The effect of COVID-19 pandemic-related financial challenges on mental health and well-being among US older adults

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Abstract

Background: Despite profound financial challenges during the COVID-19 pandemic, there is a gap in estimating their effects on mental health and well-being among older adults.

Methods: The National Health and Aging Trends Study is an ongoing nationally representative cohort study of US older adults. Outcomes included mental health related to COVID-19 (scores averaged across eight items ranging from one to four), sleep quality during COVID-19, loneliness during COVID-19, having time to yourself during COVID-19, and hopefulness during COVID-19. Exposures included income decline during COVID-19 and financial difficulty due to COVID-19. Propensity score weighting produced covariate balance for demographic, socioeconomic, household, health, and well-being characteristics that preceded the pandemic to estimate the average treatment effect. Sampling weights accounted for study design and non-response.

Results: In weighted and adjusted analyses ($n = 3257$), both income decline during COVID-19 and financial difficulty due to COVID-19 were associated with poorer mental health related to COVID-19 (b $= -0.159$, $p < 0.001$ and b $= -0.381$, $p < 0.001$, respectively), poorer quality sleep (OR $= 0.63$, 95% CI: 0.46, 0.86 and OR $= 0.42$, 95% CI: 0.30, 0.58, respectively), more loneliness (OR $= 1.53$, 95% CI: 1.16, 2.02 and OR $= 2.72$, 95% CI: 1.96, 3.77, respectively), and less time to yourself (OR $= 0.54$, 95% CI: 0.40, 0.72 and OR $= 0.37$, 95% CI: 0.27, 0.51, respectively) during COVID-19.

Conclusions: Pandemic-related financial challenges are associated with worse mental health and well-being regardless of pre-pandemic characteristics, suggesting that they are distinct social determinants of health for older adults. Timely intervention is needed to support older adults experiencing pandemic-related financial challenges.

INTRODUCTION

Older adults in the United States face unprecedented financial challenges during the coronavirus (COVID-19) pandemic. Unemployment rose from 3.5% in February 2020 to 14.8% in April, which was the highest rate on record.[1] This was followed by several months of inflation.[2] Employed older adults were likely more sensitive to pandemic-related financial challenges than younger coworkers[3] because they may have (1) quit or reduced work due to their risk of severe illness,[4] and (2) been less successful in getting a new job. Many retired older adults have less financial flexibility to handle unexpected expenses than younger adults because they rely on fixed income sources; more than half rely on Social Security for more than half of their income.[5] Although there is strong evidence linking pre-pandemic financial challenges with a higher risk of disability, dementia and earlier mortality among older adults,[6–8] there has been little attention paid to pandemic-related financial challenges. There are gaps in understanding the prevalence of financial challenges among older adults, the strategies they are using to address the challenges, and the effect of those challenges on their health and well-being.

Limited evidence suggests that pandemic-related financial challenges are associated with poorer health outcomes during the pandemic. Cross-sectional studies found that older adults experiencing financial difficulty due to the pandemic[9] and job loss[10] reported more loneliness and poorer mental health during the pandemic. Among adults of all ages, experiencing any pandemic-related financial challenge was associated with greater depressive symptoms,[11,12] and in an all-female sample those who experienced income decline or financial difficulty due to the pandemic had less sleep and exercise, and more drinking and smoking.[13] However, prior studies were limited in recruiting predominately online during the pandemic and only one had a national sampling frame.[11] Nationally representative results are important because individuals who are black, Hispanic, or Native American have been disproportionately affected by COVID-19[14] and likely also disproportionately experienced financial challenges due to persistent structural discrimination.[15] Also, cohort data are needed to evaluate whether pandemic-related financial challenges are distinct from financial challenges typically encountered before the pandemic. A better understanding of the epidemiology and outcomes associated with pandemic-

Key points

- Pandemic-related financial challenges contribute to poorer mental health and well-being for US older adults regardless of their financial situation before the pandemic.
- Older adults facing financial difficulty due to COVID-19 typically used multiple strategies to handle the challenge and some compromised basic necessities such as skipping meals or putting off paying the rent/mortgage.
- Older adults who were either black or Hispanic, and those who were financially strained before the pandemic, disproportionately experienced financial difficulty due to COVID-19, suggesting that it may exacerbate long-standing health disparities.

Why does this paper matter?

Clinical screening for financial difficulty due to COVID-19 and income decline during COVID-19 with timely referral for social services may attenuate the harmful effects of financial challenges for older adults.

related financial challenges is urgently needed to advance health equity as we navigate the COVID-19 pandemic.

In addition to empirical evidence, the theory of fundamental causes provides theoretical justification for examining pandemic-related financial challenges by suggesting that socioeconomic factors influence multiple health outcomes through multiple intervening and replicating pathways.[16] Since individuals with lower income and assets before the pandemic were more likely to additionally experience new financial challenges during the pandemic, the profound financial changes occurring during the COVID-19 pandemic may represent a new pathway contributing to socioeconomic health disparities. Therefore, there is a need to examine pandemic-related financial challenges to advance health equity. This study leveraged cohort data collected before and during the pandemic from a nationally representative sample of US older adults to test two hypotheses. First, this study tests the hypothesis that experiencing a pandemic-related

financial challenge is associated with poorer mental health and well-being. Second, this study examined potential dose-based associations by testing the hypothesis that needing more strategies to manage financial difficulty due to COVID-19 is associated with worse outcomes among those experiencing financial difficulty.

METHODS

Study design and sample

The National Health and Aging Trends Study (NHATS) recruited a cohort of US Medicare beneficiaries aged ≥65 years using stratified random sampling in 2011 and replenished the sample in 2015.[17] NHATS study design[18] and sample are[19] described in detail elsewhere. NHATS participants were interviewed at home annually by trained interviewers. All 3961 participants from the 2020 interview were mailed a separate COVID-19 survey between June and October of 2020 and 3257 (82.2%) provided a completed survey by January 2021. The COVID-19 survey was intended to capture experiences that were specific to life during the pandemic. Thus, the questions differed from those in the annual interview. NHATS was

approved by the Johns Hopkins Bloomberg School of Public Health IRB and participants provided informed consent. The local institutional review board determined these analyses were exempt from review.

Measurement

Outcomes

Mental health and well-being outcomes for this study that were measured as part of the COVID-19 survey included mental health related to COVID-19, sleep quality, loneliness, having time to yourself, and hopefulness, which each predict a higher risk of disability and earlier mortality among older adults.[20–27] Mental health related to COVID-19 was based on not feeling worried/anxious or sad/depressed about the COVID-19 outbreak, and symptoms of post-traumatic stress disorder (PTSD), including not having recurring thoughts or nightmares about the outbreak, not avoiding activities or thoughts/feelings about the outbreak, and not feeling jumpy/easily startled or feeling on guard during the outbreak (Cronbach $\alpha = 0.85$, a measure of internal reliability).[28] Responses were averaged across eight items that had
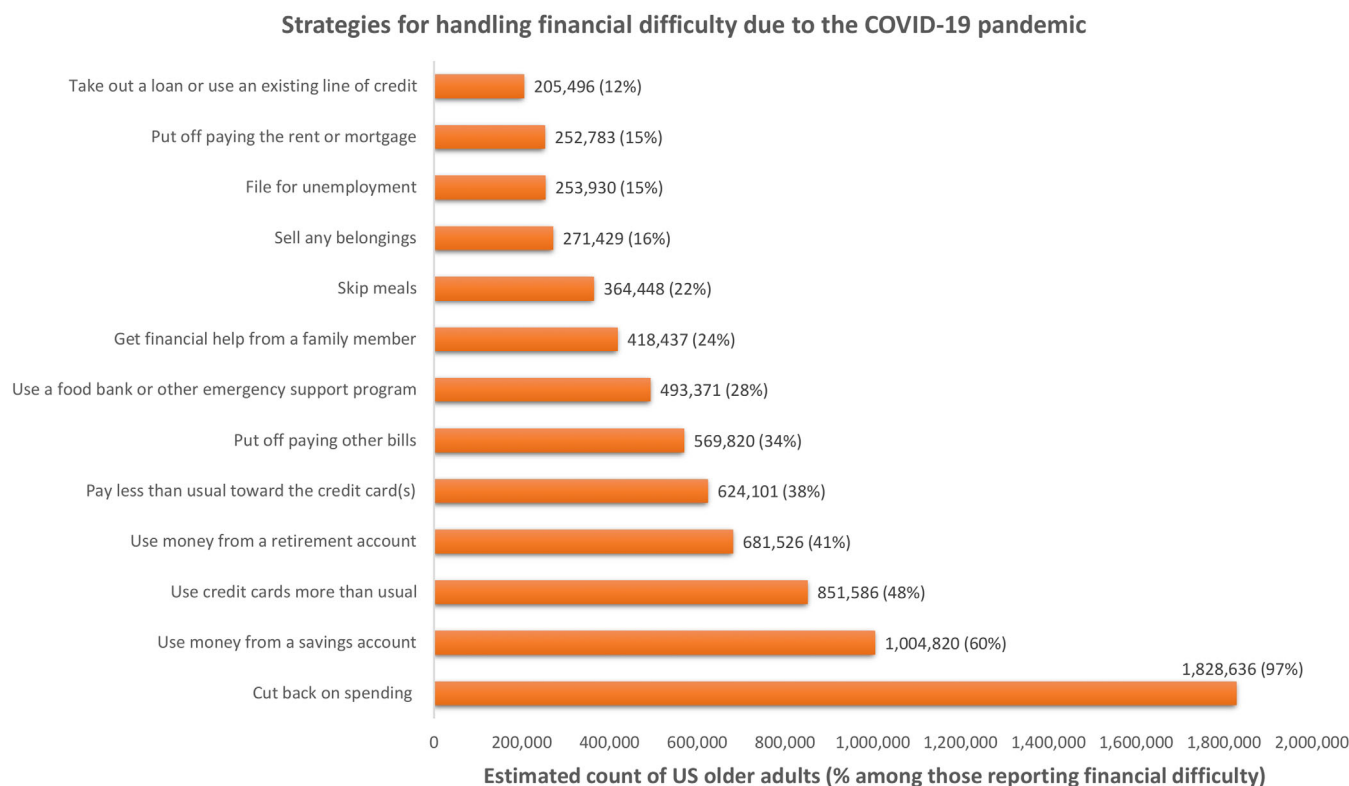

FIGURE 1 Strategies used to handle financial difficulty due to the COVID-19 pandemic by National Health and Aging Trends Study participants who reported experiencing financial difficulty due to the pandemic ($n = 175$). Sampling weights were applied so that inferences can be drawn to the 2020 population of US adults aged 70 and older. Values represent US population counts and percentages

TABLE 1 Selected sample characteristics from 2019 before the COVID-19 pandemic based on income decline during the COVID-19 pandemic among National Health and Aging Trends Study participants ($n = 3257$)

	Income decline during COVID-19		Standardized mean difference	
	No	Yes	Unweighted	Propensity score weighted
Overall sample (%)	2972 (92)	214 (8)		0.07
Financial difficulty due to COVID-19 (%)			N/A	N/A
No (ref.)	2728 (96)	135 (4)		
Yes	105 (67)	68 (33)		
Age (%)			−0.38	0.003
65–74 (ref.)	645 (89)	79 (11)		
75–79	819 (91)	73 (9)		
80–84	681 (95)	37 (5)		
≥85	827 (97)	25 (3)		
Gender (%)			0.03	−0.0008
Male (ref.)	1246 (92)	95 (8)		
Female	1726 (92)	119 (8)		
Race/ethnicity (%)				
White (ref.)	2267 (92)	157 (8)	0.05	−0.006
Black	487 (91)	40 (9)	0.02	0.008
Other	58 (91)	6 (9)	0.02	−0.0001
Hispanic	122 (95)	8 (5)	−0.16	−0.0004
Mean income to poverty ratio mean (SE)	4.14 (0.15)	5.38 (0.49)	0.24	−0.001
Mean income, in US $ (SE)	63,262 (2307)	83,005 (7496)	N/A	N/A
Educational achievement (%)			0.52	−0.007
<High school (ref.)	448 (98)	10 (2)		
High school	767 (95)	37 (5)		
Some college	810 (91)	69 (9)		
Bachelors or higher	912 (88)	95 (12)		
Mean financial strain (SE)	0.06 (0.01)	0.19 (0.06)	0.27	0.001
Homeownership (%)			−0.17	0.005
Rent (ref.)	792 (93)	53 (7)		
Own with mortgage	583 (86)	79 (14)		
Own without payments	1566 (95)	77 (5)		
Retirement status (%)			−0.20	−0.0002
No (ref.)	2443 (91)	195 (9)		
Yes	323 (96)	13 (4)		
Professional occupation (%)			0.29	−0.003
No (ref.)	1812 (94)	97 (6)		
Yes	1148 (89)	117 (11)		
Mean household size (SE)	1.97 (0.03)	2.01 (0.08)	0.05	0.003
Marital status (%)				
Married/partnered (ref.)	1448 (91)	116 (9)	0.06	−0.001
Separated/divorced	402 (91)	32 (9)	0.03	−0.0009
Widowed	1024 (93)	58 (7)	−0.13	0.004
Never married	96 (88)	8 (12)	0.09	−0.003

TABLE 1 (Continued)

	Income decline during COVID-19		Standardized mean difference	
	No	Yes	Unweighted	Propensity score weighted
Mean BMI, in kg/m² (SE)	28.21 (0.14)	28.68 (0.64)	0.09	0.0004
Mean chronic conditions (SE)	1.57 (0.03)	1.37 (0.08)	−0.17	−0.001
Self-rated health (%)			0.29	−0.005
Poor (ref.)	98 (93)	7 (7)		
Fair	546 (97)	18 (4)		
Good	1080 (92)	81 (8)		
Very good	954 (90)	75 (10)		
Excellent	290 (89)	33 (11)		
Depressive symptoms[a] (%)			−0.07	−0.0007
No (ref.)	2688 (92)	193 (8)		
Yes	284 (94)	21 (6)		
Anxiety symptoms[b] (%)			−0.04	0.002
No (ref.)	2727 (92)	195 (8)		
Yes	225 (93)	18 (7)		
Mean walking speed, in m/s (SE)	0.75 (0.01)	0.84 (0.02)	0.29	−0.002
Mean sleep quality score (SE)	7.24 (0.05)	7.49 (0.20)	0.14	0.0007
Isolation (%)				
Not isolated (ref.)	96 (94)	4 (6)	−0.07	0.0005
Socially isolated	432 (96)	18 (4)	−0.27	0.009
Severely socially isolated	2335 (91)	188 (9)	0.28	−0.008

Note: Descriptive statistics calculated before multiple imputation, applying sampling weights so that inferences can be drawn to 2020 population of US adults aged 70 and older. Standardized mean differences were calculated after multiple imputation.
[a]Based on PHQ-2 score ≥3.
[b]Based on GAD-2 score ≥3.

four-point Likert scales, resulting in scores ranging from one to four. Sleep quality during the COVID-19 outbreak was rated as poor (reference), fair or good. The frequency of feeling lonely during the outbreak, feeling like they could get time to themselves during the outbreak, and hopeful during the COVID-19 outbreak were classified as rarely or never (reference), some days, most days, and every day. Outcomes had low to moderate correlation (pairwise Spearman correlations ranged from 0.07 to 0.41), indicating that outcomes are related, but distinct.

Key predictors

Pandemic-related financial challenge measures from the COVID-19 survey included income decline during COVID-19 and financial difficulty due to the COVID-19 pandemic. Participants reported if their monthly income increased/stayed the same or declined "compared to a

typical month before the COVID-19 outbreak started," and whether their household had "any financial difficulty because of the COVID-19 outbreak" (yes/no). A third variable generated among those reporting financial difficulty due to COVID-19 was a count of up to 13 strategies that were needed to manage financial difficulty, which are listed in Figure 1.

Demographic/health covariates

Other potentially confounding variables measured before COVID-19 during one of the annual NHATS interviews between 2015 and 2019 included demographic, socioeconomic, household, and health characteristics. Demographic characteristics included age, gender, and race/ethnicity (white (reference), black, other race, and Hispanic). Socioeconomic characteristics included education (<high school, high school, some college, and ≥ Bachelor's

TABLE 2 Selected sample characteristics from 2019 before the COVID-19 pandemic based on financial difficulty due to COVID-19 among National Health and Aging Trends Study participants (*n* = 3257)

	Financial difficulty due to COVID-19		Standardized mean difference	
	No	**Yes**	**Unweighted**	**Propensity score weighted**
Overall sample (%)	2933 (94)	181 (6)		0.05
Income decline during COVID-19 (%)			N/A	N/A
No (ref.)	2783 (94)	109 (6)		
Yes	138 (57)	70 (43)		
Age (%)			−0.32	0.01
65–74 (ref.)	658 (92)	55 (8)		
75–79	821 (93)	57 (7)		
80–84	657 (95)	41 (5)		
≥85	797 (97)	28 (3)		
Gender (%)			0.13	−0.004
Male (ref.)	1258 (95)	64 (5)		
Female	1675 (93)	117 (7)		
Race/ethnicity (%)				
White (ref.)	2288 (95)	98 (5)	−0.37	−0.004
Black	441 (86)	64 (14)	0.21	0.009
Other	57 (93)	5 (7)	−0.02	−0.002
Hispanic	106 86)	13 (14)	0.36	−0.003
Mean income to poverty ratio mean (SE)	4.40 (0.17)	2.83 (0.30)	−0.45	−0.004
Mean income, in US $ (SE)	67,193 (2669)	44,617 (4587)	N/A	N/A
Educational achievement (%)			−0.16	−0.003
<High school (ref.)	394 (91)	34 (9)		
High school	744 (95)	42 (5)		
Some college	805 (92)	60 (8)		
Bachelors or higher	953 (95)	43 (5)		
Mean financial strain (SE)	0.05 (0.01)	0.48 (0.10)	0.63	0.003
Homeownership (%)			−0.26	−0.0009
Rent (ref.)	744 (92)	67 (8)		
Own with mortgage	594 (90)	51 (10)		
Own without payments	1561 (96)	61 (4)		
Retirement status (%)			−0.10	−0.003
No (ref.)	2423 (93)	161 (7)		
Yes	307 (95)	18 (5)		
Professional occupation (%)			−0.05	−0.005
No (ref.)	1739 (93)	118 (7)		
Yes	1184 (94)	62 (6)		
Mean household size (SE)	1.94 (0.02)	2.25 (0.18)	0.26	0.0004
Marital status (%)				
Married/partnered (ref.)	1473 (95)	74 (5)	−0.14	−0.002
Separated/divorced	374 (90)	45 (10)	0.20	−0.004
Widowed	987 (94)	55 (6)	−0.05	0.007
Never married	97 (90)	7 (10)	0.10	−0.001

TABLE 2 (Continued)

	Financial difficulty due to COVID-19		Standardized mean difference	
	No	Yes	Unweighted	Propensity score weighted
Mean BMI, in kg/m^2 (SE)	28.07 (0.14)	30.48 (0.76)	0.38	−0.002
Mean chronic conditions (SE)	1.53 (0.02)	1.74 (0.11)	0.17	−0.004
Self-rated health (%)			−0.20	0.0002
Poor (ref.)	82 (87)	12 (13)		
Fair	495 (91)	45 (9)		
Good	1083 (95)	59 (5)		
Very good	963 (94)	50 (6)		
Excellent	306 (94)	15 (6)		
Depressive symptoms[a] (%)			0.11	−0.003
No (ref.)	2664 (94)	157 (6)		
Yes	269 (92)	24 (8)		
Anxiety symptoms[b] (%)			0.26	0.003
No (ref.)	2703 (94)	155 (6)		
Yes	209 (88)	26 (12)		
Mean walking speed, in m/s (SE)	0.76 (0.01)	0.73 (0.02)	−0.14	−0.0006
Mean sleep quality score (SE)	7.27 (0.06)	7.19 (0.23)	−0.05	0.003
Isolation (%)				
Not isolated (ref.)	94 (93)	6 (7)	0.03	−0.002
Socially isolated	414 (92)	27 (8)	0.10	0.009
Severely socially isolated	2318 (94)	144 (6)	−0.10	−0.008

Note: Descriptive statistics calculated before multiple imputation, applying sampling weights so that inferences can be drawn to 2020 population of US adults aged 70 and older. Standardized mean differences were calculated after multiple imputation.
[a]Based on PHQ-2 score ≥3.
[b]Based on GAD-2 score ≥3.

degree), homeownership (rent (reference), own with mortgage, own without payments), retirement status (no/yes), professional occupation (based on longest occupation held using the U.S. Census classification), income to poverty ratio (ratio of 2019 household income to the relevant U.S. Census Bureau poverty threshold for individuals aged ≥65 years based on household size), and financial strain. Financial strain scores were a count of up to four items for which participants lacked enough money, including rent/mortgage, utility bills, medical/prescription bills, or food. Household characteristics included household size and marital status (married/partnered (reference), separated/divorced, widowed, never married). Although the outcomes measured in the COVID-19 survey were not also measured in the annual NHATS interview, these analyses accounted for multiple health and well-being characteristics measured in 2019 before the pandemic. Health characteristics included body mass index (BMI) based on self-reported height and weight, self-rated health (poor (reference), fair, good, very good, and excellent), three-meter usual walking speed test based on the average of two walking test trials, and chronic conditions, which was a count of the following prior diagnoses: arthritis, heart disease or heart attack, cancer that was not skin cancer, diabetes, lung disease, dementia or Alzheimer's, a stroke, a fractured hip, or other serious illness. Mental health and well-being characteristics measured before the pandemic included presence of depressive symptoms (PHQ-2 score ≥3),[29] presence of anxiety symptoms (GAD-2 score ≥3),[30] social isolation,[31] and sleep quality, based on frequency of needing >30 min to fall asleep and trouble falling back asleep.

Analyses

Two data management steps were taken before testing the hypotheses. First, multiple imputation with chained equations was employed with 10 replications to address missing data whenever imputation was supported by the

TABLE 3 Associations between income decline during COVID-19, financial difficulty due to COVID-19, and among those with financial difficulty, the number of strategies needed to manage it, with mental health and well-being outcomes during the COVID-19 pandemic among National Health and Aging Trends Study participants

	Income decline during COVID-19[a]	n	Financial difficulty due to COVID-19[a]	n	Number of strategies needed to manage financial difficulty due to COVID-19[b]	n
Mental health related to COVID-19[c] Coefficient (SE), p value	−0.159 (0.046), <0.001	3029	−0.381 (0.057), <0.001	3025	−0.070 (0.102), 0.49	175
Sleep quality during COVID-19 OR (95% CI)	**0.63 (0.46, 0.86)**	3026	**0.42 (0.30, 0.58)**	3023	**0.59 (0.37, 0.93)**	175
Lonely during COVID-19 OR (95% CI)	**1.53 (1.16, 2.02)**	3025	**2.72 (1.96, 3.77)**	3021	1.50 (0.92, 2.45)	175
Having time to yourself during COVID-19 OR (95% CI)	**0.54 (0.40, 0.72)**	3024	**0.37 (0.27, 0.51)**	3021	0.54 (0.26, 1.14)	175
Hopefulness during COVID-19 OR (95% CI)	0.91 (0.70, 1.19)	3021	0.76 (0.58, 1.01)	3017	1.49 (0.73, 3.07)	175

Note: Sampling weights were applied to all analyses so that inferences can be drawn to 2020 population of US adults aged 70 and older. Mental health related to COVID-19 was based on not feeling worried/anxious or sad/depressed about the COVID-19 outbreak, and symptoms of post-traumatic stress disorder (PTSD), including not having recurring thoughts or nightmares about the outbreak, not avoiding activities or thoughts/feelings about the outbreak, and not feeling jumpy/easily startled or feeling on guard during the outbreak (Cronbach α = 0.85, a measure of internal reliability).[28] Responses were averaged across eight items that had four-point Likert scales, resulting in scores ranging from one to four. Sleep quality during the COVID-19 outbreak was rated as poor (reference), fair, or good. The frequency of feeling lonely during the outbreak, feeling like they could get time to themselves during the outbreak, and hopeful during the COVID-19 outbreak were classified as rarely or never (reference), some days, most days, and every day. Logistic regression was used for all outcomes except that mental health related to COVID-19 was examined using linear regression. All models adjusted for age, gender, race/ethnicity, and 2019 values for income to poverty ratio, financial strain, retirement status, BMI, chronic conditions, self-rated health, presence of depressive symptoms, presence of anxiety symptoms, walking speed, sleep quality, and social isolation. Bold font indicates statistically significant results at p < 0.05.
[a]Additionally applied propensity score weights to produce doubly robust estimates of the average treatment effect. In addition to the variables listed above for the adjusted models, the propensity score model included education, professional occupation, homeownership, household size, and marital status.
[b]Among the 175 NHATS participants who experienced financial difficulty due to the COVID-19 pandemic. Participants were asked whether they used each of 13 different strategies to manage the difficulty.
[c]Scores ranged from one to four based on responses to eight items.

data. Imputation used available information from all potentially confounding variables, including 2017, 2018, and 2019 values for demographic, socioeconomic, household, and health characteristics. Second, this study used propensity score weighted models to estimate average treatment effects[32] separately for income decline during COVID-19 and financial difficulty due to COVID-19. Propensity score methods are used to improve balance by comparing the exposed and unexposed groups in observational studies so that the average treatment effect can be estimated by comparing two that are conditionally similar with regard to measured background characteristics.[33] Propensity scores were estimated using the covariate balancing propensity score method, which allows optimization of the covariate balance simultaneously with the specification of the propensity score model.[34] Propensity score models used all potentially confounding variables listed above to estimate the probability of either income decline during COVID-19 or financial difficulty due to COVID-19. Covariate balance across groups was considered to have been achieved if the standardized mean

difference comparing those with and without the respective financial challenge was <0.1.[33] Propensity scores were used to calculate the inverse probability of treatment weights.

After these steps were completed, hypothesized associations were tested with ordered logistic regressions except that linear regression was used for mental health related to COVID-19. Income decline during COVID-19 and financial difficulty due to COVID-19 were examined in separate propensity score weighted models. Additional models tested hypothesized associations between the number of strategies needed to manage financial difficulty with outcomes among those who reported experiencing financial difficulty due to COVID-19. All models adjusted for participant characteristics measured before the pandemic, including age, gender, race/ethnicity, education, occupation, and 2019 values for income to poverty ratio, financial strain, homeownership, retirement status, household size, marital status, BMI, chronic conditions, self-rated health, presence of depressive or anxiety symptoms, sleep quality, and social isolation.

FIGURE 2 Adjusted coefficient estimates with 95% confidence intervals of the associations between income decline during COVID-19 and financial difficulty due to COVID-19 with mental health and well-being outcomes during the COVID-19 pandemic among National Health and Aging Trends Study participants. Results are also presented in Table 3, except that unexponentiated coefficient values from logistic regression are presented here so that relative comparison can be made across both outcomes and exposures
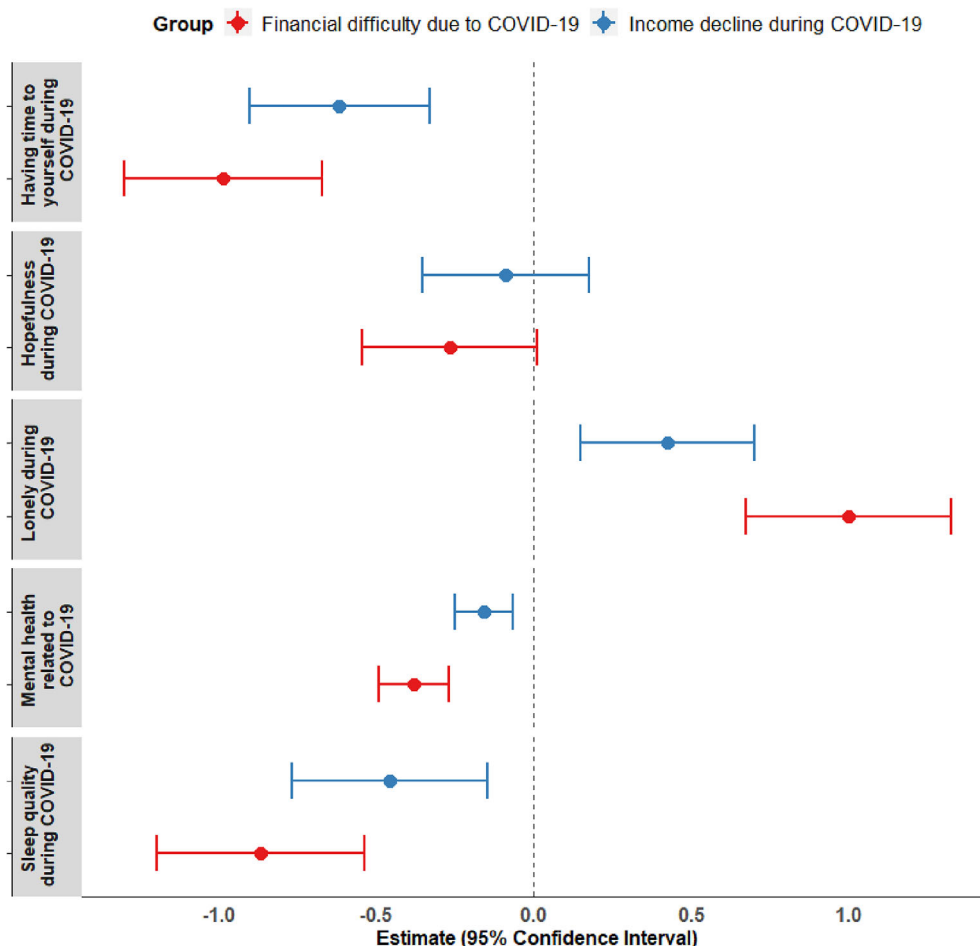
Therefore, models estimating the effects of income decline during COVID-19 and financial difficulty due to COVID-19 produced doubly robust effect estimates by accounting for all individual characteristics in both the propensity score model and the outcome model. All models applied sampling weights to account for study design and non-response so that inferences could be drawn to the US population of adults aged 70 and older in 2020. Since the effect of pandemic-related financial challenges may differ based on individual characteristics before the pandemic,[15] interactions between 2019 financial strain, black race, Hispanic ethnicity, and gender were tested with income decline and financial difficulty for each outcome. Since the mental health related to COVID-19 measure has not been used in prior studies, a sensitivity analysis separately examined feelings of anxiety, depression, and PTSD.

RESULTS

Approximately 8% (population estimate 2,639,962) of US older adults reported income decline during COVID-19 (Table 1), 6% (2,011,471) reported financial difficulty due to COVID-19 (Table 2), and 3% experienced both financial challenges. Income decline and financial difficulty were both more common among those who were black (9% and 14%, respectively) rather than white (8% and 5%, respectively), and among those with more financial strain (mean financial strain scores were 0.19 versus 0.06 among those with and without income decline, respectively, and were 0.48 versus 0.05 among those with and without financial difficulty, respectively) (Tables 1 and 2). However, income decline was most common among those with at least a bachelor's level of education (12%) and those with excellent health (11%) (Table 1), whereas financial difficulty was most common among those with less than a high school level of education (9%), or poor health (13%) (Table 2). Total sample characteristics are summarized in Supplemental Table S1.

Among older adults who reported financial difficulty due to COVID-19, many reported using multiple strategies to handle the difficulty (Figure 1). Almost all reported cutting back on spending (97%) and many also reported using savings (60%) or credit cards (48%) to handle the difficulty (Figure 1). Some individuals also compromised basic necessities; 15% put off paying the rent or mortgage, and 22% skipped meals.

In propensity score weighted and adjusted models (Table 3 and Figure 2), older adults whose income declined during COVID-19 had poorer mental health related to COVID-19 (b = −0.1592, $p < 0.001$), had poorer sleep quality (OR = 0.63, 95% CI: 0.46, 0.86), were more lonely (OR = 1.53, 95% CI: 1.16, 2.02), and had less time to themselves (OR = 0.54, 95% CI: 0.40, 0.72) during COVID-19 than their peers without income decline. Compared with older adults without financial difficulty due to COVID-19, older adults who experienced financial difficulty had worse mental health related to COVID-19 (b = −0.3811, $p < 0.001$), had poorer sleep quality (OR = 0.42, 95% CI: 0.30, 0.58), were more lonely (OR = 2.72, 95% CI: 1.96, 3.77), and had less time to themselves (OR = 0.37, 95% CI: 0.27, 0.51) during COVID-19. Neither income decline during COVID-19 nor financial difficulty due to COVID-19 were associated with hopefulness. In adjusted analyses among older adults who experienced financial difficulty due to COVID-19, those who needed more strategies to manage the difficulty had poorer sleep quality (OR = 0.59, 95% CI: 0.37, 0.93) during COVID-19, but did not differ with regard to mental health related to COVID-19, loneliness, time to themselves, or hopefulness during COVID-19. As depicted in Figure 2, coefficients for associations differed across mental health and well-being outcomes and they were relatively larger, but not statistically significantly different, for financial difficulty due to COVID-19 than for income decline. None of the interaction terms described in the analyses section were statistically significant. Sensitivity analyses found that inferences were unchanged when questions about anxiety, depression, and PTSD were analyzed separately (Table S2).

DISCUSSION

This study estimates that 2.6 million older adults experienced an income decline during COVID-19 and 2 million experienced a financial difficulty due to COVID-19. Importantly, both groups had worse mental health related to COVID-19, more loneliness, poorer sleep quality, and were less likely to have time to themselves during the pandemic than their peers without those respective financial challenges. These results shed light on at least two health equity issues related to financial difficulty due to COVID-19. First, individuals in this study who experienced financial difficulty due to COVID-19 were disproportionately individuals who are low income and either black or Hispanic, suggesting that financial difficulty due to COVID-19 may exacerbate long-standing disparities based on income, race, and/or ethnicity. When interpreted based on fundamental cause theory,[16] these results suggest that financial difficulty due to COVID-19 may

represent a novel pathway linking socioeconomic disadvantage and racial/ethnic discrimination to disparities in mental health and well-being. Combined with evidence reviewed earlier of racial and ethnic disparities in COVID-19 incidence and mortality,[14] these results suggest that individuals who are black or Hispanic are doubly disadvantaged with both a greater disease burden and more pandemic-related financial challenges. Second, although many of the strategies reported by older adults in this study may help them handle their current financial difficulty, they may have adverse long-term consequences. As examples, 22% of older adults who had financial difficulty due to COVID-19 reported skipping meals. The rate of food insecurity among older adults increased by 38% to affect an estimated 5.3 million older adults over the two decades before the pandemic[35] and these results suggest that financial difficulty due to COVID-19 likely exacerbated this growing public health problem. This finding is important because food insecurity is linked with numerous negative health outcomes, including more limitations in activities of daily living,[36] poorer self-rated health,[37,38] higher risk of having multiple chronic conditions,[38] nutritional risk,[37] and greater hospital utilization[39] among older adults. As another example, many older adults who faced financial difficulty due to COVID-19 were forced to use retirement savings and increase their credit card debt. Both strategies will increase their ratio of debt to financial assets, which is associated with more depressive symptoms and poorer health.[40]

These results build on those of prior studies examining pandemic-related financial challenges reviewed earlier[9,11,13] and contribute to the literature in three key ways. First, this study describes the prevalence of financial challenges and the characteristics of individuals who experience them among a nationally representative sample of US older adults to better understand these exposures at a population level. Second, these results are consistent with prior studies showing associations between pandemic-related financial challenges with mental health and loneliness and build on those studies by additionally finding associations with sleep quality and time to yourself. Finally, these results are likely more accurate estimates of the association between financial challenges and mental health and well-being than those of prior studies because of the cohort study design and propensity score approach. The use of propensity score weighting allowed this study to better distinguish between the effects of pandemic-related financial challenges from the effects of pre-pandemic exposures than was done in prior studies. Therefore, these results contribute to the literature by demonstrating that financial challenges predict mental health and well-being for older

adults regardless of the individual's pre-pandemic demographic, socioeconomic, household, health, and well-being characteristics.

These results have implications for clinical practice, research, and policy. As reviewed earlier, the outcomes in this study are associated with a higher risk of disability and early mortality,[20–27] suggesting that timely interventions are needed for older adults reporting financial difficulty due to the COVID-19 pandemic and/or income decline during COVID-19. These results suggest that older adults should be screened for pandemic-related financial challenges. Although both types of challenges (income decline and financial difficulty due to COVID-19) were associated with poorer mental health and well-being in this study, it likely is more important to screen for financial difficulty rather than income decline for two reasons. First, associations with income, race, and ethnicity in this study suggest that addressing financial difficulty due to COVID-19 may advance health equity. Second, evidence from prior studies examining chronic financial strain among older adults found it was associated with a higher risk of physical disability, dementia, frailty, and earlier mortality regardless of income level,[6–8,41,42] suggesting that self-report of financial challenges is important for health outcomes. Interventions addressing pandemic-related financial challenges should build on strategies that are already employed by older adults experiencing financial difficulties. As examples, these results show that the vast majority of older adults experiencing financial difficulties have already cut back on expenses and used financial resources available to them. Urgent intervention is needed to support older adults in meeting basic needs, such as providing for food security, rent, and monthly bills. Economic supports that were implemented during the pandemic, such as stimulus checks, expanded access to the Supplemental Nutrition Assistance Program, and eviction moratoriums, may need to be extended over longer periods of time to help low-income households who are experiencing financial challenges during the pandemic. Such intervention may prevent costly and burdensome disability and mortality. This study also found that individuals who reported financial strain before the pandemic were more likely to experience pandemic-related financial challenges, suggesting that interventions to address financial strain across the life course may prevent harm from future unanticipated financial challenges.

Strengths and limitations

This study was limited by measuring several outcomes using single questions and did not measure changes in outcomes over time. This study did not measure total household wealth, although the study did measure both homeownership, which is the main source of wealth for US households,[43] and financial strain, which captures adequacy of income in relation to cost of living. This study is also not able to assess whether or how financial challenges have progressed during 2021 after vaccinations were available in the United States and economic supports such as unemployment benefits or eviction moratoriums were scaled back. However, the study was strengthened by including a nationally representative sample of US older adults and the measurement of a large set of demographic, socioeconomic, and health characteristics before the onset of the COVID-19 pandemic.

CONCLUSIONS

This study found that experiencing either a financial difficulty due to the COVID-19 pandemic or income decline during COVID-19 are associated with worse outcomes, including worse mental health related to COVID-19, poorer sleep quality, more loneliness, and less time to yourself. These results suggest that pandemic-related financial challenges are distinct from other established social determinants of mental health and well-being among older adults. Urgent action is needed to address pandemic-related financial challenges for older adults to improve health outcomes and advance health equity.

CONFLICT OF INTEREST
The authors have no conflicts of interest to declare.

AUTHOR CONTRIBUTIONS
Laura J Samuel was supported by the NIA (K01AG054751). Laura J Samuel conceptualized the research question with input from Melissa Hladek, Thomas KM Cudjoe, Brittany F. Drazich, and Sarah L. Szanton; Laura J Samuel and Pallavi Dwivedi performed data management and analyses and Laura J Samuel, Pallavi Dwivedi, Melissa Hladek, Thomas KM Cudjoe, Brittany F. Drazich, Qiwei Li, and Sarah L. Szanton all contributed to writing the manuscript.

SPONSOR'S ROLE
Although the study sponsor provided guidance on study design, they were not involved in data collection, analyses, the preparation of this manuscript, or the decision to submit this manuscript.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

Table S1 Supporting information.