



Multiple financial stressors and serious psychological distress among adults in the USA

Kazumi Tsuchiya¹ · Cindy W. Leung² · Andrew D. Jones² · Cleopatra H. Caldwell³

Received: 7 August 2019 / Revised: 9 February 2020 / Accepted: 16 March 2020 / Published online: 1 April 2020
© Swiss School of Public Health (SSPH+) 2020

Abstract

Objectives Financial stress has adverse consequences for health. However, the association between individual and cumulative associations of multiple financial stressors and serious psychological distress (SPD) is unclear.

Methods Using data from the 2017 National Health Interview Survey, we examined cross-sectional associations between perceived financial worries, healthcare insecurity, food insecurity, and SPD among 23,317 US adults. Associations were examined using logistic regression.

Results Among US adults in 2017, the overall prevalence of SPD was 3.6%. Among those with SPD, 85.5% were financially worried, 50.3% were food insecure, and 51.2% were healthcare insecure. Financial worries (OR 4.27; CI 3.31, 5.52), food insecurity (OR 2.34; CI 1.92, 2.85), and healthcare insecurity (OR 2.26; CI 1.85, 2.76) were each associated with higher odds of SPD. A dose–response association was found between the number of stressors and SPD.

Conclusions Each financial stressor was adversely associated with SPD both individually and cumulatively, indicating the adverse effects of the accumulation of these stressors. Additional studies are needed to understand the longitudinal effects of multiple financial stressors on mental health outcomes.

Keywords Financial stressors · Perceived financial worries · Food insecurity · Healthcare insecurity · Serious psychological distress

Introduction

Money continues to be a top cause of stress among adults in the United States of America (USA) (Bethune 2015). Researchers have argued that financial stress is a chronic source of stress (Kahn and Pearlin 2006). In turn, chronic stress has been linked with mortality and mental health problems, including psychological distress (Kahn and Pearlin 2006; Sternthal et al. 2011). Chronic stressors may proliferate within and across domains, and the accumulation of these stressors may deter individuals' ability to cope, leading to a depletion of their resources and, in turn, contribute to the onset of an illness or psychological distress (Kahn and Pearlin 2006). Previous research on financial hardship and common mental health disorders have yielded mixed findings, where Lorant et al. (2003) have found significant associations while others have not (Laaksonen et al. 2007). With rising levels of income inequality (Guzman 2017), out-of-pocket healthcare costs (Banthin et al. 2008), in tandem with increasing incidence

✉ Kazumi Tsuchiya
tsuchiya@umn.edu

Cindy W. Leung
cinleung@umich.edu

Andrew D. Jones
jonesand@umich.edu

Cleopatra H. Caldwell
cleoc@umich.edu

¹ Minnesota Population Center, University of Minnesota, Minneapolis, MN, USA

² Department of Nutritional Sciences, University of Michigan, School of Public Health, Ann Arbor, MI, USA

³ Department of Health Behavior and Health Education, University of Michigan, School of Public Health, Ann Arbor, MI, USA

of mental health disorders in the USA (Weinberger et al. 2018), it has become increasingly paramount to understand the relationship between financial hardship and mental health. It is likely that increasing income inequality will be associated with adverse mental health outcomes.

Psychological distress

Psychological distress is defined as a state of emotional hardship often characterized by depressive symptoms and anxiety or psychological functioning (Mirowsky and Ross 2002). Psychological distress differs from other psychiatric mental disorders in that it is sensitive to external stressors (George et al. 1986). Serious psychological distress (SPD) is defined as distress that is causing moderate to severe impairment in functioning and requires treatment (Pratt et al. 2007). As such, stressors due to relationship dynamics, discrimination, and financial hardship have all been linked with psychological distress (Sternthal et al. 2011). There are also health and economic costs linked to severe psychological distress including increased healthcare expenditures and outpatient expenditures in the USA (Pirraglia et al. 2011). Given these costs and burden of distress, it is important to understand factors which are related to mitigating psychological distress and improving mental health among adults in the USA.

Financial hardship and mental health

Several indicators for socioeconomic status including education, social class, and income have been used to examine the relationship between socioeconomic status and health (Linander et al. 2015; Muennig 2008). However, emerging research shows that financial hardship (e.g., financial stressors) may be associated with mental disorders, above and beyond education and income (Laaksonen et al. 2007; Linander et al. 2015). In prior studies, a single indicator has been used as a proxy to represent socioeconomic status; however, researchers have begun to acknowledge using multiple indicators (or domains) of financial hardship and socioeconomic status to better reflect the complexity of financial hardship (Linander et al. 2015).

Financial strain is defined as the individual's perception of financial resources available to adequately meet one's needs. Individuals with similar income levels may face differing degrees of financial strain due to the various demands (or domains) on income including food, health care, transportation, and housing (Huang et al. 2010). Financial stressors of perceived financial strain (Sternthal et al. 2011; Szanton et al. 2010), food insecurity (or the insufficiency of resources for food across all household members; Leung et al. 2015; Seligman et al. 2010) and

healthcare insecurity (or the perceived affordability of health care; Bisgaier and Rhodes 2011; Madden et al. 2008), have all been linked to adverse mental health outcomes.

Of the few studies that have examined multiple domains of financial stressors together, one study found that among adults living in an urban community, across eight broad domains of stressors (e.g., employment, discrimination, early life, financial, relationship, community), financial and relationship stressors were the most salient on poor mental and physical health (Sternthal et al. 2011). Another study examined multiple domains financial stressors (e.g., food insecurity, housing, employment, medication non-adherence) among emergency department patients and found that experiencing all five financial stressors was associated with significantly higher odds of depressed mood, compared to those who experienced no financial difficulties (Bisgaier and Rhodes 2011). Furthermore, housing and food insecurity were associated with higher mental distress among adults in the USA (Liu et al. 2014). These results underscore the importance of examining individual and cumulative associations across multiple domains of financial stressors with mental health.

One of the known challenges of assessing financial hardship as a determinant of mental health is the potential of reversed relations where mental health could lead to financial hardship or health selection (Kröger et al. 2015; Linander et al. 2015). According to a review of the literature conducted by Kröger et al. (2015), which assessed the importance of either social causation (socioeconomic conditions leading to adverse health) or health selection (mental health leading to financial hardship), researchers did not find conclusive results for either hypothesis; however, they found slightly more support for social causation among population based studies. Additionally, studies conducted in the USA suggest that social causation is more salient for health than health selection (Lynch et al. 1997; Muennig 2008). Given these findings, this provides support to assess the role of financial stressors on mental health in the USA.

Current study

The objective of the current study was to examine both the singular and cumulative associations of perceived financial worries, food and healthcare insecurity on SPD among a nationally representative sample of US adults. Health disparities are driven by the co-occurrence of multiple resources and risks, which in turn has cumulative effects on health across the life course (Jones et al. 2019). Thus, examining multiple domains of financial stressors is warranted in understanding how these stressors, separately and together, contribute to adverse mental health outcomes.

Though there are several stressors that influence SPD, we chose to focus on financial stressors including food and healthcare insecurity. Our study builds on the limited previous research in this area and provides clarity on the association between multiple financial stressors and SPD among a national sample in the USA, independent of key socio-demographic and chronic health covariates that may influence these associations.

Methods

The National Health Interview Survey (NHIS) is a cross-sectional nationally representative annual household survey conducted by the US Centers for Disease Control and Prevention to monitor the health of the non-institutionalized population in the USA. Using a complex, multistage area probability sampling design, data are collected from household members who self-report their health conditions, health behaviors, and healthcare coverage. From each participating family, one adult is randomly selected, and information is collected using the Sample Adult Core questionnaire. The response rate was 80.7% for the NHIS Adult core sample.

Sample

The current analysis used the adult sample from the 2017 NHIS survey representing 26,742 adults aged 18 years and older extracted from the publicly available version of the NHIS from the IPUMS Health Surveys (Blewett et al. 2019). The analytic sample was restricted to complete data on all study variables, including perceived financial worries (missing $n = 750$), food insecurity (missing $n = 6$), healthcare insecurity (missing $n = 241$), psychological distress (missing $n = 975$), and socio-demographic factors and chronic health conditions (missing $n = 1453$). The final analytic sample was comprised of 23,317 adults.

Measures

Psychological distress was measured using the Kessler 6 (K6) scale, with a total of six items ($\alpha = 0.84$). The K6 scale is a validated tool that has been used to screen, measure, and diagnose psychological distress among the general population (Kessler et al. 2002) asking respondents the frequency of their psychological distress symptoms in the past 30 days. The items were summed and a score of ≥ 13 on K6 indicates severe levels of distress or impairment in functioning that requires treatment, serious psychological distress (SPD; Brucker 2016; Furukawa et al. 2003). As done in previous studies, this cutoff has been used to

determine SPD (Kessler et al. 2003), and was also used as the cutoff for the current study.

We assessed 12 questions regarding financial worries, which has been included in the NHIS every year since 2013, to identify multiple domains of financial stressors that may be associated with psychological distress. Principal component factor analysis (PCA) with a varimax rotation was used to identify these domains (Table 1). Items with factor loadings above 0.50 were retained for each factor, as it is considered to be the minimum cutoff level as an indicator that represents the respective factor (see Maskey et al. 2018). Based on this cutoff, three factors emerged representing constructs of financial worries (factor 1), healthcare insecurity (factor 2), and food insecurity (factor 3). Thus, these factors were used for the analysis (see description below). Initial eigenvalues indicated that factor one explained 32.9%, factor two explained 18.1%, and factor three explained 12.0% of the variance. The three-factor solution explained 63.0% of the total variance.

Perceived financial worries was measured using four items ($\alpha = 0.87$), which has been included in the NHIS annually since 2013 (National Center for Health Statistics 2014). Previous studies have included similar items (e.g., medical costs of healthcare, rent/mortgage/housing costs, paying monthly bills, maintaining standard of living) to define broadly financial difficulties (Patel et al. 2016). Categories were dichotomized as not experiencing financial worries (“not worried at all”) versus experiencing financial worries (“not too worried, moderately worried, or very worried”).

Healthcare insecurity was assessed by a six-item measure ($\alpha = 0.76$) of respondents’ perceived affordability (yes vs. no) by specific domains of health care (e.g. prescription medication, mental health, dental care, specialist, follow-up), which has been included annually in the NHIS survey (National Center for Health Statistics 2014). Item responses were dichotomized to indicate whether respondents experienced healthcare insecurity (any vs. none).

Food insecurity was assessed using two items ($\alpha = 0.88$), asking respondents about their perceptions regarding insufficient resources for food across all household members from the US Department of Agriculture’s Core Food Security Module (Bickel et al. 2000). These items have demonstrated high sensitivity and specificity for detecting food insecurity across high-risk populations (Gundersen et al. 2017). The overall distribution of this scale was skewed. Thus, affirmative responses of “sometimes or often true” vs. “never true,” on at least one question were used to indicate food insecurity.

Given the overall highly skewed distributions of food and healthcare insecurity, we used dichotomized measures of each stressor to be able to compare across them rather than standardizing or Z scoring each stressor (centering on

Table 1 Principal component factor analysis results, National Health Interview Survey (United States 2017)

Items	Factor loadings		Uniqueness
	Financial worries	Healthcare insecurity	
How worried are you about...medical costs of healthcare	0.8403	0.0690	0.1566
How worried are you about...paying rent/mortgage/housing costs	0.8717	0.0782	0.1660
How worried are you about...maintaining standard of living	0.8267	0.1012	0.0347
How worried are you about...paying monthly bills	0.8269	0.0527	0.0363
Couldn't afford prescription medicine, past 12 months	0.1128	0.5923	0.02377
Couldn't afford mental health care/counseling, past 12 months	0.0667	0.5496	0.0714
Couldn't afford dental care, past 12 months	0.1568	0.6329	0.2167
Couldn't afford eyeglasses, past 12 months	0.1046	0.6399	0.2176
Couldn't afford to see a specialist, past 12 months	0.0798	0.7824	0.0577
Couldn't afford follow-up care, past 12 months	0.0688	0.7692	0.0406
Worried food run out before had money to buy more	0.1254	0.0992	0.9224
Food did not last before had money to get more	0.1055	0.0918	0.9263
Eigen values	3.95143	2.16932	1.43631
Variance	0.3293	0.1808	0.1197

Bolded factor loadings indicate items that were included in the construct

the mean and standard deviation). However, sensitivity analyses were conducted to check whether similar patterns existed across both the dichotomized and standardized measures of stressors, with results suggesting similar patterns (results not shown).

Cumulative financial stressors were measured using a sum score of perceived financial worries, food insecurity, and healthcare insecurity. Scores ranged from 0 to 3, indicating those who did not experience any financial stressors to those who experienced one, two, or all three financial stressors.

Covariates

Socio-demographic covariates were included in multivariable regression analyses because they were hypothesized to be common determinants of financial stress and psychological distress. These included race and ethnicity (non-Hispanic Black, Hispanic, Asian, other vs. non-Hispanic white), sex, income to needs ratio (1.00–1.99, 2.00–3.99, 4.00 and above vs. 0.00–0.99), age (35–44, 45–64, 65–84, and 85 and older vs. 18–34), marital status (widowed/divorced/separated, never married vs. married or living with partner), employment (no job last week/had a job in past 12 months, no job last week/never worked vs. job last week), education (less than high school, high school graduate, some college, bachelor's degree, graduate degree), and health insurance coverage status (any vs. none).

We also controlled for prior diagnosis of major health conditions including cardiovascular disease (CVD), Type 2 diabetes, and cancer (with the exception for cancers with low rates of mortality), as these are the leading causes of mortality in the USA and known to influence financial stress and SPD (Buchanan et al. 2013). CVD was defined as prior diagnosis with any of the following conditions coronary heart disease (CHD), heart attack, stroke, angina, or heart disease.

Statistical analysis

NHIS survey weights were used in all analyses to account for different sampling probabilities and participation in the survey to obtain effect estimates and standard errors representative of the US population. Multicollinearity checks were conducted with all the stressors and covariates confirming that multicollinearity was not an issue across the study measures with VIF scores < 10 and tolerance scores > 0.2.

To assess patterns of missing data in the study, an indicator variable was created to assess patterns of missing data. Income to needs ratio had the highest missing data (less than 5%). Women and participants of older ages were more likely to be missing for income, as well as those who were not experiencing financial stressors. When the missing data indicator was included in the logistic regression models, the coefficients did not change significantly across

the stressors and SPD. Thus, we excluded anyone with missing income from the final analytic sample.

First, we compared socio-demographic characteristics by SPD (unweighted) using Chi-squared tests to compare proportions. Bivariate correlations were also calculated across all three financial stressors. Next, we examined associations between financial stressors of perceived financial worries, food insecurity, and healthcare insecurity and SPD using logistic regression models. Models were initially examined to assess each financial stressor separately on SPD and then each stressor was adjusted for the other stressors. Final models examined all the financial stress factors concurrently on SPD, adjusting for socio-demographic and health covariates.

We also created and examined the cumulative or additive association of all three financial stressors and SPD. We initially assessed the cumulative association across all the financial stressors and SPD. Models were further adjusted for socio-demographic and chronic health covariates.

Additional sensitivity analyses (detailed results provided upon request) were performed to assess factors that may contribute to potential confounding by household income (or poverty) and financial constraints from chronic health conditions. Thus, we assessed financial stressors on SPD among adults without any of the chronic health conditions ($n = 17,263$). We also assessed among those who lived in poverty using the cut point for those who live below the 200% Federal Poverty Level (FPL; $n = 7231$) or income to needs ratio of 2.00 or below. This metric is commonly used by the federal government to understand poverty-based data in the USA using a base income level set per year for a family (two adults and one child). Statistical tests were two-sided, and p values of $< .05$ were used to indicate statistical significance. All statistical analyses were estimated using Stata, version 14.0 (StataCorp, College Station, TX).

Results

In 2017, 3.6% of US adults had SPD (Table 2). Results show 44.8% experienced financial worries, 14.2% experienced food insecurity, and 15.4% experienced healthcare insecurity. Additionally, close to three quarters (74.6%) of adults experienced at least one of the financial stressors, and 5.5% experienced all three financial stressors. Bivariate correlations across each of the stressors ranged from 0.27 to 0.31.

Socio-demographic characteristics of study participants by SPD are also shown in Table 2. Among adults with

SPD, 85.5% experienced financial worries, 50.3% were food insecure, and 51.2% were healthcare insecure. Ninety-one percent of adults with SPD experienced at least one financial stressor, and 31.7% of adults with SPD reported experiencing all three financial stressors. Compared to adults without SPD, adults with SPD were more likely to be non-Hispanic white, female, living in poverty (below 2.00 for income to needs ratio), between 45 and 64 years old, either never married or widowed/divorced/separated, not employed, lower education, and did not have health insurance. Additionally, adults with SPD were more likely to have chronic conditions of CVD and Type 2 diabetes.

Significant associations were found between financial stressors and SPD (Table 3). After concurrent adjustment for other stressors, financial worries (OR 4.13, 95% CI 3.22, 5.31), food insecurity (OR 3.36, 95% CI 2.79, 4.03), and healthcare insecurity (OR 2.84, 95% CI 2.35, 3.43) were all associated with higher odds of SPD. All three stressors—financial worries (OR 4.27, 95% CI 3.31, 5.52), food insecurity (OR 2.34, 95% CI 1.92, 2.85), and healthcare insecurity (OR 2.26, 95% CI 1.85, 2.76)—were each associated with higher odds of SPD, even after adjusting for socio-demographic factors and chronic health conditions.

There was a dose–response relationship with higher odds of SPD with each addition of a financial stressor (Table 4). The odds of SPD were exponentially higher for adults who reported experiencing all three stressors than who did not report experiencing any financial stressor (OR 24.62, 95% CI 17.67, 34.30). There was more than a fivefold increase in the odds of SPD for those who reported all three stressors compared to those who experienced at least one financial stressor.

In sensitivity analyses, the results suggest similar findings compared to the main analysis (detailed results available upon request), when examining among adults without any previous diagnosis of major health conditions and among adults living in poverty (at or below 2.00 for income to needs ratio). After adjusting for socio-demographic covariates, financial worries (OR 5.03; 95% CI 3.62, 7.01), food insecurity (OR 2.42, 95% CI 1.88, 3.12), and healthcare insecurity (OR 2.45, 95% CI 1.91, 3.15) predicted higher odds of SPD among adults without chronic health conditions. Among those living in poverty, financial worries (OR 3.70, 95% CI 2.54, 5.39), food insecurity (OR 2.63, 95% CI 2.04, 3.39), and healthcare insecurity (OR 2.00, 95% CI 1.54, 2.60) also predicted higher odds of SPD. A dose–response was also noted for those who experienced all three stressors than those who experience one stressor among adults without chronic

Table 2 2017 Characteristics of US adults by serious psychological distress (United States 2017)

Characteristics <i>n</i> (weighted %)	Total	SPD ^a	
		No	Yes
Total	23,317	22,478 (96.4)	839 (3.6)
Race and ethnicity			
White	16,235 (69.6)	15,673 (63.8)	562 (65.0)
Black	2461 (10.6)	2370 (11.7)	91 (10.7)
Hispanic	2868 (12.3)	2755 (16.2)	113 (16.0)
Asian	1164 (5.0)	1148 (6.1)	16 (1.8)
Other	589 (2.5)	532 (2.2)	57 (6.5)
Sex			
Female	12,754 (51.6)	12,202 (51.2)	552 (63.6)
Male	10,563 (48.4)	10,276 (48.8)	287 (36.4)
Income to needs ratio			
0.00–0.99	3129 (11.4)	2825 (10.8)	304 (31.4)
1.00–1.99	4102 (16.6)	3876 (16.3)	226 (27.0)
2.00–3.99	7719 (33.7)	7512 (33.9)	207 (26.0)
4.00 and above	8367 (38.3)	8265 (39.0)	102 (15.6)
Age			
18–34	6015 (31.1)	5823 (31.3)	192 (25.4)
35–44	3569 (17.1)	3433 (17.1)	136 (16.5)
45–64	7823 (33.4)	7447 (33.0)	376 (45.2)
65–84	5253 (16.5)	5126 (16.7)	127 (12.1)
85 or older	657 (1.9)	649 (1.9)	8 (0.8)
Marital status			
Married/lives with partner	11,761 (60.5)	11,505 (61.2)	256 (40.1)
Widowed/divorced/separated	6125 (16.4)	5783 (16.0)	342 (30.7)
Never married	5431 (23.1)	5190 (22.8)	241 (29.2)
Employment			
Job last week	14,027 (64.5)	13,754 (65.4)	273 (35.7)
No job last week (job in 12 mo.)	1409 (6.1)	1335 (6.0)	74 (8.2)
No job last week/never worked	7881 (29.4)	7389 (28.6)	492 (56.1)
Educational attainment			
< High school	2499 (11.4)	2339 (11.1)	160 (19.4)
High school graduate	5552 (23.9)	5298 (23.6)	254 (33.0)
Some college	7346 (30.7)	7045 (30.5)	301 (33.2)
Bachelor's degree	4974 (21.6)	4885 (22.0)	89 (10.7)
Graduate degree	2946 (12.4)	2911 (12.8)	35 (3.7)
Health insurance status			
Yes	22,159 (95.0)	21,383 (95.7)	776 (93.6)
No	1158 (5.0)	1095 (4.3)	63 (6.4)
CVD			
Yes	3436 (12.3)	3206 (11.9)	230 (26.0)
No	19,881 (87.7)	19,272 (88.1)	609 (74.0)
Type 2 diabetes			
Yes	2032 (7.7)	1909 (7.5)	123 (13.9)
No	21,285 (92.3)	20,569 (92.5)	716 (86.1)
Cancer			
Yes	2126 (7.4)	2037 (7.4)	89 (8.8)
No	21,191 (92.6)	20,441 (92.6)	750 (91.2)
Financial worries			

Table 2 (continued)

Characteristics <i>n</i> (weighted %)	Total	SPD ^a	
		No	Yes
Yes	10,086 (44.8)	9374 (43.5)	712 (85.5)
No	13,231 (55.2)	13,104 (56.5)	127 (14.5)
Food insecurity			
Yes	3247 (14.2)	2831 (13.0)	443 (50.3)
No	20,043 (85.8)	19,647 (87.0)	396 (49.7)
Healthcare insecurity			
Yes	3750 (15.4)	3325 (14.3)	425 (51.2)
No	19,567 (84.5)	19,153 (85.7)	414 (48.8)
Number of stressors			
0	11,816 (25.4)	11,732 (50.4)	84 (8.9)
1	7160 (52.6)	6955 (32.6)	205 (26.8)
2	3073 (16.5)	2798 (12.8)	275 (32.6)
3	1268 (5.5)	993 (4.2)	275 (31.7)

^aChi square test was estimated to compare proportions. All categories except cancer were significant at $p < 0.01$

Table 3 Logistic regression results of financial stressors and serious psychological distress (United States 2017)

	Odds Ratio (95% CI)		
	Univariate	Model 1	Model 2
Financial worries	7.67 (6.08, 9.68)	4.13 (3.22, 5.31)	4.27 (3.31, 5.52)
Food insecurity	6.76 (5.73, 7.99)	3.36 (2.79, 4.03)	2.34 (1.92, 2.85)
Healthcare insecurity	6.30 (5.30, 7.49)	2.84 (2.35, 3.43)	2.26 (1.85, 2.76)

Model 1: adjusted for other financial stressors

Model 2: adjusted for sex, age, race/ethnicity, income to needs ratio, health insurance, employment, marital status, education, CVD, diabetes, cancer, and financial stressors

Table 4 Logistic regression results of total number of financial stressors and serious psychological distress (United States 2017)

	Odds ratio (95% CI)	
	Univariate	Model 1
Number of stressors		
0	1.00 (reference)	1.00 (reference)
1	4.64 (3.40, 6.33)	4.41 (3.21, 6.08)
2	14.38 (10.64, 19.44)	10.70 (7.74, 14.80)
3	42.57 (31.47, 57.58)	24.62 (17.67, 34.30)

Model 1: adjusted for sex, age, race/ethnicity, income to needs ratio, health insurance, employment, marital status, CVD, diabetes, cancer, and financial stressors

health conditions and those living in poverty, with a sixfold and fivefold increase in the odds of SPD, respectively.

Discussion

Results of the present analysis help to expand our understanding of the relationship between financial stressors and mental health among a nationally representative sample of

US adults. All three stressors were significantly associated with SPD, which suggests they each were independently associated with SPD. These results are consistent with previous findings that have examined across multiple domains of financial stressors and mental health (Bisgaier and Rhodes 2011; Kahn and Pearlin 2006; Sternthal et al. 2011). Additionally, our results revealed that the magnitude of a stressor was overestimated if the other financial stressors were not accounted for, suggesting that multiple financial stressors can co-exist in the same individual and household.

We also found a dose–response association between the number of stressors and SPD, where the addition of each stressor was associated with higher odds of SPD. These results are consistent with prior studies that have assessed the cumulative associations of stressors and mental health (Bisgaier and Rhodes 2011; Sternthal et al. 2011). Additionally, these findings suggest that these stressors co-occur and accumulate to be adversely associated with SPD. These stressors may be representative of other accumulated disadvantages including lack of employment opportunities and living in low-resourced communities. One study found

that as the severity of household food insecurity increased, the likelihood of households experiencing other financial hardships (e.g., rent, utilities) also increased (Loopstra and Tarasuk 2013), and vice versa (Kirkpatrick and Tarasuk 2011). These results suggest that those who experience food or housing hardship are also vulnerable to experiencing other financial stressors. As supported by the stress proliferation process, stressors may lead to the onset of other stressors within or across domains (Pearlin et al. 2005). Results of this study provide greater nuance for previous research findings.

Although 16.5% of the sample experienced two domains of financial stressors and a smaller proportion (5.5%) experienced all three, these individuals have higher odds for SPD. When considering all three types of financial stressors, separately and concurrently, these chronic stressors are adversely associated with serious psychological distress, with a greater need to address financial stress among those who are experiencing multiple domains of stress. In sum, individuals experiencing long term financial stress may be at greater risk for adverse mental health outcomes.

Income has been used as a proxy measure for SES (Galobardes et al. 2006; Szanton et al. 2010); however, it does not adequately capture the experience of meeting one's financial needs (Szanton et al. 2010). For our study, even after adjusting for household income, financial stressors were associated with SPD. These results suggest that financial stressors operate independently from income, accounting for the additional variation for SPD. Similarly, a previous study (Leung et al. 2015) had found that higher levels of depressive symptoms were associated with worse food insecurity, even after adjusting for income. Even among those with similar income levels, financial stressors may vary due to the variety of demands, with the current study providing a broader lens in our understanding of the relationship between financial hardship and psychological distress.

Limitations

The primary limitation of this study is the cross-sectional design of this study; thus, causation cannot be inferred for the observed relationships. Although previous research has found that psychological distress is a strong predictor for future psychological distress (Darin-Mattsson et al. 2018), due to the study limitations we were unable to incorporate a previous measure of distress. Emerging evidence suggests that financial hardship is salient for distress, above and beyond previous measures of distress (Darin-Mattsson et al. 2018). The potential also remains for reverse causation where it is possible that adults with mental health conditions may be at greater risk for economic

circumstances (health selection effect) and, in turn, lead to biased reporting of financial stressors. Several studies conducted in the USA find support for the social causation hypothesis, that is economic hardship and financial stress influences mental health (Lynch et al. 1997; Muennig 2008). Additionally, psychological distress may be sensitive to external stress exposures and the inability to adequately cope with the stress (Ridner 2004), supporting this interpretation. To also account for bias in reporting of exposures, we controlled for confounders that have been previously associated with financial stressors and SPD (Buchanan et al. 2013), as well as examining these relationships among those without any chronic conditions and among those living in poverty. The method used in assessing these stressors does not capture the severity, only the presence of these stressors; however, these findings still contribute to our understanding of the role of multiple financial stressors and SPD. There may be inaccuracies in reporting for financial stressors and SPD; however, the use of subjective measures is salient for mental health (Bisgaard and Rhodes 2011; Sternthal et al. 2011) and may not correspond with objective measures of economic distress (Weissman et al. 2020). Future research may consider using more nuanced measures of financial stressors across time. Additionally, each of the financial stressors was collapsed to form one cumulative incidence measure to account for the overall adverse effects of financial stressors on health. The operationalization of this measure may lead to the interpretation that each stressor may have equal weight of impact on psychological distress. Given these limitations, more research is warranted to examine across multiple financial stressors and its implications for health.

Notably, SPD rates were higher among middle aged adults and non-Hispanic white females, compared to other age, and racial, and ethnic groups. These patterns point us toward future research in using an intersectional and life course approach to disentangle the relationship between financial stress and mental health. Future studies should consider longitudinal assessments to assess causality between multiple financial stressors and SPD.

Conclusions

The findings of this study demonstrate that financial stressors are negatively associated with SPD among adults in the USA. Each stressor was independently and cumulatively associated with SPD, which suggest the potential co-occurrence of stressors and adverse implications on mental health. Practitioners could consider inquiring about financial stressors as part of their services (e.g., programs), and policies could consider a multi-sectorial approach to alleviate financial stressors (e.g., housing, food and health care). These findings also support the need for future

research to understand the complex mechanism and long-term effects of financial stress and health to ultimately alleviate financial stress and SPD in the USA.

Acknowledgements This research was funded by the Departmental Faculty Allies Mentored Writing Award at the University of Michigan School of Public Health, the Rackham Graduate School, and the Eunice Kennedy Shriver National Institute of Child Health and Human Development under Award Numbers T32HD095134-01A1 and P2CHD041023. The authors would like to thank Kirsten Herold from the University of Michigan for her feedback and support for the manuscript.

Compliance with ethical standards

Conflict of interest The authors declare no conflict of interest.

Informed consent We used a public-use data file of the National Health Interview Survey uploaded by the Centers for Disease Control and Prevention each year. This dataset includes de-identified data; thus, we did not obtain informed consent from the study participants.

References

- Banthin JS, Cunningham P, Bernard DM (2008) Financial burden of health care, 2001–2004. *Health Aff* 27(1):188–195. <https://doi.org/10.1377/hlthaff.27.1.188>
- Bisgaier J, Rhodes KV (2011) Cumulative adverse financial circumstances: associations with patient health status and behaviors. *Health Soc Work* 36(2):129–137. <https://doi.org/10.1093/hsw/36.2.129>
- Blewett LA, Drew JAR, King ML, Williams KCW (2019) IPUMS Health Surveys: National Health Interview Survey, Version 6.4 [dataset]. Minneapolis, MN: IPUMS. <https://doi.org/10.18128/D070.V6.4>
- Brucker DL (2016) Food security among young adults with disabilities in the United States: findings from the National Health Interview Survey. *Disabil Health J* 9(2):298–305. <https://doi.org/10.1016/j.dhjo.2015.10.003>
- Buchanan ND, King JB, Rodriguez JL, White A, Trivers KF, Forsythe LP, Kent EE, Rowland JH, Sabatino SA (2013) Changes among US cancer survivors: comparing demographic, diagnostic, and health care findings from the 1992 and 2010 National Health Interview Surveys. *ISRN Oncol* 2013:238017. <https://doi.org/10.1155/2013/238017>
- Bickel, Gary, Nord M, Cristofor P, Hamilton W, Cook, J (2000) Guide to measuring food insecurity.pdf (No. 6). US Department of Agriculture
- Darin-Mattsson A, Andel R, Celeste RK, Kåreholt I (2018) Linking financial hardship throughout the life-course with psychological distress in old age: sensitive period, accumulation of risks, and chain of risks hypotheses. *Soc Sci Med* 201:111–119. <https://doi.org/10.1016/j.socscimed.2018.02.012>
- Furukawa TA, Kessler RC, Slade T, Andrews G (2003) The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of Mental Health and Well-Being. *Psychol Med* 33(2):357–362. <https://doi.org/10.1017/S0033291702006700>
- Galobardes B, Shaw M, Lawlor DA, Lynch JW, Smith GD (2006) Indicators of socioeconomic position (part 1). *J Epidemiol Community Health* 60(1):7–12. <https://doi.org/10.1136/jech.2004.023531>
- George LK, Hughes DC, Blazer DG (1986) Urban/rural differences in the prevalence of anxiety disorders. *Am J Soc Psychiatry* 6(4):249–258
- Gundersen C, Engelhard EE, Crumbaugh AS, Seligman HK (2017) Brief assessment of food insecurity accurately identifies high-risk US adults. *Public Health Nutrition* 20(8):1367–1371. <https://doi.org/10.1017/S1368980017000180>
- Guzman GG (2017) American Community Survey Briefs. 13
- Huang J, Guo B, Kim Y (2010) Food insecurity and disability: do economic resources matter? *Soc Sci Res* 39(1):111–124. <https://doi.org/10.1016/j.ssresearch.2009.07.002>
- Jones NL, Gilman SE, Cheng TL, Drury SS, Hill CV, Geronimus AT (2019) Life course approaches to the causes of health disparities. *Am J Public Health* 109(S1):S48–S55. <https://doi.org/10.2105/AJPH.2018.304738>
- Kahn JR, Pearlin LI (2006) Financial strain over the life course and health among older adults. *J Health Soc Behav* 47(1):17–31. <https://doi.org/10.1177/002214650604700102>
- Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand S-LT, Walters EE, Zaslavsky AM (2002) Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychol Med* 32(6):959–976. <https://doi.org/10.1017/S0033291702006074>
- Kessler RC, Barker PR, Colpe LJ, Epstein JF, Gfroerer JC, Hiripi E, Howes MJ, Normand S-LT, Manderscheid RW, Walters EE, Zaslavsky AM (2003) Screening for serious mental illness in the general population. *Arch Gen Psychiatry* 60(2):184–189. <https://doi.org/10.1001/archpsyc.60.2.184>
- Kirkpatrick SI, Tarasuk V (2011) Housing circumstances are associated with household food access among low-income urban families. *J Urban Health* 88(2):284–296. <https://doi.org/10.1007/s11524-010-9535-4>
- Kröger H, Pakpahan E, Hoffmann R (2015) What causes health inequality? A systematic review on the relative importance of social causation and health selection. *Eur J Public Health* 25(6):951–960. <https://doi.org/10.1093/eurpub/ckv111>
- Laaksonen E, Martikainen P, Lahelma E, Lallukka T, Rahkonen O, Head J, Marmot M (2007) Socioeconomic circumstances and common mental disorders among Finnish and British public sector employees: evidence from the Helsinki Health Study and the Whitehall II Study. *Int J Epidemiol* 36(4):776–786. <https://doi.org/10.1093/ije/dym074>
- Leung CW, Epel ES, Willett WC, Rimm EB, Laraia BA (2015) Household food insecurity is positively associated with depression among low-income supplemental nutrition assistance program participants and income-eligible nonparticipants. *J Nutr* 145(3):622–627
- Linander I, Hammarstrom A, Johansson K (2015) Which socioeconomic measures are associated with psychological distress for men and women? A cohort analysis. *Eur J Public Health* 25(2):231–236. <https://doi.org/10.1093/eurpub/cku137>
- Liu Y, Njai RS, Greenlund KJ, Chapman DP, Croft JB (2014) Relationships between housing and food insecurity, frequent mental distress, and insufficient sleep among adults in 12 US States, 2009. *Prev Chronic Dis*. <https://doi.org/10.5888/pcd11.130334>
- Loopstra R, Tarasuk V (2013) Severity of household food insecurity is sensitive to change in household income and employment status among low-income families. *J Nutr* 143(8):1316–1323. <https://doi.org/10.3945/jn.113.175414>
- Lorant V, Deliège D, Eaton W, Robert A, Philippot P, Ansseau M (2003) Socioeconomic inequalities in depression: a meta-analysis. *Am J Epidemiol* 157(2):98–112. <https://doi.org/10.1093/aje/kwf182>
- Lynch JW, Kaplan GA, Shema SJ (1997) Cumulative impact of sustained economic hardship on physical, cognitive,

- psychological, and social functioning. *N Engl J Med* 337(26):1889–1895. <https://doi.org/10.1056/NEJM199712253372606>
- Madden JM, Graves AJ, Zhang F, Adams AS, Briesacher BA, Ross-Degnan D, Gurwitz JH, Pierre-Jacques M, Safran DG, Adler GS, Soumerai SB (2008) Cost-related medication nonadherence and spending on basic needs following implementation of medicare part D. *JAMA* 299(16):1922–1928. <https://doi.org/10.1001/jama.299.16.1922>
- Maskey R, Fei J, Nguyen H-O (2018) Use of exploratory factor analysis in maritime research. *Asian J Shipp Logist* 34(2):91–111. <https://doi.org/10.1016/j.ajsl.2018.06.006>
- Mirowsky J, Ross CE (2002) Measurement for a human science. *J Health Soc Behav (JSTOR)* 43(2):152–170. <https://doi.org/10.2307/3090194>
- Muennig P (2008) Health selection vs. causation in the income gradient: what can we learn from graphical trends? *J Health Care Poor Underserved* 19(2):574–579. <https://doi.org/10.1353/hpu.0.0018>
- National Center for Health Statistics (2014) 2013 National Health Interview Survey (NHIS) public use data release: NHIS survey description. National Center of Health Statistics, Hyattsville
- Patel MR, Piette JD, Resnicow K, Kowalski-Dobson T, Heisler M (2016) Social determinants of health, cost-related nonadherence, and cost-reducing behaviors among adults with diabetes: findings from the National Health Interview Survey. *Med Care* 54(8):796–803. <https://doi.org/10.1097/MLR.0000000000000565>
- Pearlin LI, Schieman S, Fazio EM, Meersman SC (2005) Stress, health, and the life course: some conceptual perspectives. *J Health Soc Behav* 46(2):205–219. <https://doi.org/10.1177/002214650504600206>
- Pirraglia PA, Hampton JM, Rosen AB, Witt WP (2011) Psychological distress and trends in healthcare expenditures and outpatient healthcare. *Am J Manag Care* 17(5):319–328
- Pratt LA, Dey AN, Cohen AJ (2007) Characteristics of adults with serious psychological distress as measured by the K6 scale: United States, 2001–04 (No. 382). National Center for Health Statistics
- Ridner SH (2004) Psychological distress: concept analysis. *J Adv Nurs* 45(5):536–545. <https://doi.org/10.1046/j.1365-2648.2003.02938.x>
- Seligman HK, Laraia BA, Kushel MB (2010) Food insecurity is associated with chronic disease among low-income NHANES participants. *J Nutr* 140(2):304–310. <https://doi.org/10.3945/jn.109.112573>
- Sternthal MJ, Slopen N, Williams DR (2011) Racial disparities in health, how much does stress really matter? *Du Bois Rev* 8(01):95–113. <https://doi.org/10.1017/S1742058X11000087>
- Szanton SL, Thorpe RJ, Whitfield K (2010) Life-course financial strain and health in African-Americans. *Soc Sci Med* 71(2):259–265. <https://doi.org/10.1016/j.socscimed.2010.04.001>
- Weinberger AH, Gbedemah M, Martinez AM, Nash D, Galea S, Goodwin RD (2018) Trends in depression prevalence in the USA from 2005 to 2015: widening disparities in vulnerable groups. *Psychol Med* 48(8):1308–1315. <https://doi.org/10.1017/S0033291717002781>
- Weissman J, Russell D, Mann JJ (2020) Sociodemographic characteristics, financial worries and serious psychological distress in U.S. adults. *Community Mental Health J*. <https://doi.org/10.1007/s10597-019-00519-0>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.