode the sense of personal control, reinforcing deeper perceptions of powerlessness in individuals who experience more hardships.

Table 4 presents results for changes in psychological distress between waves 2 and 3. Model 1 shows that each additional recession hardship is associated with a 0.173 increase in psychological distress (p < 0.01), and this relationship increases after adjusting for covariates in Model 2 (b = 0.221, p < 0.01). Model 3 in Table 4 introduces changes in the sense of personal control as a predictor of changes in psychological distress. This model shows that a standard deviation increase in personal between waves is associated with a -0.991 decrease in distress symptoms (p < 0.001), net of baseline (Wave 2) personal control and all study covariates. Baseline personal control is not significantly associated with changes in distress. Comparing the Models 2 and 3 shows that the coefficient for recession hardships is reduced by approximately 19% ([0.221–0.179]/.221). This reduction suggests that changes in personal control may partially explain the association between recession hardships and increases in psychological distress between waves 2 and 3. To test the statistical significance of this indirect effect, we conducted separate analyses that test for mediation using structural equation modelling and bootstrapping techniques to compute total, direct, and indirect effects. These models indicated a similar percentage mediated (21%), but we did not find a significant indirect effect at the p < 0.05 threshold (b = 0.021; percentile-based 95% CI = -0.002 to 0.041). These

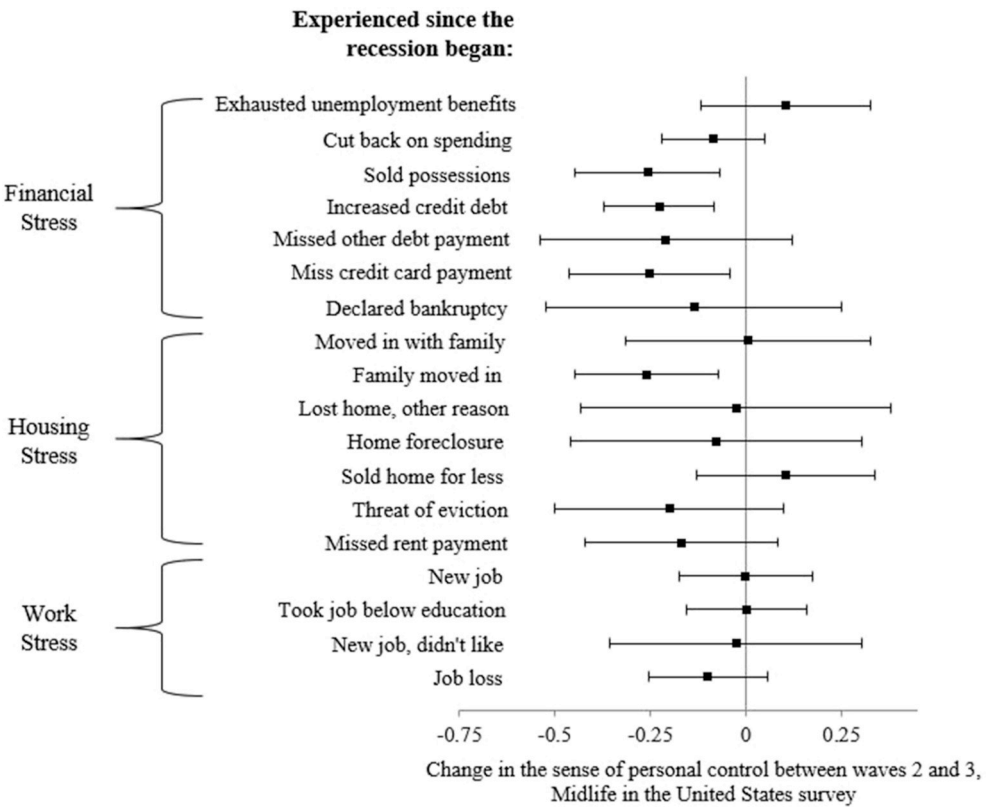

Fig. 1. Adjusted associations between individual recession-related hardships and changes in personal control (standardized) with 95% confidence intervals, (N = 1,739).
Point estimates and confidence intervals represent results from 18 separate OLS models that adjust for age, gender, race/ethnicity, and the following measured at baseline (wave 2): marital status, number of children, household income, and financial strain.
Sample restricted to those under the age of 75.
All models weighted by the inverse probability of attrition.
Standard errors clustered at the individual level.

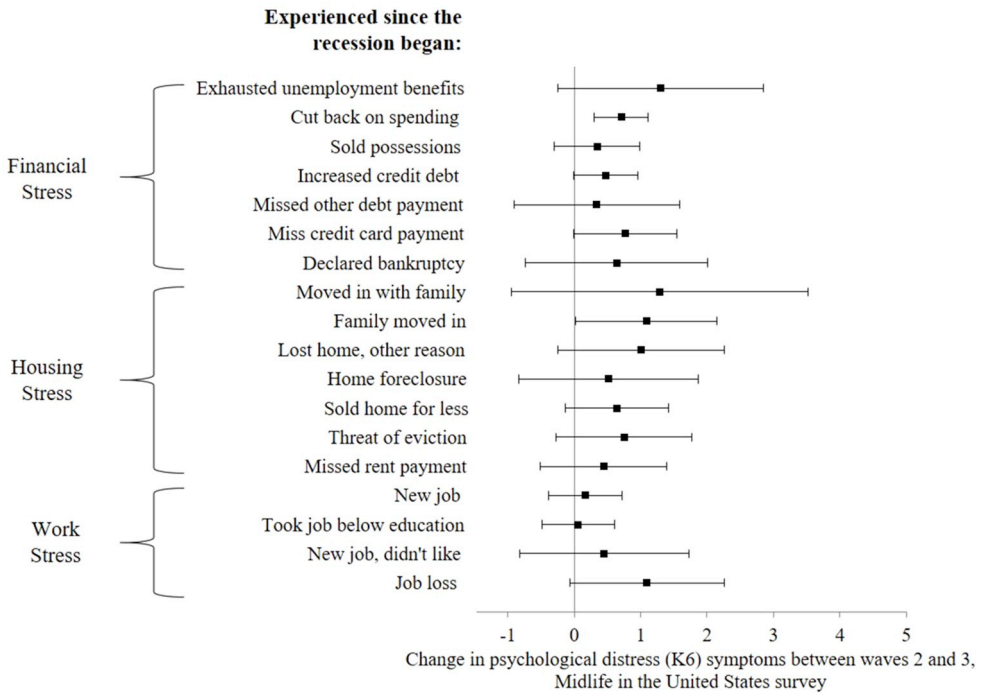

Fig. 2. Adjusted associations between individual recession-related hardships and changes in psychological distress with 95% confidence intervals, (N = 1,739).
Point estimates and confidence intervals represent results from 18 separate OLS models that adjust for age, gender, race/ethnicity, and the following measured at baseline (wave 2): marital status, number of children, household income, and financial strain.
Sample restricted to those under the age of 75.
All models weighted by the inverse probability of attrition.
Standard error clustered at the individual level.

latter results are shown in Appendix 3.

3.2. Structural amplification

Model 4 in Table 4 tests the structural amplification hypothesis by adding and interaction term for *recession hardships* × Δ *personal control,* which is negative and statistically significant ($b = -0.110$, $p < 0.05$). To facilitate an interpretation of this coefficient, Fig. 3 shows the relationship between the number of recession hardships and changes in psychological distress by changes in personal control.

We also implemented post-hoc estimation of average marginal effects following the model estimating the interaction between recession

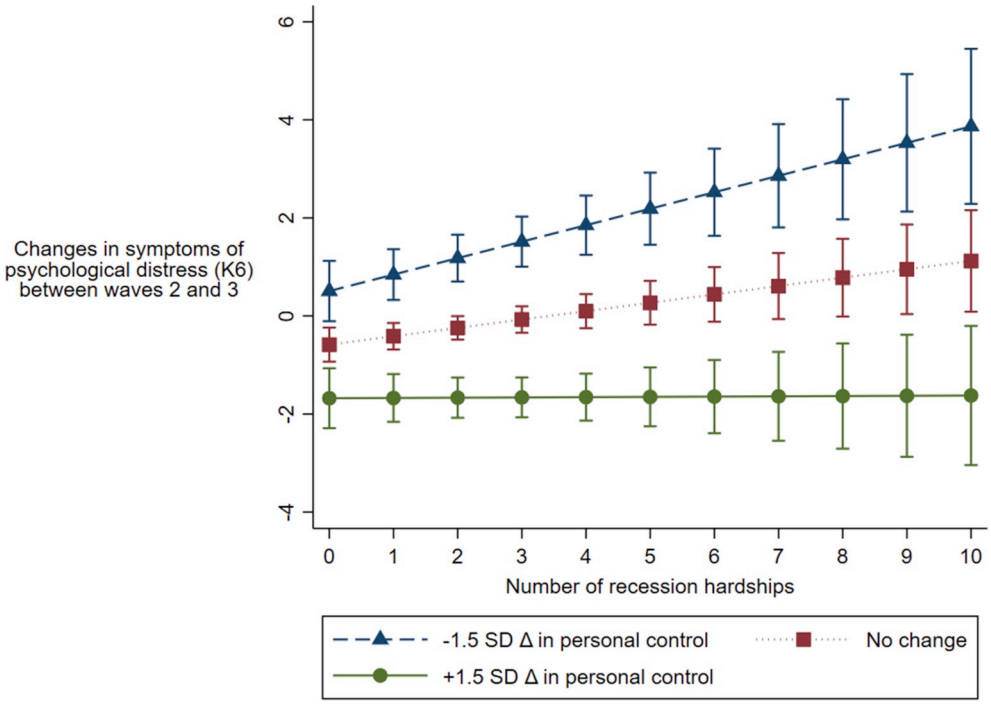

Fig. 3. Structural amplification: the association between recession-related hardships and changes in psychological distress by changes in personal control, with 95% CI (N = 1,739).
Standard errors clustered at the individual level.
Model estimated using OLS and weighted by the inverse probability of attrition.
Changes in distress and personal control are between waves 2 and 3 of the Midlife in the United States survey.
Recession hardships are measured at wave 3.

Table 4
The relationship between recession hardships and distress: mediation and structural amplification.

	Model 1		Model 2		Model 3		Model 4	
	b	Robust S.E.	*b*	Robust S.E.	*b*	Robust S.E.	*b*	Robust S.E.
Recession hardships	0.173**	(0.066)	0.221**	(0.071)	0.179**	(0.066)	0.171**	(0.064)
Wave 2 personal control					-0.195	(0.174)	-0.181	(0.174)
Personal control Δ (std)					-0.991***	(0.126)	-0.729***	(0.172)
Financial hardships × Personal control Δ (std)							-0.110*	(0.047)
Age			-0.123	(0.213)	0.001	(0.207)	-0.008	(0.208)
Age squared			0.001	(0.002)	-0.000	(0.002)	-0.000	(0.002)
Financial Strain at Wave 2			-0.205**	(0.074)	-0.161+	(0.086)	-0.162+	(0.085)
Female (ref: male)			-0.488**	(0.180)	-0.453**	(0.172)	-0.439*	(0.170)
Not employed (ref: employed)			0.040	(0.284)	-0.034	(0.277)	-0.065	(0.279)
Race/ethnicity (ref: white)								
Non-white			0.103	(0.764)	0.129	(0.754)	0.100	(0.756)
Wave 2 Marital Status (ref: Married)								
Not married/single			-0.015	(0.337)	0.065	(0.329)	0.091	(0.329)
Number of children at Wave 2 (ref: zero children)								
1			0.169	(0.383)	0.308	(0.367)	0.331	(0.363)
2			-0.153	(0.457)	-0.041	(0.450)	0.006	(0.449)
3			0.087	(0.403)	0.378	(0.400)	0.431	(0.400)
Respondent Education at Wave 2 (ref: less than high school)								
High School or GED			-0.438	(1.400)	-0.332	(1.396)	-0.348	(1.395)
Some college			-0.168	(1.419)	0.071	(1.406)	0.080	(1.406)
Vocational			-0.095	(1.416)	0.136	(1.402)	0.173	(1.403)
College degree or above			-0.243	(1.397)	-0.025	(1.385)	-0.047	(1.384)
Income Quintile at Wave 2 (ref: bottom quintile)								
2nd			-0.399	(0.305)	-0.281	(0.297)	-0.318	(0.292)
3rd			-0.452	(0.297)	-0.236	(0.282)	-0.270	(0.282)
4th			-0.867*	(0.363)	-0.653+	(0.333)	-0.684*	(0.333)
5th			-0.841**	(0.290)	-0.592*	(0.278)	-0.613*	(0.277)
Constant	-0.551***	(0.150)	5.257	(5.757)	2.260	(5.564)	2.419	(5.596)
R-squared	0.0129		0.0375		0.1141		0.1206	

Standard errors clustered at the individual level.
***p < 0.001, **p < 0.01, *p < 0.05, + p < 0.10.
All models estimated using OLS and weighted by the inverse probability of attrition.
Changes in distress and personal control are between waves 2 and 3 of the Midlife in the United States survey.
Recession hardships are measured at wave 3.

hardships and personal control, shown in Appendix 4. These results reveal a null association between the number of recession hardships and changes psychological distress for those who experienced a large increase (1.5 SD) in personal control ($b = 0.006$; $p = 0.953$). Put differently, a large increase in the sense of personal control between waves appears to completely buffer the association between recession hardships and distress. For those reporting no change in personal control, the relationship between hardships and changes distress is positive and significant ($b = 0.171$; $p < 0.01$). This relationship is magnified substantially ($b = 0.336$, $p < 0.01$) for respondents that endured a large decrease in personal control, providing further support for the structural amplification hypothesis. Notably, the average marginal effect of recession hardships for those with no changes in personal control ($b = 0.171$) is almost identical to the unadjusted association between recession hardships and distress shown in Table 4, Model 1 ($b = 0.171$), underscoring the contingent nature of the relationship between cumulative stress exposure and mental health.

3.3. Sensitivity analyses

To assess whether our findings are robust to alternative methods for addressing the uncertainty associated with attrition and missing data, we removed our inverse probability of attrition weight and replicated all models using listwise deletion (Appendix 5) and multiple imputation with chained equations (Appendix 6). Both methods produce the same qualitative patterns reported in our main analyses. We also reproduced all models removing the age restriction imposed in our main analyses, shown in Appendix 7. Again, we find the same substantive patterns.

We also conducted separate analyses to distinguish between the moderating role of *changes* versus *levels* of personal control by estimating the relationship between recession hardships and distress with baseline personal control as the moderator (shown in Appendix 8). Here, we do not find a significant interaction between hardships and control ($b = 0.017$; $p = 0.837$), underscoring the importance of studying changes in coping resources in response to stressors, as opposed to treating psychosocial resources such as the sense of control as a static trait from an analytic standpoint.

To compare the mental health effect of recession hardships with the experience of other stressful life events, we estimated the relationship between changes in chronic conditions and distress between waves 2 and 3, where chronic conditions is measured as an additive index of the number of self reported chronic health conditions at each wave. Appendix 9 shows that an increase of one chronic health condition between waves is associated with a $b = 0.161$ change in distress ($p < 0.001$), which is similar in magnitude in magnitude to the unadjusted coefficient for the recession hardships-distress association ($b = 0.173$).

4. Discussion

Despite a growing literature demonstrating the harmful consequences of economic downturns for mental health, little is known about the cumulative impact of recession-related stress exposures, and how the mental health effects of recession-related hardships may be transmitted through and modified by psychosocial beliefs. The present study uses data from before and after the Great Recession, and survey questions specifically designed to evaluate recession-related experiences, to address these limitations and offers three main contributions to the literature.

First, we demonstrate that psychological distress rises in association with the number of recession-related hardships individuals endure, specifically addressing calls for more research examining multiple shocks during recessionary periods and individual responses over time (Burgard & Kalousova, 2015). Sociologists and social psychologists have long recognized that stressful life events circumstances are unlikely to occur in isolation (Pearlin, 1989; Pearlin, Menaghan, & Lieberman, 1981), and that a given stressor may represent one link in a chain or cascading set of adversities (Burgard & Kalousova, 2015; Price, Choi, & Vinokur, 2002). By measuring recession-related hardships cumulatively, our study accounts for the possibility that certain individuals experience multiple stress exposures across life domains that coalesce to undermine mental health.

Second, to our knowledge, this is the first study to assess the mediating and moderating role of perceived control in the relationship between cumulative recession-related stress exposure and mental health. Although we did not detect a significant indirect effect, which may reflect a lack of statistical power, the patterns are qualitatively consistent with mediation: the sense of personal control declines in association with a greater number of recession hardships, and adjusting for changes in perceived control attenuates the association between recession hardships and changes in psychological distress by approximately 20%. We did however find a statistically significant interaction between recession hardships and changes in personal control, resulting in patterns consistent with the structural amplification hypothesis—the association between recession hardships and distress was magnified for those who experienced large declines in the sense of control, while this association was reduced to non-significance for those that reported increases in personal control. Taken together, these cross-cutting patterns highlight the psychological cost of powerlessness perceptions in the face of threatening life circumstances, and also underscore the protective effects of perceived control.

Third, and relatedly, our findings contribute to literature that seeks to identify resilience factors in the link between recessions and mental health, which has largely overlooked the role of psychosocial beliefs (Glonti et al., 2015). Importantly, our findings highlight the salience of *changes* rather than *levels* of personal control. This strategy avoids the conceptualization of vulnerability and resilience as stable personality traits, and directs attention towards the ways that coping resources, or lack thereof, are shaped by individual placement in structural conditions of security and privilege on the one hand, versus disadvantage and adversity on the other (Ross & Mirowsky, 2006; Ross & Sastry, 1999). Indeed, we did not detect any protective effect of baseline personal control in our sensitivity analysis. Future research should examine the ways that broader economic conditions shape perceptions of control and powerlessness at the individual, community, and regional levels in order to forge a deeper understanding of circumstances that foster resilience or amplify vulnerability during turbulent times.

4.1. Study limitations

Our study had several limitations. First, our measure of recession-related hardships was collected after the recession had ended. This creates potential recall biases, as well as an inability to perfectly track changes over time. To address this, we adjust for several baseline covariates (ie. wave 2), and note that recession acted as a relatively exogenous shock. Nonetheless, there remains potential for unobserved confounding which we were unable to adjust for. Additionally, to perform a formal causal mediation analysis, taking advantage of a temporal dimension, would require data on recession hardships which preceded both personal control and distress measures, which were unavailable (VanderWeele, 2015).

Second, our analyses cannot differentiate why certain individuals suffer while others are able to maintain or increase their sense of personal control in the face of recession-related hardships. This invokes a multi-level notion of resilience. Those who maintain personal control despite recessions may benefit from more efficacious coping strategies, or highly supportive social networks, which may in turn give rise to perceptions that threatening life circumstance can be overcome. Future research is needed to understand such sources of resilience and how these intersect with disadvantaged social statuses including race, class and gender.

Third, attrition between the first and third waves of dates collection makes the sample unrepresentative of the U.S. population. Those

respondents disproportionately exposed to recession hardships and associated distress could have been more likely to be lost to attrition between waves. This would bias our findings conservatively, as corroborated by our sensitivity tests finding that excluding weights for potential non-random attrition attenuate effect sizes.

Lastly, we use change scores in order to rule out unobserved time-stable differences between individuals that may confound the associate between changes in personal control and changes in psychological distress. However, we acknowledge that change scores have been criticized for issues related to unreliability and regression towards the mean (Allison, 1990).

4.2. Policy implications

Notwithstanding these limitations, our findings highlight personal control as a psychosocial target for intervention in the association between recessions and mental health. Active labour market policies may help mitigate large declines in personal control associated with recession hardships. These programmes may enhance resilience, for example, by improving re-employment prospects through enhancing human capital through the acquisition of new skills (Coutts, 2009; Coutts, Stuckler, & Cann, 2014). Such programmes, in the aggregate, appear to mitigate rises in suicides during recessionary periods (Stuckler, Basu, Suhrcke, Coutts, & McKee, 2009). Another possibility is to administer cognitive-behaviour therapy based training interventions to improve coping skills and psychological well-being among long-term unemployed individuals (Creed, Machin, & Hicks, 1999). Our research supports the notion that recessions pose threats to mental health, but that these consequences are not inevitable and can be prevented. The challenge now is better understand how best to do so. Understanding the roles of perceived control and resilience is a good place to start.

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Declaration of competing interest

None.

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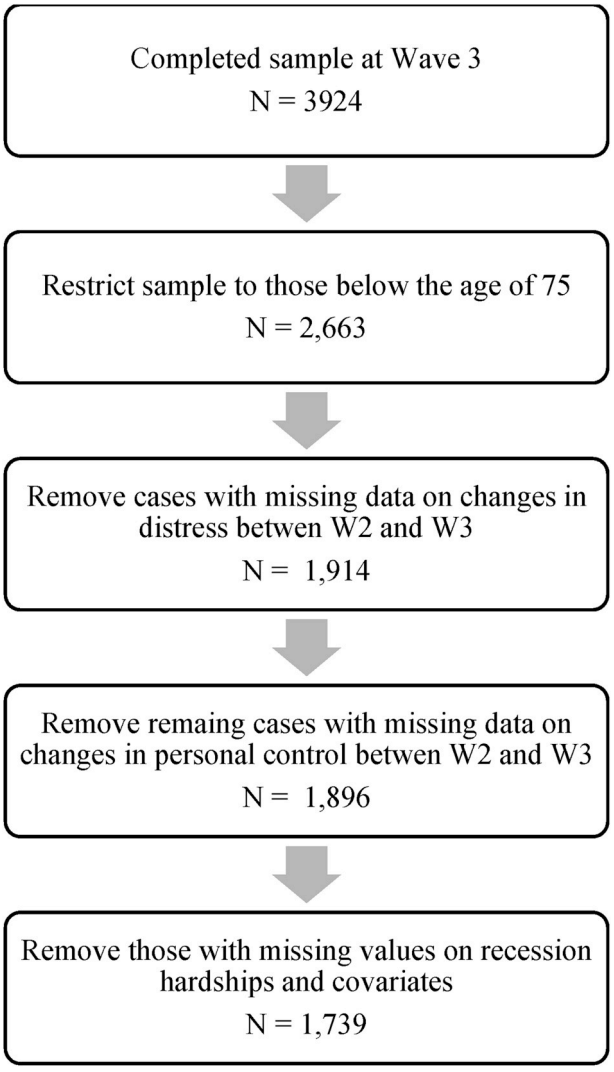
Appendix 1. Criteria for sample inclusion



Appendix 2. Logistic regression model predicting sample inclusion

	Odds Ratio		95% confidence interval		
Martial status (ref: Married)					
Separated	0.71		0.46	to	1.09
Divorced	1.00		0.83	to	1.21
Widowed	0.49	**	0.32	to	0.77
Never married	0.71	**	0.58	to	0.87
Education level (ref: less than high school)					
High school	1.70	***	1.28	to	2.24
Some college	1.79	***	1.35	to	2.38
2 year vocational or associates	1.79	**	1.28	to	2.50
4 year degree or more	2.73	***	2.06	to	3.61
Race/Ethnicity (ref: white)					
Black	0.44	***	0.32	to	0.61
Other	0.44	***	0.31	to	0.62
Self-rated mental health (ref: poor)					
Fair	2.33		0.87	to	6.27
Good	2.01		0.77	to	5.29
Very good	2.32		0.88	to	6.09
Excellent	2.20		0.83	to	5.81
Self-rated health (ref: poor)					
Fair	1.58		0.86	to	2.91
Good	1.98	*	1.10	to	3.57
Very good	2.16	*	1.20	to	3.91
Excellent	2.11	*	1.15	to	3.86
Never diagnosed with cancer (ref: yes)	1.14		0.88	to	1.48
Conscientiousness	1.28	**	1.10	to	1.47
Female	1.27	***	1.13	to	1.44
Age	0.96	***	0.95	to	0.97
Household income quintile (ref: bottom)					
2nd	1.03		0.83	to	1.27
3rd	1.37	**	1.11	to	1.70
4th	1.42	**	1.14	to	1.76
5th	1.49	***	1.19	to	1.86
Missing on income	0.40	***	0.23	to	0.70
Constant	0.09	***	0.03	to	0.32

***p < 0.001, **p < 0.01, *p < 0.05.
Logistic regression model estimated using complete case analysis (N = 6,101).
All predictors measured at Wave 1.

Appendix 3. Total, direct, and indirect effects of recession hardships on distress, personal control as a mediator, (N = 1,896)

	β	Bias	Bootstrap S.E.	95% Confidence Interval			
Indirect effect	0.021	0.000	0.011	-0.002	to	0.041	(P)
				-0.004	to	0.041	(BC)
Direct effect	0.077	-0.002	0.036	0.009	to	0.147	(P)
				0.016	to	0.150	(BC)
Total effect	0.098	-0.002	0.040	0.024	to	0.174	(P)
				0.030	to	0.180	(BC)

(P) percentile confidence interval.
(BC) bias-corrected confidence interval.
Estimates computed using structural equation models with full-information maximum likelihood in Stata 15.1.
Standard errors and confidence intervals are bootstrapped with 200 replications.
Adjusted for age, gender, race/ethnicity, and the following measured at baseline (wave 2): marital status, number of children, education, household income, sense of control, and financial strain.

Appendix 4. Average marginal effects for the association between recession hardships and changes in K6 distress by changes in personal control, (N = 1,739)

	Average marginal effect	95% confidence intervals		
Effect of recession hardships at:				
-1.5 SD Δ in personal control	0.336**	0.146	to	0.525
No change in control	0.171**	0.045	to	0.297
+1.5 SD Δ in personal control	0.006	-0.177	to	0.188

Standard errors estimated using the delta method.
Average marginal effects derived using the *margins* command in Stata v15.1.
Adjusted for age, gender, race/ethnicity, and the following measured at Wave 2: marital status, number of children, household income, and financial strain.
Estimates are weighted by the inverse probability of attrition.

Appendix 5. The relationship between recession hardships and changes in distress: mediation and structural amplification, unweighted sensitivity analysis using listwise deletion, (N = 1,739)

	Model 1		Model 2		Model 3		Model 4	
	b	Robust S.E.	*b*	Robust S.E.	*b*	Robust S.E.	*b*	Robust S.E.
Recession hardships	0.104**	(0.039)	0.128**	(0.041)	0.096*	(0.037)	0.090*	(0.036)
Wave 2 Personal control			0.455***	(0.092)	0.034	(0.093)	0.047	(0.093)
Personal control Δ (std)					-0.938***	(0.094)	-0.690***	(0.122)
Recession hardships × Personal control Δ (std)							-0.105**	(0.033)
Adjusted for covariates	No		Yes		Yes		Yes	
Constant	-0.439***	(0.091)	1.574	(4.215)	1.424	(4.086)	1.577	(4.108)

***p < 0.001, **p < 0.01, *p < 0.05.
Standard errors clustered at the individual level.
Model 1 is unadjusted. Models 2-4 adjust for age, gender, race/ethnicity, and the following measured at baseline (Wave 2): marital status, number of children, household income, and financial strain.

Appendix 6. The relationship between recession hardships and changes in distress: mediation and structural amplification, sensitivity analysis using multiple imputation with chained equations (N = 1896)

	Model 1		Model 2		Model 3		Model 4	
	b	Robust S.E.	*b*	Robust S.E.	*b*	Robust S.E.	*b*	Robust S.E.
Recession hardships	0.099**	0.037	0.135**	0.041	0.100**	0.036	0.094**	0.036
Wave 2 Personal control					0.094	0.093	0.1047	0.093
Personal control Δ (std)					-0.957***	0.092	-0.728***	0.121
Recession hardships × Personal control Δ (std)							-.0967**	0.034
Adjusted for covariates	No		Yes		Yes		Yes	
Constant	-0.454***	0.090	4.838	3.989	0.797	3.868	0.885	3.883

***p < 0.001, **p < 0.01, *p < 0.05.
Coefficients and standard errors are combined estimates from 20 multiple-imputation data sets.
Model 1 is unadjusted. Models 2-4 adjust for age, gender, race/ethnicity, and the following measured at baseline (Wave 2): marital status, number of children, household income, and financial strain.
Standard errors clustered at the individual level.

Appendix 7. The relationship between recession hardships and changes in distress: mediation and structural amplification, no age restrictions (N = 2,160)

	Model 1		Model 2		Model 3		Model 4	
	b	Robust S.E.	*b*	Robust S.E.	*b*	Robust S.E.	*b*	Robust S.E.
Recession hardships	0.149*	(0.064)	0.236***	(0.069)	0.189**	(0.067)	0.183**	(0.064)
Wave 2 Personal control			0.123	(0.139)	-0.233+	(0.138)	-0.230+	(0.138)
Personal control Δ (std)					-0.814***	(0.106)	-0.562***	(0.135)
Recession hardships × Personal control Δ (std)							-0.131**	(0.045)
Adjusted for covariates	No		Yes		Yes		Yes	
Constant	-0.211+	(0.115)	5.329*	(2.691)	5.623*	-2.614	5.714*	(2.609)

Standard errors clustered at the individual level.
***p < 0.001, **p < 0.01, *p < 0.05, + p < 0.10.
Models 2-4 adjust for age, gender, race/ethnicity, and the following measured at baseline (Wave 2): marital status, number of children, household income, and financial strain.

Appendix 8. The relationship between recession hardships and distress: baseline personal control as a moderator (N = 1,739)

	b	Robust S.E.
Recession hardships	0.130	(0.491)
Baseline (wave 2) Personal control	0.210	(0.194)
Recession hardships × Baseline (wave 2) Personal control	0.017	(0.083)
Constant	3.381	(5.905)

Standard errors clustered at the individual level.
*p < 0.05.
Adjusted for age, gender, race/ethnicity, and the following measured at baseline (wave 2): marital status, number of children, household income, and financial strain.
All models weighted by the inverse probability of attrition.

Appendix 9. The relationship between changes in chronic health conditions and changes in distress

	b	Robust S.E.
Changes in chronic conditions	0.161***	(0.038)
Constant	1.989	(4.050)
Observations	1,664	

***p < 0.001, **p < 0.01, *p < 0.05.
Models estimated with OLS and listwise deletion.
All models adjust for age, gender, race/ethnicity, and the following measured at Wave 2: marital status, number of children, household income, sense of control, and financial strain.

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