

Hardships of the Great Recession and health: Understanding varieties of vulnerability

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Abstract

The Great Recession of 2007–2009 is regarded as the most severe economic downturn since World War II. This study examined relationships between reported recession hardships and physical health in a national survey of American adults ($N = 1275$). Furthermore, education and psychological resources (perceived control, purpose in life, and conscientiousness) were tested as moderators of the health impacts of the recession. A greater number of hardships predicted poorer health, especially among the less educated. Psychological resources interacted with education and hardships to predict health outcomes. Although typically viewed as protective factors, such resources became vulnerabilities among educationally disadvantaged adults experiencing greater recession hardships.

Keywords

conscientiousness, Great Recession, health disparities, perceived control, purpose in life, reserve capacity model

The Great Recession of 2007–2009 has been defined as the longest and deepest global economic crisis of the post–World War II era. In the United States, housing and financial conditions plummeted, and unemployment rates soared (Bricker et al., 2011). Consequently, many Americans experienced a mix of hardships, including job insecurity, unemployment, increased debt, and housing instability (Morin, 2010). Those experiencing such hardships may suffer from depression (Alley et al., 2011; Burgard et al., 2009, 2013) and may engage in unhealthy behaviors (e.g. alcohol and drug use, smoking, and unhealthy eating). Over time, such factors increase risk for a range of health problems, such as physical pain, sickness, cardiovascular disease, and diabetes.

Some individuals may, however, be more vulnerable to the strains of economic hardship than others. Minorities, younger adults, and low-education workers are known, for example, to have experienced disproportionate losses (Hoynes et al., 2012). Furthermore, during the Great Recession, less educated adults were more likely to experience work problems and to take out loans to cover living expenses (Taylor et al., 2010). Conversely, other findings indicate that the protective benefits of higher education are robust during economic downturns. A cross-national study

of Europeans documented unemployment rates from 1948 to 2012 and found that higher education was especially health protective among cohorts entering the workforce during periods of high unemployment (Cutler et al., 2015). Despite selective evidence supporting subgroup differences in recession impact, a majority of studies on the health correlates of recession hardships have focused on broader population averages. Few published studies have explicitly examined risk and protective factors that might explain subgroup differences in health vulnerability (Glonti et al., 2015). Such findings underscore the need to better understand the role of *pre-existing vulnerabilities*, such as low or high levels of educational attainment, in evaluating health impacts of the Great Recession.

Psychological resources have been studied as buffers against economic disadvantage (Matthews et al., 2010). The Whitehall studies (Marmot et al., 1991) demonstrated that

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low status employees were less likely to succumb to poor health if they had higher levels of perceived control at work. Few studies, however, have tested the interplay of psychological resources and educational status in evaluating health concomitants of the Great Recession. The aims of this study follow from these observations. Using a national sample of young and middle-aged adults, links between self-reported recession hardships and health were examined. Furthermore, emphasis was given to pre-existing vulnerability, defined in terms of low educational standing, as well as to whether psychological resources interacted with recession experiences and educational status in predicting multiple indicators of physical health.

Recession hardships and health

Economists have posited that the Great Recession was unique from prior downturns in that individuals were likely to have been threatened by multiple recession-related hardships, rather than a stand-alone event. The health correlates of job loss, unemployment, financial strain, and other recession-related hardships have typically been examined in separate studies (see Burgard and Kalousova, 2015). For example, home foreclosures have been associated with weight gain (Arcaya et al., 2013), job loss has predicted poorer self-rated health (Burgard et al., 2007), and unemployment has predicted increased risk of chronic health problems (Astell-Burt and Feng, 2013). Of importance is testing whether more widespread recession hardship is associated with more widespread health problems.

Emerging research conducted in the United States and Europe have linked the Great Recession with a diverse set of health outcomes such as increased suicide rates (Chang et al., 2013), poorer self-rated health (Simou and Koutsogeorgou, 2014), and increased prevalence of cardiovascular and respiratory problems (Astell-Burt and Feng, 2013). Based on findings from prior recession research, this study examined the association between recession-related hardships and health using a diverse set of indicators, including self-rated health, waist circumference, acute symptoms (e.g. backaches and stomachaches), and chronic health problems (e.g. cardiovascular disease and diabetes). We predicted that a greater number of hardships would be linked with poorer self-rated health, an unhealthy waist circumference and more chronic and acute health problems.

Pre-existing vulnerability to the Great Recession: low educational status

The recent recession has influenced, to differing degrees, the lives of many Americans, although the impact of pre-existing vulnerabilities on health has not been carefully elaborated. National studies show that less educated adults experienced more economic hardships and had more difficulty recovering from the recent recession than their higher educated

counterparts (Hoynes et al., 2012). Furthermore, educational attainment has become an ever stronger predictor of health and longevity in recent decades, raising concerns about widening inequalities across educational levels (Case and Deaton, 2015; Hayward et al., 2015; Maera et al., 2008). Based on these findings, this study focused on educational status as a key pre-existing vulnerability factor.

Educational status is an indicator of socioeconomic standing (SES) that remains relatively stable in adulthood (Krieger et al., 1997; Winkleby et al., 1992). Previous research has established strong and consistent relationships between educational status and health. At every level of the education gradient, lower ranking individuals show higher rates of morbidity and mortality than their more advantaged counterparts (Adler et al., 1994; Loucks et al., 2009). Educational attainment, compared to other markers of SES (e.g. income and occupation), is also consistently linked with physical and mental health outcomes, such as chronic diseases (Adler et al., 1994) as well as increased levels of inflammation, which are important risk factors of cardiovascular and other diseases (Friedman and Herd, 2010; Morozink et al., 2010). Lower educational status may also foster less healthy behaviors (e.g. smoking and heavy alcohol use; Cutler and Lleras-Muney, 2010).

On a daily basis, lower educated adults are known to experience more severe stressors and appraise such events as posing greater threats to financial stability and self-concept (Almeida, 2005). Educational status may modify associations between recession hardships and health by altering emotional and physiological responses to stress. In contrast to other SES indicators (e.g. income and wealth), educational status has emerged as one of the strongest moderators of the impacts of job loss on depression, such that lower educated experienced greater depressive symptoms following job loss compared to higher educated (Berchick et al., 2012). Recession-related hardships may also amplify the negative health consequences of low educational attainment and possibly worsen social inequalities in health. In a review of prior recession findings (see Glonti et al., 2015), low educational attainment was more strongly associated with negative health outcomes during periods of economic downturns compared to before their onset. Additionally, Cutler et al., (2015) demonstrated that periods of high unemployment amplified the negative health consequences of low educational attainment. That is, educationally disadvantaged who entered the labor market during economic downturns were most likely to suffer poorer health. Applying these prior findings to the Great Recession, we hypothesized that lower educated adults represent a pre-existing vulnerable subgroup that would experience more widespread hardship and, relatedly, worse health.

Psychological moderators of recession hardship

It is expected that individuals will show variability in how they respond to hardships of the Great Recession.

To understand these differences, it is useful to examine risk and protective factors that modify the associations between recession hardships and health. To date, few studies in the recession and health literature have tested the role of psychological factors in modifying health outcomes (Glonti et al., 2015). Outside the recession context, however, research on social disadvantage and health inequalities has found strong and consistent evidence for the health-protective role of psychological resources. According to the reserve capacity model, the presence of psychological resources contributes to more positive health outcomes and can buffer the effects of social disadvantage (Gallo et al., 2009; Matthews et al., 2010). We examined three psychological resources—perceived control, purpose in life, and conscientiousness—as potential moderators of the health impacts of the Great Recession. The health-protective role of these psychological resources for the lower SES has been documented in prior work.

Perceived control and mastery over one's environment are viewed as essential components of health and well-being, especially among Americans and those from other Western cultures (Lachman and Agrigoroaei, 2010). A generalized sense of control (i.e. an overall belief in one's ability to exert influence over one's life and bring about desired outcomes) has been linked to better physical functioning (Lachman and Agrigoroaei, 2010; Lachman and Weaver, 1998) and increased longevity (Infurna et al., 2013; Turiano et al., 2014). Although higher SES is associated with a greater perceived control (Lachman and Weaver, 1998), there is individual variation in control beliefs within SES strata. Among low SES groups, those with high perceived control showed similar levels of health and well-being and mortality rates to their higher SES counterparts (Lachman and Weaver, 1998; Turiano et al., 2014) and showed a reduced risk for chronic conditions over time (O'Brien, 2012). Perceived control may therefore be an important buffer against life adversity.

Purpose in life, a dimension of psychological well-being, involves having goals and objectives to live for as well as a capacity to derive meaning from one's experiences, including encounters with adversity (Ryff, 1989; Ryff and Keyes, 1995). Research has linked purpose in life with reduced risk of morbidity and mortality (Boyle et al., 2009, 2010; Kim et al., 2013a, 2013b). Regarding educational gradients in health, higher purpose in life was associated with reduced inflammation among lower but not higher educated adults (Morozink et al., 2010). In summary, the health-modifying roles of purpose in life may be particularly important to assess during times of heightened adversity, such as the Great Recession.

Finally, personality traits have been studied as mediators of SES gradients in health, although recent findings suggest that SES and personality traits independently predict mortality, and therefore explain not only between-strata variation but also within-strata variation in health (Chapman

et al., 2009). Conscientiousness reflects a disposition of being responsible, organized, and hardworking. Decades of research show this trait to be an important predictor of health and well-being (Bogg and Roberts, 2013) and greater longevity (Kern and Friedman, 2008; Jokela et al., 2013; Turiano et al., 2015). Lower levels of conscientiousness also predict engagement in health-compromising behaviors such as smoking, heavy alcohol use, and unhealthy eating (e.g. Turiano et al., 2015). Together, these findings suggest that some individuals may offset the adverse health effects of economic adversity through being conscientious.

Aims of the present study

Respondents from a national sample of US adults answered multiple questions about recession experiences (job insecurity, housing instability, and financial strain) as well as diverse indicators of health and psychological resources. The key objectives of this study were to examine links between recession hardship and health and to identify risk and protective factors that contribute to subgroup differences in these associations. We sharpened our focus on educational status as a pre-existing vulnerability factor and psychological resources (sense of control, purpose in life, and conscientiousness) as protective factors.

We hypothesized that educational status would moderate relationships between recession hardship and health. Tests of two-way interactions were predicted to show that more widespread recession hardship would be more strongly associated with worse physical health among the educationally *disadvantaged*. For the educationally *advantaged*, we predicted that the relationship between recession hardship and negative health outcomes would be attenuated. These findings would extend prior literature that has shown that individuals with lower levels of education experienced greater depressive symptoms following job loss compared to individuals with higher levels of education (Berchick et al., 2012).

Consistent with the reserve capacity model (Matthews et al., 2010), psychological resources were hypothesized to mitigate the negative health consequences of heightened exposure to recession hardships. Studies have demonstrated that psychological resources can protect against the negative health impacts of educational disadvantage, but few published studies have tested hypotheses involving the health returns of psychological resources in broader socioeconomic contexts. Tests of two-way interactions were expected to show that psychological resources would moderate the associations between recession hardship and health. For respondents who rate themselves higher in perceived control, purpose in life, and conscientiousness, we predicted that the associations between more widespread recession hardship and poor health would be attenuated compared to respondents who might lack these psychological resources.

Few studies have examined the interactions between pre-existing vulnerabilities (low educational status) and psychological resources in investigating health impacts of the Great Recession. How these factors come together could, however, take different forms (Shanahan et al., 2014). According to the “disabling” hypothesis, socioeconomic circumstances that increase exposure to stress may undo the potential benefits attributed to protective resources. Alternatively, the resource accumulation and positive amplification hypothesis propose that protective factors may be amplified by supportive and stable socioeconomic contexts. Support for the disabling hypothesis comes from observations made in the Terman Sample of Gifted Children. Such work revealed that psychological strengths could be weakened in contexts of economic decline. High conscientiousness in adolescence was not beneficial for social or psychological well-being among adults who later entered workforce during the Great Depression, but was beneficial for adults who entered the workforce after World War II (Shanahan et al., 1997). This study aims to extend the findings from the Terman sample by considering how interactions between recession hardship and psychological resources assessed in adulthood are further modified by one’s educational attainment. Two directional hypotheses were considered for tests of three-way interactions among educational status, psychological resources, and recession hardship. One from the reserve capacity model predicts that less educated adults with high levels of psychological resources would be protected against risk of poorer health outcomes associated with more widespread economic hardship. The second hypothesis originates from the “disabling” hypothesis, suggesting that heightened economic hardship of the Great Recession would undermine the health benefits typically associated with the presence of high psychological resources among the less educated.

To summarize, the overarching predictions were as follows: (1) education would emerge as a key vulnerability factor such that recession hardships would be more strongly associated with worse physical health among less educated adults; (2) psychological resources would emerge as key protective factors such that they attenuate the association between recession hardship and worse physical health; and (3) alternatively, more widespread recession hardship may undo the health-protective role of psychological resources, especially for those with pre-existing vulnerability (i.e. low educational status). The cross-sectional limitations of the study are noted and examined in discussing the findings.

Methods

Sample

Data were collected from adults recruited into the Midlife in the United States (MIDUS) study, a national longitudinal study of health and well-being (<http://midus.wisc.edu>).

MIDUS began in 1995 with the purpose of understanding the bio–psycho–social processes of aging and is a major forum for investigating health of US adults. In 2012, adults were recruited to “refresh” (augment) the MIDUS study, with a core purpose of investigating the health impacts, broadly defined, of the ongoing economic recession on the lives of US adults. Consistent with the original 1995 MIDUS study (M1), the data collection process for this “refresher” study includes a number of different protocols including the main survey project, cognitive assessments, daily stress diaries, and biomarker and neuroscience data. Data from the main survey project were currently available for reporting for this study, as sampling and data collection for the other protocols are still ongoing.

Respondents were selected from the 48 contiguous states using random digit dialing (RDD) of numbers with age and sex information about household composition. This “refresher” sample ($N=2152$) included respondents aged 25–54 years¹ who first completed a 45-minute phone interview focusing on sociodemographic and psychosocial assessments. Respondents received a US\$25 post-incentive for completing the phone interview. All sampling and methods procedures were approved by the University of Wisconsin, Madison Institutional Review Board. The response rate for the phone interview was 55 percent, and respondents were comparable to the US population in terms of sex, age, race, and marital status. However, the sample was more highly educated relative to the national population. A subset of these respondents ($N=1414$) completed a set of self-administered questionnaires (SAQs) that included assessments of health, employment, income, and psychosocial measures. Respondents received US\$10 with the survey and an additional US\$25 post-incentive. The response rate for the SAQ was 67 percent. For this study, data are reported for a sample of 1275 respondents that completed both the phone interview and the SAQ portions and had complete data for all dependent variables tested in the analyses. This subset of respondents was comparable to the larger refresher sample on sociodemographic factors (age, gender, marital status, and education).

Measures

Recession hardships. A composite measure of recession-related hardships was assessed with 18 items, derived from a national survey of unemployed adults conducted by the Heidrich Center for Workforce Development, Rutgers (Borie-Holtz et al., 2010; see Appendix 1). The following question opened the MIDUS phone interview, “Which of the following have you experienced since the beginning of the Recession in August 2008?” Respondents responded “yes” or “no” to each item. Four items assessed job impact (e.g. lost your job), seven items assessed home impact (e.g. lost your home due to foreclosure), and seven items assessed financial impact (e.g. declared bankruptcy). To

quantify overall recession experience, a composite score was computed by summing the number of “yes” responses, resulting in a possible range of 0–18.

Physical health outcomes. Four indicators of physical health were examined.

Self-reported health is a single global question. Although subjective, this item has consistently predicted mortality, frequently better than physician-rated health (Benyamini and Idler, 1999; DeSalvo et al., 2006; Idler and Benyamini, 1997). In the phone interview portion of the study, respondents rated their present physical health on a 5-point scale (1 = “poor” and 5 = “excellent”).

Chronic conditions were measured with 39 items in the SAQ. They indicated whether they had experienced any chronic health issues (e.g. arthritis, lupus, and diabetes) in the past 12 months. Using the same procedures as Piazza et al., (2013), some items were excluded to prevent the same or similar conditions from being counted multiple times. Conditions related to emotional distress (e.g. anxiety/depression) and neurological disorders were also excluded. Appendix 2 lists the 19 chronic conditions included in the analysis and the percentage of respondents reporting each of these conditions. A total score was computed based on the number of chronic conditions respondents endorsed. Higher values indicate a greater number of chronic conditions (possible range 0–19).

Frequency of acute somatic symptoms consisted of 11 items that assessed the occurrence of minor health symptoms (e.g. headaches, backaches, and stomach problems). The scores ranged from 1 (*almost every day*) to 6 (*not at all*). The items were reverse scored and averaged.

Waist circumference was used to assess overweight status because it is a strong predictor of morbidity and mortality risk (Bigaard et al., 2005; Jacobs et al., 2010). Respondents were mailed a tape measure along with the MIDUS SAQ and were instructed to measure their waist circumference under their clothes at the level of their navel to the nearest ¼ inch. In prior population research, intra-class correlations have demonstrated high concordance between measured and self-reported values for waist circumference (Dekkers et al., 2008).

Psychological moderators. Three psychological factors were tested as moderators of the health impacts of the recession.

Perceived control was assessed with a 12-item composite with an internal consistency of .89. The measure assesses perceived control over outcomes in life and consists of two subscales from the MIDUS sense of control scale: personal mastery (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; Lachman and Weaver, 1998). The items were assessed with a 7-point Likert scale (1 = *strongly agree* and 7 = *strongly disagree*). To create the scale, the items for personal mastery were reverse coded

such that higher values indicated a higher sense of control, and all 12 items were averaged.

Purpose in life is a dimension of psychological well-being that was measured with seven items on a 7-point Likert scale (1 = *strongly agree* and 7 = *strongly disagree*; Ryff, 1989; Ryff and Keyes, 1995). Respondents rated the degree to which they endorsed items, such as “I have a sense of direction and purpose in life” and “My daily activities often seem trivial and unimportant to me” (reverse scored). To create the scale, the items that were negatively worded were reverse coded to reflect higher standing in the scale, and the seven items were summed. Internal consistency for these items is .76.

Conscientiousness was assessed via the self-administered measure of the Big Five in dimensions of personality as part of the Midlife Development Inventory (MIDI; Lachman and Weaver, 1997). Respondents were asked how much each of the five adjectives (responsible, hardworking, organized, thorough, and careless) described themselves on a scale ranging from 1 (*not at all*) to 4 (*a lot*). Conscientiousness was calculated by first reverse-scoring *careless* and then averaging the five adjectives. Internal consistency for these items was .68.

Sociodemographic variables. Respondents were asked to report how many years of school or college they had completed. The 12 response categories ranged from no schooling to completion of a professional degree. Education was treated as a continuous variable in the analyses. All models for were adjusted for age, sex, race, and marital status. A dummy code was constructed for both race and marital status. Caucasians were contrasted against all other races, and those married were contrasted against those who were unmarried.

Data analysis

Table 1 lists the descriptive statistics for all variables included in the analyses. To test the impact of recession hardships on health and the moderating role of educational status and psychosocial variables, a series of general linear models was estimated with the statistical program R. Differences in recession hardships were examined as a function of sociodemographic factors, with a primary focus on educational standing, although age, gender, race, and marital status were also examined. The purpose of these initial analyses was to provide a descriptive look at subgroup differences in recession hardship. Such data are useful for comparing findings from MIDUS to other large national studies.

To test the main hypotheses, separate multiple regression analyses were run for each health outcome. All continuous predictors were standardized. Case analyses did not reveal statistical outliers or influential data points. Tests of model assumptions suggested violations of normality

Table 1. Descriptive statistics for sample ($N = 1275$).

	Mean (SD) or %	Range
<i>Health outcomes</i>		
Chronic conditions	1.5 (1.9)	0–16.0
Frequency of acute somatic symptoms	2.5 (1.0)	1.0–6.0
Self-rated physical health	3.6 (1.1)	1.0–5.0
Waist circumference	37.5 (7.3)	16.0–88.0
<i>Sociodemographics</i>		
Age	41.0 (8.4)	25–54
Female	55.0%	
Male	45.0%	
White	82%	
Non-white	18%	
Married	65%	
Not married	35%	
<i>Educational status</i>		
≤ High school	19.8%	
Some college	29.7%	
≥ College degree	50.6%	
<i>Psychological factors</i>		
Perceived control	5.4 (1.0)	1.4–7.0
Purpose in life	38.2 (7.1)	13.0–49.0
Conscientiousness	3.4 (0.5)	1.4–4.0
<i>Recession hardships</i>		
Recession events score	3.1 (2.8)	0–14

SD: standard deviation.

Descriptive statistics for sample ($N = 1275$).

and homogeneity of variance for models predicting chronic conditions. These models were reanalyzed with a square root transformation of chronic conditions and yielded similar results as untransformed analyses. Therefore, original, untransformed models are reported in the final results. Age, gender, race, and marital status have been associated with number of chronic conditions, and other health outcomes and were therefore included as covariates in the analyses. To reduce multicollinearity, separate hierarchical regression models were run for each psychological moderating factor.

A set of hierarchical regression models was estimated to first test the hypothesis that educational status would moderate the relationships between recession hardships and health. The first model included sociodemographic covariates (age, sex, marital status, and race). The second model included education, with sociodemographic covariates. The third model incorporated recession hardships, and the fourth model included the two-way interaction between educational status and recession hardships.

A second set of hierarchical regression models was estimated to test hypotheses that psychological resources would modify the effects of the recession on health. The first step included sociodemographic variables, including education and recession hardships. The second step included the psychological variable, and a third step tested

two-way interactions, one set between the psychological variable and recession experiences and the second set between education and psychological factors. Of primary interest, per the guiding hypotheses, were the tests of the three-way interactions among education, recession experience, and psychological factors.

Preliminary analyses revealed that education, recession hardships, and psychological factors were moderately correlated with each other. To test whether multicollinearity was an issue, the variance inflation factor (VIF) for each of the predictors in the regression models was calculated. VIFs indicate how much the standard error of the parameter estimate increases as a result of redundancy among the predictor variables, where VIFs greater than 5 are considered problematic. None of the VIFs calculated exceeded a value of 2, indicating that multicollinearity was not problematic for the tested models.

Results

Sociodemographic differences in recession experiences

Sociodemographic differences were examined by regressing the composite measure of recession hardships on each variable and comparing estimated group mean differences. Educational status was of primary interest, although subgroup differences in gender, age, race, and marital status were also examined. As predicted, respondents without a 4-year college degree reported more recession events (high school or lower: $M = 3.55$, standard error (SE) = .18; some college: $M = 3.47$, $SE = .14$) than adults with a 4-year college degree ($M = 2.66$, $SE = .11$), $t(1278) = 4.38$, $p < .001$, $t(1, 278) = 4.59$, $p < .001$, respectively. Females ($M = 3.33$, $SE = .10$) experienced significantly more recession events than males ($M = 2.76$, $SE = .11$), $t(1, 279) = 3.75$, $p < .001$. Age did not significantly predict differences in number of recession hardships reported. Individuals who identified as a racial minority reported more recession hardships ($M = 3.83$, $SE = .16$) than individuals who identified as white ($M = 2.85$, $SE = .09$), $t(1278) = 5.36$, $p < .001$. Individuals who were unmarried reported more recession hardships ($M = 3.80$, $SE = .13$) than individuals who were married ($M = 2.69$, $SE = .09$), $t(1269) = 6.93$, $p < .001$.

Educational status as a moderator of recession impacts on health

A set of hierarchical regression models tested the prediction that less educated adults would be more vulnerable to the health impacts of the Great Recession (i.e. educational status would moderate associations between recession hardships and health outcomes). The top portion of Table 2 illustrates the results of these regression models. Step 2 shows that educational status was a significant predictor of all four health

Table 2. Hierarchical regression of covariates, education, recession hardships, and psychological factors and two-way and three-way interactions (N= 1275).

Predictors	Chronic conditions		Frequency of acute somatic symptoms		Self-rated physical health		Waist circumference	
	B (SE)	ΔR ²	B (SE)	ΔR ²	B (SE)	ΔR ²	B (SE)	ΔR ²
<i>Hierarchical regression model for education and recession hardships</i>								
Step 1: covariates								
Age	.40 (.05)	.04	.20 (.03)	.04	-.13 (.03)	.01	.53 (.21)	.01
Gender	.27 (.10)	.01	.28 (.06)	.02	.08 (.06)	.001	-2.00 (.41)	.02
Race	<i>-.12 (.14)</i>	<.001	<i>-.21 (.07)</i>	.01	<i>-.09 (.08)</i>	<.001	<i>-.92 (.53)</i>	.002
Marital status	.77 (.11)	.03	.39 (.06)	.03	-.50 (.06)	.05	1.87 (.43)	.01
Step 2: education	-.35 (.05)	.03	-.22 (.03)	.04	.27 (.03)	.06	-1.39 (.20)	.04
Step 3: recession hardships	.24 (.05)	.01	.18 (.03)	.03	-.19 (.03)	.03	.46 (.20)	.004
Step 4: education × recession	-.14 (.05)	.01	<i>-.01 (.03)</i>	<.001	.01 (.03)	<.001	.54 (.20)	.01
<i>Test of psychological moderators of links between recession hardship and health outcomes</i>								
Psychological factors								
Perceived control	-.40 (.05)	.04	-.31 (.03)	.09	.26 (.03)	.05	-.68 (.20)	.01
Purpose in life	-.31 (.05)	.02	-.27 (.03)	.06	.23 (.03)	.04	-.94 (.20)	.02
Conscientiousness	-.09 (.05)	.003	-.10 (.03)	.01	.18 (.03)	.03	-.62 (.20)	.01
Psychological factors × education interactions								
Perceived control × education	.16 (.05)	.01	.04 (.02)	.001	<i>-.05 (.03)</i>	.002	<i>-.12 (.29)</i>	<.001
Purpose in life × education	.11 (.05)	.004	<i>.04 (.02)</i>	.002	<i>-.05 (.03)</i>	.002	.07 (.19)	<.001
Conscientiousness × education	<i>.06 (.05)</i>	.001	.06 (.02)	.004	<i>-.05 (.03)</i>	.002	<i>-.06 (.18)</i>	<.001
Psychological factors × recession interactions								
Perceived control × recession	<i>.03 (.05)</i>	<.001	.01 (.03)	<.001	<i>-.02 (.03)</i>	<.001	<i>-.07 (.20)</i>	<.001
Purpose in life × recession	<i>.02 (.05)</i>	<.001	.02 (.03)	<.001	<i>-.04 (.03)</i>	.001	<i>-.10 (.20)</i>	<.001
Conscientiousness × recession	.17 (.05)	.01	.04 (.03)	.001	<i>-.05 (.03)</i>	.002	.03 (.20)	<.001
Three-way interactions								
Perceived control × education × recession	<i>-.02 (.05)</i>	<.001	.01 (.03)	<.001	.06 (.03)	.003	.01 (.20)	<.001
Purpose in life × education × recession	-.12 (.05)	.01	<i>-.05 (.02)</i>	.002	.07 (.03)	.01	<i>-.12 (.19)</i>	<.001
Conscientiousness × education × recession	-.11 (.05)	.003	.01 (.03)	<.001	.01 (.03)	<.001	<i>-.21 (.20)</i>	<.001

SE: standard error.

Bold values indicate significant predictor ($p < .05$); values in italics indicate marginal predictor ($p < .10$).

1 = test of psychological factors and their interactions with education and recession were tested in separate hierarchical models. All models included the lower order predictors: age (standardized), gender (centered), race (0 = white and 1 = minority), marital status (0 = married, 1 = unmarried) education (standardized), and recession hardships (standardized).

outcomes: chronic conditions, acute somatic symptoms, self-rated health, and waist circumference. Lower educated individuals showed more negative health outcomes such as more chronic conditions, more frequent somatic symptoms, worse self-rated health, and larger waist circumference. In step 3, recession hardships explained a significant additional proportion of variance for each health outcome. Individuals who reported more recession hardships also reported more chronic conditions, more acute somatic symptoms, lower self-rated health, and larger waist circumference.

The key test of hypothesis 1 was examined in step 4, which probed the interaction of educational status with recession hardships. Education significantly moderated the relationship between recession experience and chronic conditions as well as the relationship between recession experience and waist circumference ($p < .05$, see Table 2). These interactions indicate that, as predicted, lower educated adults showed a stronger and significantly more positive relationship between recession hardships and number of chronic conditions and waist circumference than their higher educated counterparts. No other health outcomes were significantly moderated by education.

Psychological moderators of links between recession hardship and health outcomes

Perceived control. A set of hierarchical regression models tested perceived control as a moderator of recession hardships on health outcomes. The second portion of Table 2 illustrates the results of these regression models. The first model tested the main effect of perceived control (separate from other psychological factors) and included the lower order effects of age, gender, marital status, race, education, and recession experiences. The main effect of perceived control for each of the four health outcomes was statistically significant. The second model tested perceived control as a moderator of educational status and health relationships. Perceived control significantly moderated educational gradients in chronic conditions ($p < .05$, see Table 2). The positive coefficient for the interaction term of .16 (.05) means that for every unit increase in educational status, the negative relationship between perceived control and chronic conditions weakens and becomes more positive by .23 units. In other words, sense of control was more strongly and negatively associated with chronic conditions among the lower educated relative to the higher educated. Perceived control did not moderate relationships between recession hardships and health outcomes.

Purpose in life. Purpose in life was tested as a moderator of recession hardships and health outcomes in separate regression models (see Table 2). Purpose in life significantly predicted each of the four health outcomes. Furthermore, purpose in life significantly moderated educational gradients in chronic conditions ($p < .05$). The positive coefficient

for the interaction term of .17 (.05) means that for every unit increase in educational status, the negative relationship between purpose in life and chronic conditions weakens and becomes more positive by .17. In other words, purpose in life was more strongly and negatively associated with chronic conditions among the lower educated relative to the higher educated. Purpose in life did not moderate relationships between recession hardships and health outcomes.

Conscientiousness. Conscientiousness (see Table 2) significantly predicted each of the four health outcomes and also significantly moderated educational gradients in frequency of acute somatic symptoms ($p < .05$). The positive coefficient for the interaction term of .06 (.02) means that for every unit increase in educational status, the negative relationship between conscientiousness and acute somatic symptoms weakens and becomes more positive by .06 units. In other words, conscientiousness was more strongly and negatively associated with acute somatic symptoms among the lower educated relative to the higher educated.

Three-way interactions: recession hardship, education, and psychological resources

Perceived control. Of primary interest was the test of three-way interaction among education, recession hardships, and perceived control. This interaction was statistically significant for self-rated health only ($p < .05$, see Table 2 for coefficient). Figure 1(a), top two panels, illustrates the significant three-way interaction by depicting the two-way interaction between recession hardships and perceived control by educational status. Overall, perceived control predicted higher levels of self-rated health, but was a weaker predictor of self-rated health for low-educated individuals who reported more recession hardships (left panel of the figures, dotted line). A different pattern emerged among high-educated individuals. Recession hardship was more strongly negatively associated with self-rated health among individuals who reported 1 standard deviation (SD) below the mean in perceived control. No other significant interactions were evident in analyses for perceived control.

Purpose in life. Three-way interactions among purpose in life, recession hardships, and educational status were evident for self-rated health and for chronic conditions ($p < .05$, see Table 2 for coefficients). Figure 1(b), bottom two panels, illustrates the significant three-way interaction for self-rated health. Overall, purpose in life predicted better self-rated health, but less so for low-educated individuals who reported more recession hardships (left panel of the figures, dotted line). A different pattern emerged among high-educated individuals. Recession hardship was more strongly negatively associated with self-rated health among individuals who reported 1 SD below the mean in purpose

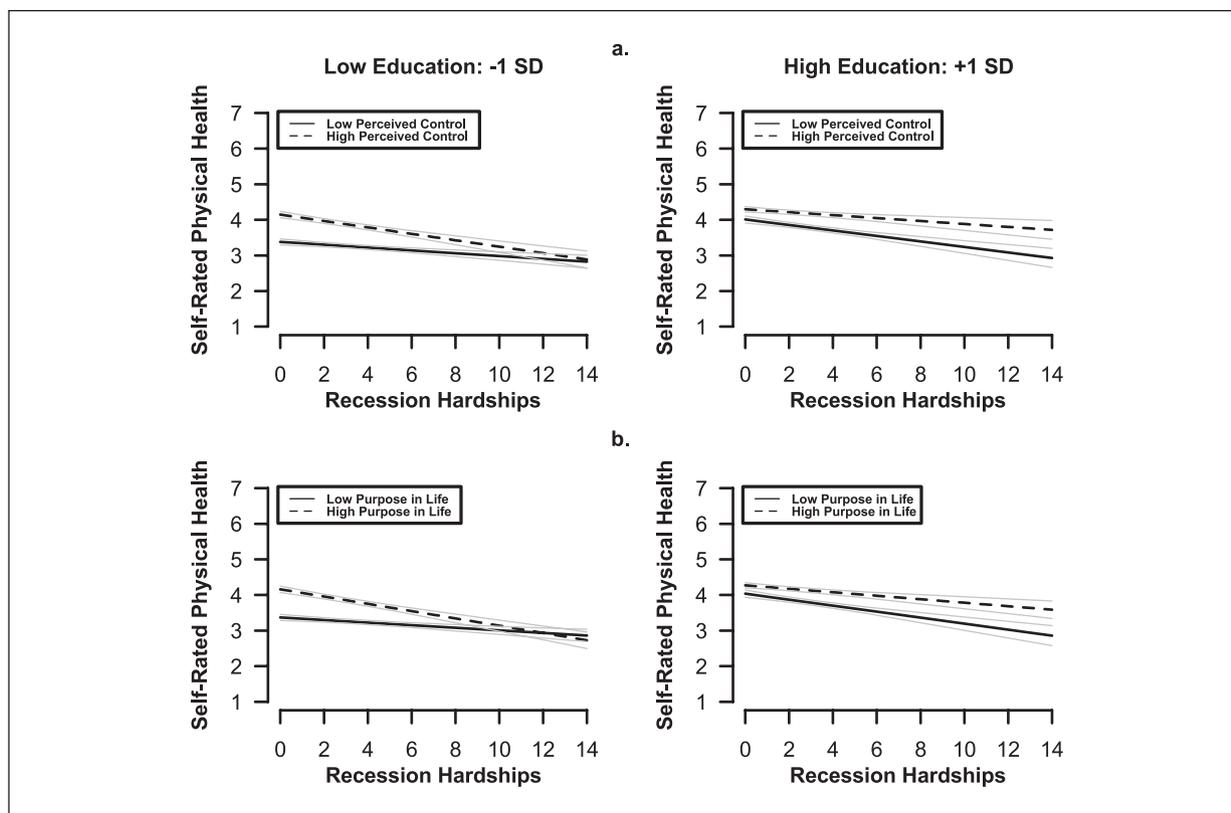


Figure 1. (a) The top panels depict the significant three-way interaction between perceived control, educational status, and recession hardships for self-rated health (1 = *poor* and 5 = *excellent*). The left panel represents model predictions for self-rated health graphed at 1 standard deviation (SD) below the mean for education. The right panel represents model predictions for self-rated health graphed at 1 SD above the mean for education. Solid lines represent model predictions by perceived control (1 SD below the mean) and dotted lines represent model predictions by high perceived control (1 SD above the mean). Confidence interval bands (± 1 standard error of point estimates from generalized linear model (GLM)) are provided to indicate the precision of the point estimates across the observed range of number of recession hardships reported (0–14) and (b) the bottom panels depict the significant three-way interaction between purpose in life, educational status, and recession hardships. The left panel represents model predictions for self-rated health graphed at 1 SD below the mean for education. The right panel represents model predictions for self-rated health graphed at 1 SD above the mean for education. Solid lines represent model predictions by low purpose in life (1 SD below the mean) and dotted lines represent model predictions by high purpose in life (1 SD above the mean). Confidence interval bands (± 1 standard error of point estimates from GLM) are provided to indicate the precision of the point estimates across the observed range of number of recession hardships reported (0–14).

in life. Figure 2(a), top two panels, illustrates the significant three-way interaction for chronic conditions. Overall, high purpose in life predicted fewer chronic conditions, but less so for low-educated individuals who reported more recession hardships (left panel of the figures, dotted line). This interaction between recession hardship and purpose in life was not observed among high-educated individuals.

Conscientiousness. Tests of our main hypothesis regarding three-way interactions among conscientiousness, recession hardships, and educational status were significant for chronic conditions ($p < .05$, see Table 2 for coefficients). Figure 2(b), bottom two panels, shows that conscientiousness predicted fewer chronic conditions, but less so for low-educated individuals who reported more recession hardships (left panel of the figures, dotted line). This

interaction between recession hardships and conscientiousness was not observed among high-educated individuals.

Discussion

This study investigated links between reported hardships from the Great Recession and physical health in a nationally representative study of US midlife adults. Findings supported the hypothesis that low educational status is key pre-existing vulnerability factor: lower educated adults reported more recession hardships compared to their higher educated counterparts, and differences in educational status were associated with disparities across all four health outcomes. In addition, educational status moderated the relationship between recession impact and two indicators of health (chronic conditions and waist circumference),

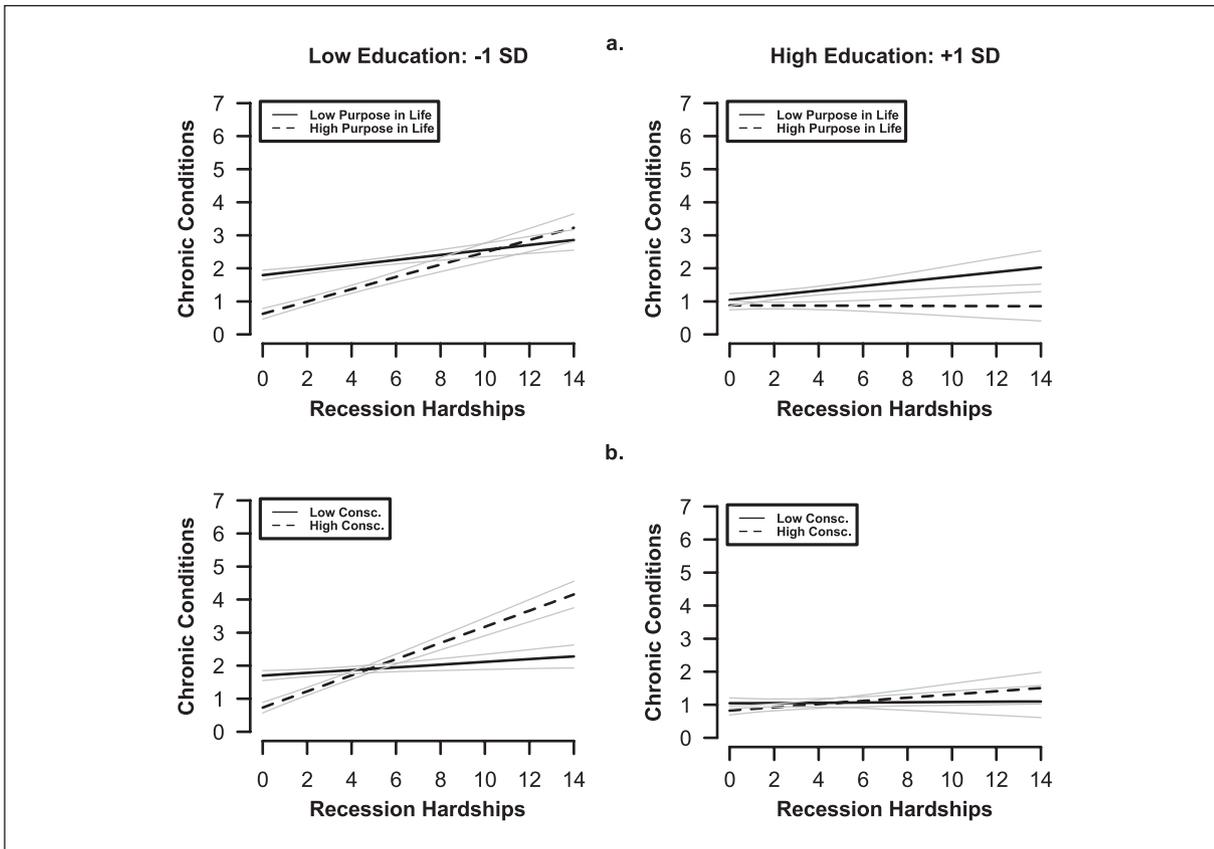


Figure 2. (a) The top panels depict the significant three-way interaction between purpose in life, educational status, and recession hardships. The left panel represents model predictions for chronic conditions graphed at 1 standard deviation (SD) below the mean for education. The right panel represents model predictions for chronic conditions graphed at 1 SD above the mean for education. Solid lines represent model predictions by low purpose in life (1 SD below the mean) and dotted lines represent model predictions by high purpose in life (1 SD above the mean). Confidence interval bands (± 1 standard error of point estimates from generalized linear model (GLM)) are provided to indicate the precision of the point estimates across the observed range of number of recession hardships reported (0–14) and (b) the bottom panels depict the significant three-way interaction between conscientiousness, educational status, and recession events. The left panel represents model predictions for chronic conditions graphed at 1 SD below the mean for education. The right panel represents model predictions for chronic conditions graphed at 1 SD above the mean for education. Solid lines represent model predictions by low conscientiousness (1 SD below the mean) and dotted lines represent model predictions by high conscientiousness (1 SD above the mean). Confidence interval bands (± 1 standard error of point estimates from GLM) are provided to indicate the precision of the point estimates across the observed range of number of recession hardships reported (0–14).

revealing that lower educated adults were more likely to show heightened chronic conditions and a larger waist circumference *in the face of high recession impact* compared to higher educated adults.

Consistent with the prior literature, purpose in life and perceived control moderated educational gradients in chronic conditions, whereas conscientiousness moderated educational gradients in acute somatic symptoms. In support of prior work by Lachman and Weaver (1998) and Morozink et al. (2010), perceived control and purpose in life were more health protective among the lower educated relative to the higher educated. Conscientiousness also interacted with educational status to predict acute somatic symptoms, suggesting that it was more health protective among the lower educated relative to the higher educated.

According to the reserve capacity model, psychological resources may protect against the negative health effects of economic disadvantage (Gallo et al., 2009; Matthews et al., 2010). Few published studies have tested this model in the context of macro-economic events, such as the recent recession. The tests of the two-way interactions between recession hardship and psychological resources yielded few significant findings. This suggested that psychological resources did not protect against more widespread, economic hardship. However, these two-way interactions ignored the role of pre-existing vulnerability vis-à-vis educational disadvantage. Key to this investigation was the interplay of educational status with psychological resources in the face of economic hardships of the Great Recession.

Tests of the three-way interactions between educational status, recession hardship, and psychological resources showcased different combinations of subgroup vulnerability. For those with pre-existing vulnerability (i.e. low educational attainment), the health returns of psychological resources were undermined under conditions of more widespread economic hardship. First, for self-rated physical health, having higher perceived control and higher purpose in life was *less protective* among educationally disadvantaged adults who reported high recession impact. Second, for chronic conditions, the findings showed that having higher purpose in life and higher conscientiousness was *less protective* among educationally disadvantaged adults who reported high recession hardship. These findings support the “disabling” hypothesis by demonstrating that psychological strengths could be “disabled” via the combination of high recession impact and educational disadvantage.

A second subgroup consisted of individuals who had pre-existing vulnerability but did not report high levels of recession hardship. The findings for this subgroup were consistent with thinking behind the reserve capacity model. For lower educated adults experiencing less recession hardship, the health returns of sense of control, purpose in life, and conscientiousness were evident.

A third subgroup that emerged from the three-way interactions pertained to those *without* pre-existing vulnerability (higher educated adults) who nonetheless reported *high recession hardship*. Because we hypothesized that high-educated adults would overall show weaker associations between recession hardships and health compared to low educated, we did not have specific predictions relating to this subgroup. Findings for them converged with conventional perspectives on psychological resources. Specifically, for self-rated health only, high levels of sense of control and purpose in life attenuated the relationship between recession hardship and health. In contrast, high recession hardship was more strongly associated with poorer self-rated health for those who reported low levels of resources.

This study tested the protective health benefits of purpose in life, sense of control, and conscientiousness, but sharpened the focus on those with pre-existing vulnerabilities, defined in terms of low educational status. Even in good economic times, those who are educationally disadvantaged are known to be confronted with disproportionate life stressors (Almeida, 2005). When major economic downturns aggravate people’s lives, psychological commitments to purposeful living, control, and conscientiousness may become yet additional sources of distress. Further research on the subjective experience of economic adversity and the mechanisms through which psychological strengths are transformed into vulnerabilities among disadvantaged groups is needed to support this interpretation. Longitudinal analyses are particularly important in addressing stability or change in psychological resources and how such patterns are linked with physical health.

Several limitations of the study must be acknowledged. First, the cross-sectional design undermines the implied causal inference between recession hardships and health. For some individuals, poor health may have preceded the economic recession. Future work thus needs to incorporate pre- and post-recession measures of economic hardship as well as psychological strengths and health outcomes. Fortunately, such analyses are on the future horizon for MIDUS. First, the third wave of data collection from the core sample is currently underway. The Great Recession punctuated the time period between the second and third waves of the study, which will allow for a more direct assessment of how recession hardships effected change in the health and well-being of US adults. With longitudinal data, we will be able to examine the stability or change of psychological resources over time and to compare and contrast variability in health outcomes among different subgroups. Furthermore, the interplay between pre-existing vulnerability and psychological resources could be approached within the moderated-mediation analytical framework. Specifically, we could test whether associations between recession hardships and health are more strongly mediated through sense of control and purpose for lower educated adults, while controlling for influences of pre-recession levels of psychological resources and health.

A second limitation pertains to the fact that multiple hypotheses were tested, and multiple health outcomes were measured. With each additional hypothesis test, risk of type 1 error increases. One option to correct for this error is to adjust the alpha threshold by the number of tests. However, adjusting the p value for all tests of interest undermines the ability to detect significant three-way interactions, which are the primary focus of the article. Alternatively, reporting the effect sizes gives an indication of the robustness of the findings. Although the effect sizes are modest, prior research has noted that small effect sizes are common in large heterogeneous samples, such as MIDUS (McCartney and Rosenthal, 2000).

Additionally, significant three-way interactions were observed for chronic conditions and self-rated physical health but not for acute somatic symptoms and waist circumference. Self-reported health measures are vulnerable to positivity or negativity response biases, which may explain the lack of cohesion among the results. Additionally, individuals may have different reference levels against which they judge their health. For example, individuals may be likely to report “very poor” health only if they feel they are much less healthy than others of the same age, sex, educational status, or gender (Groot, 2000; Van Doorslaer and Gerdtham, 2003). Overall, these findings underscore the need for replication and extension of these findings in other samples and outcomes. Future analyses with objective indicators of health will strengthen the inferences that can be drawn. Prior findings in MIDUS have linked biological risk factors (e.g. stress hormones, inflammatory

markers, and cardiovascular risk factors) to educational status and psychosocial factors (e.g. Morozink et al., 2010; Ryff et al., 2004). These biomarkers are currently being collected on the MIDUS “refresher” sample.

Tests of reserve capacity model and the “disabling” hypothesis were limited to psychological strengths. Future work needs to investigate whether “disabling” effects of economic downturns apply to the social domain. Emerging sociocultural research suggests that because lower SES individuals have limited financial and material resources, they are especially dependent on the support of family and friends, especially during times of perceived financial crisis (Piff et al., 2012). Compared to their high SES counterparts, low SES individuals are more likely to demonstrate others-oriented emotions and cognitions as well as engagement in pro-social behavior (Kraus and Keltner, 2009; Kraus et al., 2012). Lower SES individuals may therefore especially benefit from social resources in times of economic crises.

Another future direction pertains to macro-level factors. That is, maintaining health and well-being during an economic crisis may depend on a nation’s social safety net (Woolf and Braveman, 2011). There is evidence that social safety nets in some European countries were more robust and therefore more health protective than those set in place in United States during the global recession (see Modrek et al., 2013; Riumallo-Herl et al., 2014). In countries where there is more social protection among disadvantaged subgroups, psychological factors may less likely become “disabled” than in countries where there is less protection.

In conclusion, this study is among the first to investigate the health impacts of the Great Recession in a national sample of midlife adults. Extending previous research, this study demonstrated that the educationally disadvantaged experienced more recession events and had worse health outcomes compared to their higher educated counterparts. These findings underscore that educational disadvantage during major societal events, such as economic recessions, heightens concern about inequality. By juxtaposing predictions made by the reserve capacity model and the “disabling” hypothesis, this study has made novel contributions to understanding how psychological strengths operate during times of notable economic adversity. The emerging evidence suggests that psychological strengths may be transformed into vulnerabilities among those who are educationally disadvantaged and are exposed to major economic hardship. Overall, the findings emphasize the importance of attending to heightened health disparities in the United States and related needs to develop effective policies to reduce these societal problems.

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Note

1. Midlife in the United States (MIDUS) Refresher data were subsequently collected on older respondents (aged 55–74 years) as well. These older adults were not included in the present analyses because they were sampled in a separate recruitment stage beginning in 2013, but also because the focus in these analyses is on recession impacts among early and midlife adults.

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Appendix 1. Recession hardship measure (N= 1275).

Type of recession hardship	Percentage of respondents reporting recession hardship
Job impact	
Lost a job	22.0
Started a job you did not like	14.5
Taken job below education or experience	19.3
Taken an additional job	17.3
Home impact	
Missed mortgage or rent	15.0
Been threatened with foreclosure or eviction	7.7
Sold home for less than it cost	3.5
Lost home due to foreclosure	2.0
Lost home due to something other than foreclosure	1.9
Had family or friends move in to save money	12.9
Moved in with family or friends to save money	8.9
Financial impact	
Declared bankruptcy	3.9
Missed credit card payment	17.5
Missed other debt payment	14.4
Increased credit card debt	33.8
Sold possessions to make ends meet	26.0
Cut back on spending	79.5
Exhausted unemployment benefits	8.7

Appendix 2. Chronic conditions included in composite measure (N= 1275).

Type of chronic condition	Percentage of respondents reporting condition
Asthma/bronchitis/emphysema	10.5
Other lung problems	2.7
Joint bone diseases	10.8
Back pain (sciatica/lumbago)	12.0
Migraines	11.8
Foot trouble	6.6
Persistent skin trouble	7.7
Thyroid disease	6.5
Hay fever	11.5
Stomach trouble	16.0
Urinary/bladder problems	8.9
Constipated	5.8
Ulcer	1.2
Gallbladder	1.3
Hernia	1.2
Piles/hemorrhoids	6.5
High blood pressure	14.9
Diabetes/high blood sugar	6.0
High cholesterol	10.8