Investigating the Impact of Job Loss and Decreased Work Hours on Physical and Mental Health Outcomes Among US Adults During the COVID-19 Pandemic

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Objective: To investigate associations between adverse changes in employment status and physical and mental health among US adults (aged 18 years or older) during the COVID-19 pandemic. **Methods:** Data from participants ($N = 2565$) of a national Internet panel (June 2020) were assessed using path analyses to test associations between changes in self-reported employment status and hours worked and physical and mental health outcomes. **Results:** Respondents who lost a job after March 1, 2020 (vs those who did not) reported more than twice the number of mentally unhealthy days. Females and those lacking social support had significantly worse physical and mental health outcomes. Participants in the lowest, pre-pandemic household income groups reported experiencing worse mental health. **Conclusions:** Results demonstrate the importance of providing economic and social support services to US adults experiencing poor mental and physical health during the COVID-19 pandemic.

Keywords: anxiety, COVID-19, depression, mental health, social support, underemployment, unemployment

INVESTIGATING THE IMPACT OF JOB LOSS DURING THE COVID-19 PANDEMIC ON PHYSICAL AND MENTAL HEALTH OUTCOMES AMONG US ADULTS

The significant mental health impacts of the COVID-19 pandemic on individuals living in the United States is becoming more apparent.[1,2] According to one study, among US adults, national estimates of self-reported symptoms of anxiety disorder were approximately three times higher during the pandemic in the second quarter of 2020 compared with the second quarter of 2019 (25.5% vs 8.1%); the prevalence of depressive disorder symptoms was approximately four times higher (24.3% vs 6.5%).[3] Researchers have also demonstrated that the pandemic has exacerbated existing mental health disparities by sociodemographic factors.[1,3] Results from a national survey of US adults fielded from March 10 to 16, 2020 indicate that people who were younger, female, or not married were significantly more likely to experience greater levels of mental distress, while people with higher household incomes or those currently employed were less likely to experience significant mental distress.[1]

To date, limited evidence exists on the mental-health related impact of unemployment (and underemployment) during the current public health crisis and efforts in this area have been called for.[4] Our study addresses these gaps in the literature by exploring how changes in employment status and hours worked resulting from the COVID-19 pandemic have affected people's physical and mental health in the United States. We were guided by multiple theoretical perspectives that support the notion that unemployment and underemployment have a negative impact on physical and mental health.[5–14] We analyzed data from a large, national sample weighted to United States adult population statistics during the first wave of the COVID-19 pandemic, when businesses were shutting down and/or laying off or furloughing workers. We investigated (pre-pandemic) income as a moderator of the association between changes in employment and physical and mental health outcomes and explored whether these changes were differentially experienced by respondents across varying levels of household income. Social support is an important resource that may attenuate the effects of loss-related events,[8] and thus we included this variable in our analysis. We also explored the extent to which sociodemographic variables—including age, gender/sex, race/ethnicity, educational attainment, and marital status—are associated with physical and mental health outcomes. Identifying groups that are disproportionately affected by the COVID-19 pandemic can assist in prioritizing populations for interventions, now and in future public health emergencies.

THEORY DEVELOPMENT

Unemployment

Substantial evidence from systematic reviews and meta-analyses reveals the link between unemployment and adverse mental health outcomes, supporting a possible causal relationship,[5,11,12,14] as well as poorer self-reported functional health and more chronic diseases.[13] Mental health effects of adverse employment changes have been shown to be mediated by both the loss of income and social-psychological supports such as collective purpose, social contact, and social status.[6,9,10,13] Theory also suggests that people are motivated to foster, protect or attain resources, and stress occurs when key resources are threatened to be lost, are actually lost, or new resources are not gained.[15,16]

During the COVID-19 pandemic, communities have suffered as a result of job/economic loss, work and school closures, and inadequate health and safety resources.[17] These effects have translated into a range of emotional disturbances.[1,18] We therefore propose:

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Clinical significance: Study results indicate the need for mental health supportive services for people—including those with lower levels of household income—experiencing adverse changes in employment status during the COVID-19 pandemic. Potential, deleterious effects of longer unemployment duration and worse mental health outcomes for some groups (eg, females) should be assessed.

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Hypothesis 1

Losing a job after March 1, 2020, during the COVID-19 pandemic in the United States, controlling for other factors, will be associated with worse physical and mental health.

Underemployment

Underemployment (defined in part as working less than full-time or at a lower wage than would be expected) has also been shown to have a detrimental effect on mental health.[6,19] Findings from a longitudinal study by Friedland and Price[19] indicate that underemployed (eg, having inadequate wages, hours, or status) compared with adequately employed workers reported lower levels of health and well-being. Dooley et al[6] found in a longitudinal survey of US youth (aged 14–22 years) that underemployment was associated with more depressive symptoms (controlling for prior depression). Research from Australia of a cohort of working people indicates that declines in mental health were associated with decreasing hours of employment.[20] We therefore propose:

Hypothesis 2

Having work hours reduced after March 1, 2020, controlling for other factors, will be associated with worse physical and mental health.

Social Support

People receiving more social support have been reported to have better physical and mental health.[21–23] Social support is an important resource that may attenuate the effects of loss-related events.[8] National survey research from Holingue et al[1] indicates that being separated or divorced, or being never married, during COVID-19 were significantly associated with greater levels of psychological distress. Cao et al[24] report that social support was negatively correlated with anxiety among Chinese college students during the pandemic. Having adequate social support appears to be critical for physical and mental health during public health emergencies and natural disasters.[25,26] Based on this evidence, we propose:

Hypothesis 3

Lack of social support, controlling for other factors, will be associated with more physically and mentally unhealthy days and more depressive and anxiety symptoms.

Income

Research by Weissman et al[27] indicates that people in higher income brackets experience lower rates of serious mental distress. This is consistent with theory suggesting that people with compromised resources are most susceptible to additional resource loss, while those with higher socioeconomic status are more likely to have resource buffers that facilitate coping.[16] Evidence suggests that unemployment is harmful to both health and well-being, in itself and because it results in the loss of income.[28] Furthermore, unemployment has been shown to contribute to significantly poorer mental health among groups with low (previous) wages.[29] It has been posited that being in a socially disadvantaged position is by itself a risk factor for mental distress, amplifying the negative impact of unemployment on mental health.[29] During the COVID-19 pandemic, research indicates that higher household income and being employed are protective against mental distress.[1] These results are partially supported by McGinty et al,[30] who found that US adults ($N = 1468$) with household income of less than $35,000 annually had among the highest prevalence rates of psychological distress (19.3%; [95% CI, 14.2% to 25.6%]) in April 2020 of the pandemic compared with the other subgroups included in the analysis. Given that unexpected household income reduction causes distress for individuals, job loss and wage cuts on the scale occurring during the pandemic are of substantial concern for public health.[31] Therefore, we propose:

Hypothesis 4

The association between losing a job after March 1, 2020, and poor mental health will be dependent upon household income. We also hypothesize that these associations will be the same or similar to those revealed for respondents having had their work hours reduced.

Previous evidence demonstrates that the following socio-demographic variables are associated with mental health outcomes and thus were included in our analytical models:

Age

Prior studies indicate that among adults, mental health improves and physical health declines as individuals age.[32,33] A recent US study reports elevated rates of psychological distress among adults (in April 2020, compared with National Health Interview Survey data from 2018), with the relative increase being the greatest among young adults aged 18 to 29 years (24.0% [95% CI, 16.3% to 33.8%]) compared with other subgroups examined.[30] Analyses using a large sample ($N > 15,000$) from the UK Household Longitudinal Study panel assessing mental health with the 12-item General Health Questionnaire (GHQ-12) in April 2020 indicated that mean GHQ-12 scores were higher among younger respondents (aged 16 to 24 years: 14.7 [95% CI, 14.1 to 15.3]) than in older ones (aged 70 years or older: 10.9 [95% CI 10.6 to 11.1]).[34] In a representative sample of the Austrian population 4 weeks after a national lock-down due to COVID-19, Pieh et al[35] report that adults (aged 65 years or older) in their sample were demonstrating better mental health outcomes than younger adults (aged 18 to 24 years). These results are supported by those from a national survey conducted during the beginning of the COVID-19 pandemic in the United States reporting that older (vs younger) adults scored lower on measures of both depression and anxiety.[36]

Gender/Sex

In the United States, extensive evidence indicates that more depressive symptoms are commonly reported among females than males.[27,37] Holingue et al[1] also demonstrate (from results of a national survey fielded in March 2020) that females compared with males are experiencing significantly higher depression and anxiety during the pandemic, results that align with those reported by McGinty et al.[30] The study by Pierce et al[34] described previously, indicates that UK females are among the groups experiencing the greatest increase in poor mental health symptoms during the pandemic. Pieh et al[35] report that females compared with males in Austria during COVID-19 had statistically significant increased mean scores for symptoms of depression (PHQ-9) and anxiety (GAD-7).

Race/Ethnicity

Being a member of a racial or ethnic minority group in the United States has been shown to be associated with social and health inequities, but, paradoxically, with a similar or lower incidence of some negative mental health outcomes.[38–40] However, racial disparities in mental health have also been observed.[41] Racial and ethnic minority group identity and cultural values may foster some behavioral health resilience.[42] However, the COVID-19 pandemic may be contributing to disproportionate, adverse mental health outcomes for racial/ethnic groups.[43] For example, Czeisler et al[3] found that, during the pandemic, poor mental health is being disproportionately experienced by Hispanic persons and non-Hispanic Black persons. Research from McGinty et al[30] reveals Hispanic adults (April 2020) had among the highest prevalence rates of psychological distress (18.3% [95% CI, 11.2% to 28.3%]) compared with other subgroups examined.

Educational Attainment

A national survey of African American adults ($N = 3570$) living in the United States indicates that higher levels of educational

attainment were associated with lower depressive symptoms and psychological distress. Findings from a recent survey of US respondents conducted during the early stages of the COVID-19 pandemic, indicate that people with higher educational attainment experienced a greater increase in depressive symptoms compared with those with lower education levels.[2] Conversely, Donnelly and Farina[31] report in an analysis of a large national dataset (more than 580,000 respondents, April to July 2020) that the odds for depression were higher among respondents with lower (vs higher) levels of education.

METHOD

Participants and Procedure

Data were collected by Porter Novelli Services for their SummerStyles survey[44] fielded from June 10 through June 25, 2020 via an online panel weighted to US adult population statistics from the 2019 U.S. Current Population Survey.[45] Porter Novelli adheres to professional standards and codes of conduct set forth by the Insights Association [https://www.insightsassociation.org/issues-policies/ insights-association-code-standards-and-ethics-market-research-and-data-analytics-0]). Panel members were randomly recruited by mail using probability-based sampling by address from a pool of approximately 60,000 eligible respondents. Participants earned cash-equivalent reward points (worth approximately $10). The survey was sent to 6463 households and non-responders received up to three email reminders. Survey completion times were approximately 38 minutes (median). Surveys with fewer than half of the questions completed or those that were completed within 5 minutes were removed from the dataset ($n = 5$). A total of 4053 adults met the inclusion criteria and completed the survey for a response rate of 62.7%.

Survey proportions weight for sex (male/female), age (18 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, 65+), pre-pandemic household income (21 categories, range [less than $5000, less than or equal to $250,000]), race/ethnicity (White, Non-Hispanic persons; Black, Non-Hispanic persons; all other races, Non-Hispanic persons; more than one race, Non-Hispanic persons; Hispanic/Latino persons), household size (one, two, three, four, more than or equal to five), educational attainment (less than high school; high school; some college; Bachelor's degree and higher) census region (Northeast, Midwest, South, West), and metro status (as defined by the US Office of Management and Budget [OMB] Core-Based Statistical Areas) (Non-metro, Metro).

Measures

Physical and Mental Health Outcome Variables

The outcomes of interest include two items from the U.S. Centers for Disease Control and Prevention (CDC) Healthy Days measures,[33,46,47] which have previously demonstrated content, construct, and criterion validity.[48] For physically unhealthy days, respondents assess how many days during the past 30 days their physical health was not good. For mentally unhealthy days, respondents assess how many days during the past 30 days their mental health—which includes stress, depression, and problems with emotions—was not good.[46] Additional outcome measures include the two-item version of the Patient Health Questionnaire (PHQ-2)[49] and the two-item Generalized Anxiety Disorder scale (GAD-2),[50] both of which have demonstrated high levels of sensitivity and specificity.[49,51] The PHQ-2 is a measure of depressive symptoms and anhedonia and specifically asks about (1) loss of interest and (2) feeling down, depressed, or hopeless, over the past 2 weeks. Response options include: not at all (0); several days (1); more than half the days (2); and nearly every day (3). The GAD-2 measures general anxiety disorders and asks about, (1) feeling nervous, anxious, or on edge, and (2) not being able to stop or control worrying, over the past 2 weeks. Response options are identical to those for the PHQ-2.

Predictor Variables

To assess changes in employment status and hours worked resulting from the pandemic, respondents reported: Since March 1, 2020, did you lose a job, get furloughed, or have your hours or work schedule changed due to public health closures or social distancing measures? (Response choices [check all that apply]: I lost a job; I was temporarily laid off or furloughed; I had my hours reduced; I had my hours increased; I had to work a different schedule; None of these). To assess levels of social support respondents were asked: How often do you get the social and emotional support you need? (Response choices: Always; Usually; Sometimes; Rarely; Never; I don't know how to get what I need).

Sociodemographic Variables

Sociodemographic items assessed include age (in years, as a continuous variable), gender/sex (male/female), race/ethnicity (White, Non-Hispanic; Black, Non-Hispanic; all other races, Non-Hispanic; more than one race, Non-Hispanic; and Hispanic/Latino), educational attainment (Bachelor's, Graduate, or Professional degrees vs < Bachelor's degree), married or living with a partner (yes/no), and pre-pandemic household income (21 categories, range: less than $5000 to more than or equal to $250,000, modeled as a continuous variable).

Statistical Analyses

We used SPSS version 26 (SPSS Inc., Chicago, IL) to compare unadjusted mean scores between physical and mental health outcomes by employment status to determine which categories merited further examination. We tested two path models using full information maximum likelihood estimation with robust standard errors (MLR) in Muthén's & Muthén's Mplus 8.4 software (Muthén and Muthén, Los Angeles, CA). In the analyses, lost a job (model 1) or reduced work hours (model 2) were the independent variables, the four physical and mental health outcomes served as dependent variables, and pre-pandemic household income was a moderator of these associations.[52] Both models included and were adjusted for social support and the sociodemographic variables. We used the Johnson–Neyam technique[53] to determine whether the strength of the association between employment status (lost a job and hours reduced) and the physical and mental health outcomes were significant across all levels of household income.

RESULTS

Participants included 2565 US adults who indicated that they were either employed at the time of the survey or who had lost their job since March 1, 2020 during the COVID-19 pandemic. Table 1 provides demographic and social variable characteristics for the sample population. The average age of respondents was 47.7 years (range: 18 to 94 years).

Evaluation of unadjusted mean scores between physical and mental health outcomes by employment category (Table 2) indicates that having lost a job since March 1, 2020 (at the time the survey was conducted) was significantly associated with poorer mental health outcomes (mentally unhealthy days, $p < 0.05$; PHQ-2, $p < 0.05$; GAD-2; $p < 0.05$), but was not significantly associated with physically unhealthy days. On average, respondents who lost a job reported more than twice the number of mentally unhealthy days compared with those who did not lose a job (5.24 days vs 2.41 days out of the last 30, respectively). Respondents who were temporarily laid off /furloughed after March 1, 2020 (at the time the survey was conducted) had higher unadjusted mean scores across all physical and mental health outcomes compared with those not experiencing

TABLE 1. Descriptive Statistics ($N = 2,565$), Porter Novelli SummerStyles Survey, June 2020

Category	Unweighted No.	Percent (%)
Gender/sex		
Male	1,386	54.0
Female	1,179	46.0
Race/Ethnicity		
White, Non-Hispanic	1,861	72.6
Black, Non-Hispanic	218	8.5
All other races, Non-Hispanic	146	5.7
More than 1 race, Non-Hispanic	77	3.0
Hispanic/Latino	263	10.3
Educational attainment		
<High school graduate	81	3.2
High school graduate	542	21.1
Some college or Associates degree	720	28.1
Bachelor's degree	690	26.9
Graduate or professional degree	532	20.8
Married/living with a partner	1,810	70.5
Employment status*		
Lost job after 3/1/2020	108	4.2
Temporarily laid off/furloughed	317	12.4
Hours reduced	335	13.1
Hours increased	164	6.4
Different schedule	273	10.6
No change	1,502	58.6
Income		
Less than $34,999	287	11.2
$35,000–$74,999	611	23.8
$75,000–$124,999	751	29.3
$125,000–$199,999	620	24.2
$200,000 or more	296	11.5
Social support		
Always	660	25.7
Usually	1,056	41.2
Sometimes	491	19.1
Rarely	191	7.4
Never	167	6.5

*Respondents could select more than one option. Therefore, categories do not sum to 100%.

these changes, but only reached significance on the PHQ-2 ($p < 0.01$). The same pattern was observed for respondents who had to work a different schedule after March 1, 2020.

Similar to respondents losing a job, having reduced work hours was significantly associated with poorer mental health (mentally unhealthy days, $p < 0.01$; PHQ-2, $p < 0.05$; GAD-2, $p < 0.05$), and with poorer physical health (physically unhealthy days, $p < 0.01$). Having hours reduced resulted in poorer physical and mental health than did being laid off or furloughed. Respondents having hours increased had higher unadjusted mean scores across the physical and mental health outcomes compared with those not having hours increased, but only reached significance for GAD-2 scores ($p < 0.05$). Overall, those who reported not having any changes to either employment status, hours worked, or schedule since March 1, 2020, had better physical and mental health compared with respondents' who did experience such changes. Based on the findings presented above and in Table 2 and to investigate our hypotheses, we analyzed separate path models for the ''lost a job'' (model 1) and the ''hours reduced'' (model 2) categories.

Table 3 presents results for model 1 (Table 4 presents the bivariate correlation matrix) indicating that losing a job after March 1, 2020 (reported at the time the survey was conducted in June 2020) was associated with more mentally unhealthy days ($b = 7.06$; standard error [SE] = 2.82; $p = 0.012$), worse depression (PHQ-2; $b = 0.91$; SE = 0.44; $p = 0.038$), and more anxiety (GAD-2; $b = 1.08$; SE = 0.43; $p = 0.013$). These results support Hypothesis 1. The results for model 2 (Table 5) indicate that having work hours reduced was significantly associated with more anxiety (GAD-2; $b = 0.88$; SE = 0.30; $p = 0.003$), providing partial support for Hypothesis 2.

For Model 1 (Table 3), not being able to obtain social support was significantly associated with poorer physical health (physically unhealthy days: $b = 0.57$; SE = 0.11; $p < 0.001$) and mental health (mentally unhealthy days: $b = 1.33$; SE = 0.13; $p < 0.001$; PHQ-2: $b = 0.36$; SE = 0.03; $p < 0.001$; and GAD-2: $b = 0.28$; SE = 0.03; $p < 0.001$). Results for the social support variable in model 2 (Table 5), are nearly identical to those for model 1 (physically unhealthy days [$b = 0.57$; SE = 0.11; $p < 0.001$]; mentally unhealthy days [$b = 1.34$, SE = 0.13; $p < 0.001$]; depression [PHQ-2: $b = 0.36$; SE = 0.03; $p < 0.001$]; and anxiety [GAD-2: $b = 0.28$, SE = 0.03; $p < 0.001$]). These results provide support for Hypothesis 3.

As illustrated by model 1 (Table 3), pre-pandemic household income was significantly associated with physically unhealthy days ($b = -0.11$; SE = 0.03; $p = 0.001$), depression (PHQ-2: $b = -0.03$; SE = 0.01; $p < 0.001$) and anxiety (GAD-2: $b = -0.02$; SE = 0.01; $p = 0.008$), with respondents from lower (vs higher) income households reporting more physically unhealthy days and worse

TABLE 2. Unadjusted Mean Scores for Physical and Mental Health Measures for Employment Categories Assessed Since March 1, 2020, United States (June 10 to 25, 2020)

	Employment Categories											
	Lost a Job		Temporarily Laid Off or Furloughed		Had Hours Reduced		Had Hours Increased		Had to Work a Different Schedule		No Change	
Physical/Mental Health Measure	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Physically unhealthy days‡	1.46	1.79	1.47	1.53	1.39	2.08*	1.43	2.11	1.45	1.70	1.84	1.23†
Mentally unhealthy days‡	2.41	5.24†	2.48	2.84	2.41	3.27*	2.47	3.27	2.49	2.79	3.11	2.12†
PHQ-2§	0.79	1.27†	0.79	0.95*	0.78	1.03†	0.80	0.94	0.79	0.97*	0.99	0.68†
GAD-2¶	0.86	1.44†	0.87	0.98	0.84	1.19†	0.86	1.17†	0.87	0.98	1.09	0.74†

*Significantly different ($p < 0.01$) than those who did not experience each related job change.
†Significantly different ($p < 0.05$) than those who did not experience each related job change.
‡Mean number of self-reported physically and mentally unhealthy days experienced over the past 30 days.[46]
§2-item version of the Patient Health Questionnaire.[49] Response options include not at all (0), several days (1), more than half the days (2), and nearly every day (3).
¶2-item Generalized Anxiety Disorder scale.[50] Response options include not at all (0), several days (1), more than half the days (2), and nearly every day (3).

TABLE 3. Associations Between Losing a Job After of March 1, 2020, Demographic and Social Predictors, and Physical and Mental Health Outcomes During the COVID-19 Pandemic, United States ($N = 2565$), June 10 to 25, 2020

	Physically Unhealthy Days			Mentally Unhealthy Days			PHQ-2			GAD-2		
	b	SE	*p*	*b*	SE	*p*	*b*	SE	*p*	*b*	SE	*p*
Age	**0.02**	**0.01**	**0.010**	**−0.05**	**0.01**	**<0.001**	**−0.01**	**0.00**	**<0.001**	**−0.02**	**0.00**	**<0.001**
Female	**0.65**	**0.21**	**0.002**	**1.28**	**0.23**	**<0.001**	**0.17**	**0.05**	**<0.001**	**0.36**	**0.05**	**<0.001**
Black, Non-Hispanic	0.80	0.48	0.095	−0.19	0.44	0.671	−0.06	0.09	0.526	−0.04	0.09	0.700
All other races, Non-Hispanic	−0.35	0.32	0.266	−0.60	0.46	0.191	0.14	0.10	0.169	−0.01	0.10	0.929
Hispanic/Latino	**−0.58**	**0.25**	**0.019**	**−0.71**	**0.36**	**0.047**	0.03	0.09	0.717	0.08	0.09	0.396
More than 1 race, Non-Hispanic	0.90	0.81	0.267	0.70	0.74	0.348	0.17	0.17	0.319	0.16	0.17	0.335
College graduate	−0.01	0.21	0.980	−0.30	0.25	0.218	0.01	0.05	0.849	0.03	0.05	0.526
Married/Live with a partner	0.12	0.25	0.638	−0.24	0.28	0.391	−0.05	0.06	0.461	0.00	0.06	0.952
Lost job	1.30	1.77	0.463	**7.06**	**2.82**	**0.012**	**0.91**	**0.44**	**0.038**	**1.08**	**0.43**	**0.013**
Social support needed	**0.57**	**0.11**	**<0.001**	**1.33**	**0.13**	**<0.001**	**0.36**	**0.03**	**<0.001**	**0.28**	**0.03**	**<0.001**
Household income (before COVID-19)	**−0.11**	**0.03**	**0.001**	−0.06	0.03	0.087	**−0.03**	**0.01**	**<0.001**	**−0.02**	**0.01**	**0.008**
Lost job X Income	−0.08	0.10	0.421	**−0.36**	**0.17**	**0.037**	−0.05	0.03	0.097	−0.05	0.03	0.064
R^2	**0.040**	**0.01**	**<0.001**	**0.114**	**0.01**	**<0.001**	**0.144**	**0.01**	**<0.001**	**0.124**	**0.01**	**<0.001**

GAD-2, Generalized Anxiety Disorder scale; PHQ-2, Patient Health Questionnaire.

depression and anxiety. A significant interaction effect was observed between pre-pandemic household income and "lost a job" for mentally unhealthy days ($b = -0.36$; SE = 0.17; $p = 0.037$), indicating that having lost a job after March 1, 2020 (at the time the study was conducted) and having more mentally unhealthy days was moderated by the respondents' household income. These results provide partial support for Hypothesis 4. To further investigate this interaction, we explored whether there were differential effects between having lost a job and mentally unhealthy days for each of the 21 income categories (range: less than $5000 to more than or equal to $250,000). This analysis revealed that the strength of the association between losing a job and a higher number of mentally unhealthy days was dependent upon household income. Respondents in the lowest income groups experienced the strongest associations between losing a job and mentally unhealthy days, up to a household income of $100,000 ($b = 1.70$; SE = 0.76; $p = 0.024$), after which this association is no longer significant (see Fig. 1).

Although the overall interactions did not reach significance for the other mental health outcomes, at the lower income levels, significant effects were found between those who lost a job and PHQ-2 and GAD-2. For PHQ-2, individuals in the lowest income groups experienced the strongest associations between "lost a job" and worse symptoms of depression, up to a household income of $85,000 ($b = 0.28$; SE = 0.13; $p = 0.028$), when this association is no longer significant. As illustrated in Fig. 1, for those who lost a job, the associations with worse anxiety symptoms were significant for levels of household income up to $125,000 ($b = 0.28$; SE = 0.14; $p = 0.043$).

For model 2, having work hours reduced (results presented in Table 5), pre-pandemic household income was significantly associated with physically unhealthy days ($b = -0.10$; SE = 0.03; $p = 0.002$), and depression (PHQ-2: $b = -0.03$; SE = 0.01; $p = 0.001$), and approached significance for mentally unhealthy days ($b = -0.07$; SE = 0.04; $p = 0.052$). These findings indicate that respondents who had their hours reduced from lower income households reported more physically unhealthy days and worse depression. We found a significant interaction between "hours reduced" and income for GAD-2 ($b = -0.05$; SE = 0.02; $p = 0.019$), providing partial support for Hypothesis 4. When probing the interaction further, findings indicate that the associations between reduced work hours and GAD-2 were significant across the levels of household income up to $100,000 $b = 0.19$; SE = 0.07; $p = 0.008$).

Increased age (model 1, results presented in Table 3) was significantly associated with more physically unhealthy days ($b = 0.02$; SE = 0.01; $p = 0.010$) but better mental health (mentally unhealthy days: $b = -0.05$; SE = 0.01; $p \leq 0.001$); PHQ-2: $b = -0.01$; SE < 0.001; $p < 0.001$; GAD-2: $b = -0.02$; SE < 0.001; $p < 0.001$). The results for the age variable in model 2 (Table 5) were nearly identical to those reported for model 1.

Being female (model 1) was significantly associated with more physically unhealthy days ($b = 0.65$; SE = 0.21; $p = 0.002$), more mentally unhealthy days ($b = 1.28$; SE = 0.23; $p < 0.001$) and worse depressive and anxiety symptoms (PHQ-2: $b = 0.17$; SE = 0.05; $p < 0.001$; GAD-2: $b = 0.36$; SE = 0.05; $p < 0.001$). The results for the gender/sex variable in model 2 were nearly identical to those reported for model 1, with females having worse outcomes across all measures.

Hispanic compared with non-Hispanic White participants had significantly fewer physically unhealthy days ($b = -0.58$; SE = 0.25; $p = 0.019$) and mentally unhealthy days ($b = -0.71$; SE = 0.36; $p = 0.047$) (see model 1). When considering the effects by race/ethnicity in model 2, the only significant association was for Hispanic (compared with non-Hispanic White) participants having significantly fewer physically unhealthy days ($b = -0.60$; SE = 0.25; $p = 0.015$).

Educational attainment or being married or living with a partner were not significantly associated with any of the physical or mental health outcomes assessed in either model.

DISCUSSION

Recent research demonstrates that the COVID-19 pandemic has negatively affected people's, including workers',[54] health and well-being.[1–3,17,26,30,34] Losing a job or having work hours reduced can further exacerbate the negative impacts of this public health crisis.[55] In the current study, respondents who reported losing a job had more than twice the number of mentally unhealthy days (over the previous 30 days) compared with those who did not lose a job. These findings are consistent with a substantial body of evidence that unemployment and underemployment are detrimental to people's mental health.[5,6,11–13,19,20] Consistent with theory,[9,10] unemployment (or underemployment) during the pandemic may be

TABLE 4. Bivariate Correlations

Days	Physically Unhealthy Days	Mentally Unhealthy Days	PHQ-2	GAD-2	Age	Income	Lost Job	Social Support Needed	Female	Black	All other races, Non-Hispanic	Hispanic/ Latino	More than 1 race, Non-Hispanic	Collage Educated or Greater	Married/ partner
Physically unhealthy days	1														
Mentally unhealthy days	0.42	1													
PHQ-2	0.34	0.69	1												
GAD-2	0.28	0.68	0.72	1											
Age	0.04	−0.13	−0.14	−0.18	1										
Household income (before COVID-19)	−0.12	−0.14	−0.17	−0.14	0.11	1									
Lost job	0.01	0.09	0.07	0.08	−0.04	−0.06	1								
Social support needed	0.13	0.27	0.33	0.25	−0.06	−0.14	0.05	1							
Female	0.07	0.11	0.07	0.14	−0.03	−0.1	−0.02	−0.03	1						
Black, Non-Hispanic	0.06	0.02	0.01	0.01	−0.01	−0.13	0.04	0.01	0.03	1					
All other races, Non-Hispanic	−0.02	−0.01	0.03	0.01	−0.04	0.05	0.03	0.04	−0.04	−0.08	1				
Hispanic/Latino	−0.03	0	0.04	0.05	−0.09	−0.05	0.05	0.06	−0.02	−0.1	−0.08	1			
More than 1 race, Non-Hispanic	0.04	0.04	0.04	0.04	−0.03	−0.02	−0.01	0.04	0.03	−0.05	−0.04	−0.06	1		
College educated or greater	−0.06	−0.08	−0.07	−0.05	−0.06	0.43	−0.03	−0.12	−0.05	−0.06	0.11	−0.1	−0.02	1	
Married/live with a partner	−0.04	−0.09	−0.1	−0.08	0.09	0.34	−0.05	−0.11	−0.06	−0.11	−0.01	−0.02	−0.02	0.15	1

GAD-2, Generalized Anxiety Disorder scale; PHQ-2, Patient Health Questionnaire.

depriving people of critical supports, potentially contributing to negative mental health outcomes.[17,18,26] Previous research also indicates that longer term unemployment is harmful to subsequent mental health.[13,56] Thus, it will be important to monitor on-going changes in/disruptions to employment among US adults due to the COVID-19 pandemic.[4]

Although respondents who were temporarily laid off or furloughed after March 1, 2020 during the pandemic (at the time the survey was conducted) reported increased levels of anxiety symptoms, overall, these individuals had better physical and mental health outcomes than those who reported losing a job or having hours reduced. A possible explanation may be that those who were laid off or furloughed had the expectation of being rehired, and therefore perceive their non-working status as temporary.[28] These workers may have also received unemployment benefits or compensation that could have mitigated the negative impacts of being laid off or furloughed,[4] and/or they may sense relief at not having to report to a workplace where the risk of virus transmission is potentially increased.

We report that not being able to obtain social support was significantly associated with poorer physical and mental health outcomes, which theory posits is a critical resource that ameliorates the effects of loss-related events, and that not having adequate social support undermines mental health.[6,8,17,22,23,57,58] Cao et al[24] found that social support during the COVID-19 pandemic was negatively correlated with anxiety among Chinese college students. Moreover, results from Holingue et al[1] indicate that being separated or divorced, or being never married, during COVID-19 were significantly associated with greater levels of psychological distress. The American Psychological Association[59] promotes the importance of social support during the COVID-19 pandemic.[26] Broadly speaking, having adequate social support is critical for fostering good physical and mental health during public health emergencies and natural disasters.[25,26]

Findings from the current analyses reveal that the impact of job loss and reduced work hours on mental health outcomes was differentially experienced by respondents at various income levels, with those in the lowest household income groups experiencing worse mental health outcomes during the COVID-19 pandemic. These findings are consistent with research from China[24] demonstrating that having a less stable family income increased the risk of mental distress during the pandemic. Pieh et al[35] reported that people in lower income groups in Austria experienced a higher burden of mental health problems when compared with survey respondents in higher income groups. In the United States, a recent study reports that a higher income was protective against mental distress during the pandemic.[1] As Donnelly and Farina[31] note, experiencing a job loss or a reduction in work hours is a stressful event and high unemployment during the pandemic raises concerns about the mental health of the US public.

Our analyses indicate that increased age was associated with more physically unhealthy days but better mental health, results supported by pre-pandemic research.[32,33] Our findings are consistent with recent US and international studies[1,3,30,34–36] reporting increased prevalence of poor mental health during the pandemic among younger compared with older adults, with poor mental health outcomes decreasing as age increases.

In our study, being female was associated with worse physical and mental health outcomes. These results are consistent with meta-analytic evidence indicating that, broadly speaking, females in the United States experience more depressive symptoms than do males ($d = 0.27$).[37] Our findings are similar to those reported by Pieh et al,[35] where females compared to males during the pandemic had statistically significant increased depression and anxiety symptoms. Research from the United Kingdom[34] demonstrates that being female, being young, and living with preschool-aged children

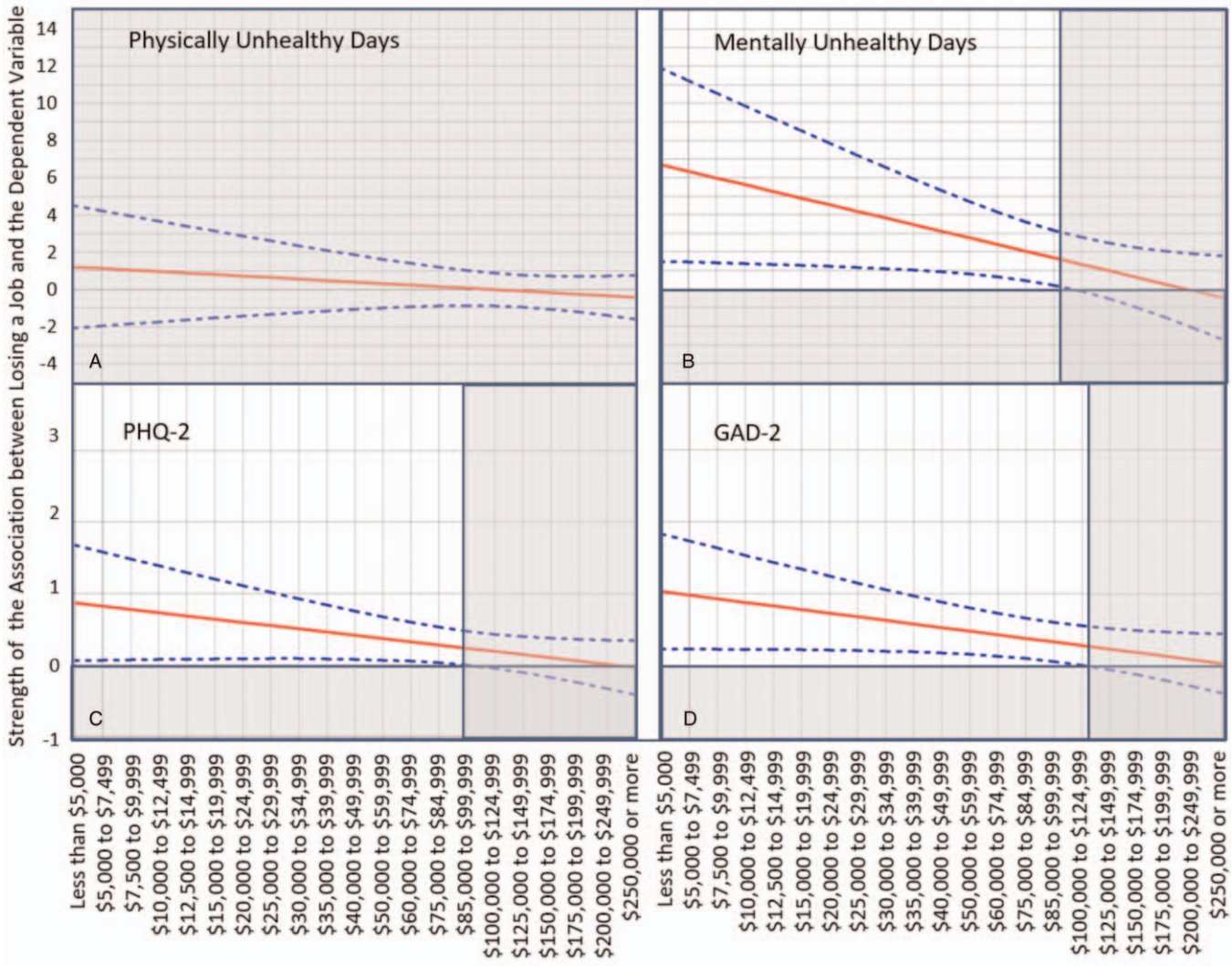

FIGURE 1. Johnson–Neyman plots representing the strength of the association between losing a job and mental and physical health outcomes at different levels of household income.

TABLE 5. Associations Between Having Work Hours Reduced After March 1, 2020, Demographic and Social Predictors, and Physical and Mental Health Outcomes During the COVID-19 Pandemic, United States ($N = 2565$), June 10 to 25, 2020

	Physically Unhealthy Days			Mentally Unhealthy Days			PHQ-2			GAD-2		
	b	*S.E.*	*p*	*b*	*S.E.*	*p*	*b*	*S.E.*	*p*	*b*	*S.E.*	*p*
Age	**0.02**	**0.01**	**0.010**	**−0.05**	**0.01**	**<.001**	**−0.01**	**0.00**	**<.001**	**−0.02**	**0.00**	**<.001**
Female	**0.64**	**0.21**	**0.002**	**1.26**	**0.23**	**<.001**	**0.17**	**0.05**	**0.001**	**0.36**	**0.05**	**<.001**
Black, Non-Hispanic	0.78	0.48	0.105	−0.14	0.45	0.755	−0.06	0.09	0.536	−0.04	0.09	0.696
All other races, Non-Hispanic	−0.35	0.31	0.263	−0.47	0.47	0.315	0.15	0.10	0.131	0.01	0.10	0.948
Hispanic/Latino	**−0.60**	**0.25**	**0.015**	−0.66	0.36	0.067	0.03	0.09	0.712	0.07	0.09	0.415
More than 1 race, Non-Hispanic	0.86	0.81	0.287	0.58	0.74	0.435	0.15	0.17	0.375	0.14	0.17	0.418
College Graduate	0.00	0.20	0.992	−0.26	0.24	0.280	0.01	0.05	0.782	0.04	0.05	0.463
Married/Live with a Partner	0.12	0.25	0.640	−0.26	0.28	0.353	−0.05	0.06	0.422	−0.01	0.06	0.877
Hours Reduced	1.57	1.34	0.240	1.49	1.39	0.286	0.53	0.30	0.079	**0.88**	**0.30**	**0.003**
Social Support Needed	**0.57**	**0.11**	**<.001**	**1.34**	**0.13**	**<.001**	**0.36**	**0.03**	**<.001**	**0.28**	**0.03**	**<.001**
Household income (before COVID-19)	**−0.10**	**0.03**	**0.002**	−0.07	0.04	0.052	**−0.03**	**0.01**	**0.001**	**−0.02**	**0.01**	**0.043**
Hours Reduced X Income	−0.09	0.09	0.321	−0.07	0.09	0.413	−0.03	0.02	0.158	**−0.05**	**0.02**	**0.019**
R^2	**.041**	**0.01**	**<.001**	**0.106**	**0.01**	**<.001**	**.143**	**0.01**	**<.001**	**.126**	**0.01**	**<.001**

GAD-2, Generalized Anxiety Disorder scale; PHQ-2, Patient Health Questionnaire.

during the pandemic, have contributed substantially to increases in mental distress. Holingue et al[1] and McGinty et al[30] report findings from survey research demonstrating that females compared with males in the United States during the pandemic are experiencing increased mental distress. One possible explanation for these reported differences is that females are performing a disproportionate share of household work and childcare.[60] Research is needed to investigate the physical and mental health impacts associated with additional household and family burdens during the COVID-19 pandemic.

The current study demonstrates that Hispanic compared with non-Hispanic White participants had fewer physically unhealthy and fewer mentally unhealthy days, results supported by previous research indicating that racial and ethnic minority group identity and cultural values may foster some behavioral health resilience.[39,40,42,61] However, our results do not align with those reported by Czeisler et al[3] who found that, during the pandemic, poor mental health outcomes are disproportionately affecting Hispanic persons and Black persons. Moreover, McGinty et al[30] found in their analysis of national survey data that Hispanic adults during the pandemic have among the highest prevalence rates of psychological distress compared with other subgroups examined. As Purtle[43] notes, although racial/ethnic minorities (compared with non-Hispanic Whites in the United States) demonstrate lower lifetime prevalence rates of mood and anxiety disorders,[38] specific aspects of the current crisis, including financial insecurity due to a job loss, could have disproportionate, adverse, mental health effects on racial/ethnic minorities and low-income groups.

Findings from the current research indicate that educational attainment, measured as having at least a college degree versus having less than a college degree, was found to have no significant association with increased depressive and anxiety symptoms or more mentally unhealthy days. These results are inconsistent with those reported by Wanberg et al,[2] who report results from their research that people with higher educational attainment experienced a greater increase in depressive symptoms during the early stages of the pandemic, in comparison to those with lower education levels. More research is needed on the association between educational attainment, unemployment, and mental health during the COVID-19 crisis.

Limitations of our study include its cross-sectional design,[34] which does not allow for making causal inferences. Additionally, internet surveys vary in methodology and quality and lower response rates from diverse socioeconomic and racial/ethnic minority groups are common.[62] Future research would benefit from a longitudinal design that measures outcomes at different time points, and a closer examination of sociodemographic and regional differences.

CONCLUSION

The COVID-19 pandemic has substantial implications for individual and collective physical and mental health.[17] The current study contributes to the unemployment/underemployment and public health literature by exploring how changes in employment status and hours worked resulting from the pandemic have affected US adults' physical and mental health. Limited evidence exists on the impacts of unemployment (or underemployment) resulting from the COVID-19 pandemic on mental health and efforts in this area have been called for.[4] Experiencing a job loss or a reduction in work hours is a stressful event and high unemployment during the pandemic raises concerns about the mental health of the US public.[31] Our analyses also address research gaps related to how associations between mental health and un/underemployment vary for respondents of different income levels. The results highlight the need for mental health supportive services for those experiencing changes to their employment status or hours worked due to the pandemic, especially among those with household incomes of less than $100,000. The potential, deleterious effect of longer unemployment duration,[13,53] and indications from this study and that some groups (eg, females, lower income households, and those not being able to obtain social support) are experiencing worse mental health outcomes, suggest the critical importance for the public health community to monitor the on-going impact of the COVID-19 pandemic on people's health and wellbeing, including and perhaps especially for those disproportionately affected by the current crisis.

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