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Personal and work-related factors associated with mental health among auto workers during the COVID-19 pandemic in the United States

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A B S T R A C T

Little is known about the psychological impact of the COVID-19 pandemic on non-healthcare workers, especially among those who weathered unemployment related to shutdowns and supply-chain disruptions. We administered a cross-sectional survey (May – October 2021) to understand patterns between personal and work-related predictors and mental health symptoms among in-person auto workers in the United States (N = 1,165). The Generalized Anxiety Disorder-2 and the Patient Health Questionnaire-2 measured the presence of anxiety and depressive symptoms, respectively. Predictors included the presence of financial/family stressors, fear of SARS-CoV-2 exposure, perceptions of safety climate/culture, and clarity of workplace COVID-19 protocols. We used multinomial logistic regression to examine associations between the predictors and anxiety symptoms alone, depressive symptoms alone, and both anxiety and depressive symptoms compared to no symptoms, adjusting for socio-demographic characteristics, employee type, COVID-19 infection history, and preexisting psychological or psychiatric disorders. Experiencing financial/family stressors (adjusted odds ratio (AOR): 2.65, 95 % CI: 1.86–3.78) and feeling very concerned over SARS-CoV-2 exposure (AOR: 2.12, 95 % CI: 1.47–3.06) increased the odds of having both anxiety and depressive symptoms in comparison to experiencing no stressors, and feeling less than very concerned over exposure, respectively. Positive perceptions of safety climate/culture (AOR = 0.79, 95 % CI: 0.75–0.84) and strong clarity of COVID-19 protocols (AOR = 0.91, 95 %CI: 0.84–0.99) were associated with lower odds of both anxiety and depressive symptoms. These findings highlight the importance of job security and feeling safe at work in affecting the psychological impact of the pandemic on workers. Considerations for COVID-19 prevention in the workplace and mental health should go hand-in-hand.

1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic gave rise to occupational health threats that most employers were unprepared for and employees had not anticipated when they took the job. (Michaels and Wagner, 2020a,b) Two years into the pandemic, workplaces are a recognized source of SARS-CoV-2 exposure contributing to work-related COVID-19 infections, fatalities and a rise in mental health disorders. (Chen et al., 2021; Czeisler et al., 2020; Hawkins and Letitia, 2021; Heinzerling et al., 2022; Matthay et al., 2021; Moreno et al., 2020; Pray et al., 2021; Vindegaard and Benros, 2020; Center for Medicare and Medicaid Services, 2022; Safety and Administration, 2022; US Department of Labor, 2021) The surge in research about healthcare workers on the frontlines of the pandemic has found that a lack of adequate personal protective equipment (PPE), fear of infection, social isolation, stigma, and pressure to work longer hours have contributed to an increase in anxiety, depression, burnout syndrome, and posttraumatic stress disorder (PTSD). (Muller et al., 2020; Pappa et al., 2020; Raudenská et al., 2020) Mental health disorders can exacerbate or lead to poor physical health, substance abuse, suicide ideation, and health care deferment. (Vindegaard and Benros, 2020; Gunnell et al., 2020).

Evidence is lacking, however, on the psychological impact of the COVID-19 pandemic among non-healthcare workers (essential and non-essential) whose jobs cannot be performed remotely (hereafter, "in-person" workers). SARS-CoV-2 exposure risk, workplace COVID-19 safety protocols, and the economic impact of the pandemic have differed by industry and occupation. For example, meat processors, retail workers, and drivers for online purchases have been burdened by staff shortages, decreased break times, and limited hazard pay. (Partners and Role, 2021; Strategic Organizing Center, 2021; Waltenburg et al., 2021) Other workers, including within auto manufacturing, restaurants, hotels, and personal care industries, have endured job loss, temporary layoffs, and pay cuts. (Boudette, 2021; Lippert et al., 2021; Kim, 2020; Davahli et al., 2020; Rosemberg et al., 2021) Common across all industries has been working under unsafe conditions. (Michaels and Wagner, 2020) Understanding industry-specific risk factors of poor mental health related to the COVID-19 pandemic among the estimated 108.4 million in-person workers in the U.S. can inform individual and organizational-level approaches to improve worker well-being. (Baker, 2020).

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The objectives of this study were to describe the prevalence of anxiety and depressive symptoms and determine the personal and work-related correlates of poor mental health among workers at a large U.S. auto manufacturing company using a cross-sectional online survey. Auto workers have an elevated risk of SARS-CoV-2 exposure due to working indoors and, often, in close-quarters. (U.S. Department of Labor, 2021) Additionally, auto workers experienced numerous job disruptions since March 2020 due to plant closures required to minimize COVID-19 transmission and global supply chain delays. (Kostov, 2021; Colias, 04/09/2021 Apr).

By contributing needed data on predictors of mental health among in-person workers outside of the healthcare industry, this study can inform recommendations on workplace practices to mitigate the psychological impact of the COVID-19 pandemic. We hypothesized that financial insecurity coupled with family stressors related to the pandemic would make it harder to pay important bills and trigger uncertainty about the future, contributing to higher odds of anxiety and/or depressive symptoms. Similarly, we hypothesized that fear of SARS-CoV-2 exposure would be associated with higher odds of anxiety and/or depressive symptoms. Alternatively, a positive safety climate and strong clarity on COVID-19 safety protocols in the workplace would be protective against poor mental health outcomes by helping workers feel more informed and valued by their employer.

2. Methods

We administered a cross-sectional, online survey (between May and October 2021) among a convenience sample of employees of a U.S. based auto manufacturing company with locations in over fifteen states. All hourly (i.e., production, skilled trades and temporary) and salaried employees that worked in-person for at least thirty days during the pandemic were eligible.

A survey instrument was designed in collaboration with representatives of the United Auto Workers (U.A.W.) union and approved by the partner company. In designing the survey, reducing participant burden and ensuring anonymity were key priorities; survey duration was limited to ten minutes and identifiable data, including internet protocol (IP) addresses, were not collected. We checked for duplicate responses by searching for surveys with the same age, sex, race/ethnicity, income, education, employee type, length of employment, and primary work location. Using this method, we did not find any duplicates. The survey link and QR code were distributed using printed flyers, business cards, social media posts, and the company's main employee webpage. The University of Michigan Institutional Review Board approved all study protocols.

3. Outcome

Presence of anxiety symptoms was defined using the Generalized Anxiety Disorder–2 (GAD-2) screening tool. (Sapra et al., 2020) The GAD-2 asks respondents how often they have been bothered by "feeling nervous, anxious or on edge?" and "not being able to stop or control worrying?" over the last two weeks. Presence of depressive symptoms was defined using the Patient Health Questionnaire–2 (PHQ-2) screening tool. (Kroenke et al., 2003) The PHQ-2 asks respondents how often they have been "bothered by having little interest of pleasure in doing things?" and "feeling down, depressed or hopeless?" over the last two weeks. Responses for each of the questions were measured using a 4-point Likert scale with assigned numerical values: 0="Never," 1="For several days," 2="For more than half the days," 3="Nearly every day." We summed the values for the GAD-2 and the PHQ-2 separately; scores 3 and higher indicated presence of symptoms for each scale. (Sapra et al., 2020; Kroenke et al., 2003) The outcome measure created for our analyses combined the two indicator variables into a four-level variable: No anxiety or depressive symptoms (reference), anxiety symptoms only, depressive symptoms only, and both anxiety and depressive symptoms.

4. Predictors

The presence of financial and family stressors since the start of the pandemic was measured using five dichotomous (yes/no) questions. Respondents were asked if they or their family had a change in their ability to pay important bills, and if they had access to enough food, clean water, needed medications, and childcare since the start of the pandemic. We created a binary predictor for experiencing one or more of these stressors for the analysis.

We measured fear of COVID-19 exposure on the job and exposing a household member to COVID-19 with two separate questions. Responses were recorded on a 5-point Likert scale ("not at all concerned," "slightly concerned," "moderately concerned," "very concerned," and "extremely concerned"). We created a dichotomous variable that indicated whether respondents felt "very" or "extremely concerned" about either exposure for the analysis.

Respondents were asked to respond to three statements on safety climate and one on safety culture. The safety climate items, derived from the National Institute of Occupational Safety and Health (NIOSH) "Quality of Worklife" module of the General Social Survey, aimed to capture perceived management attitudes toward safety. (National Institute for Occupational Safety and Health. Quality of Worklife Module of the General Social Survey., 2010) Respondents rated their level of agreement with the following statements: "The safety and health conditions where I work are good," "The safety of workers is a big priority with management where I work," and "Where I work, employees and management work together to ensure the safest possible working conditions." The safety culture item, derived from the NIOSH "Safety Culture" questionnaire, aimed to capture a shared safety practice ("I feel free to report safety violations where I work"). (Safety Culture, 2010) Responses to all four statements were rated on a 4-point Likert scale with assigned numerical values: 0="strongly disagree," 1="disagree," 2="agree," and 3="strongly agree." The Cronbach's alpha, a measure of scale reliability, for the four items was 0.90, indicating that the four separate items had high internal consistency. We created an aggregate variable by taking the sum of the four items (range 0–12). A higher score indicated a more positive safety climate/culture.

All employees received instructions on COVID-19 work safety, testing, and quarantining protocols, in addition to, procedures for when a coworker tests positive for COVID-19. Respondents were asked to rate the clarity of these instruction domains using a 3-point Likert scale with assigned numeric values: 0="not at all clear," 1="somewhat clear," and 2="very clear." The Cronbach's alpha for the four items was 0.87. To create an aggregate variable for instruction clarity, we calculated the sum of the four items (range: 0–8). A higher score represented better clarity.

We adjusted for socio-demographic characteristics including sex at birth (male, female), age (18–34, 35–54, 55 + years), race/ethnicity (non-Hispanic White, non-Hispanic Black, another race or ethnicity), and education (high school or less, some college or technical school, college degree +). Employee type was dichotomized as hourly (i.e., production, skilled trades, and temporary workers) and salaried employees. Additionally, we collected self-reported COVID-19 infection history (lab-confirmed and probable), and presence of a psychological or psychiatric condition prior to the COVID-19 pandemic. The survey ended with an optional, open-ended question dedicated to sharing comments concerning COVID-19 and their job.

Among the 1,373 completed surveys, we defined a complete case analytic sample by excluding respondents with missing data from the outcome (presence of anxiety or depressive symptoms, (0.66 %)), the main predictors (2.77 %), or any of the covariates (12.31 %). Group level comparisons between the analytic sample (n = 1,165) and the excluded dataset (n = 208) revealed no statistical differences in the distribution of the outcome or the main predictors.

5. Statistics

We calculated descriptive statistics of all predictors and covariates for the analytic sample. We used multinomial logistic regression to measure unadjusted and adjusted associations between each of the predictors, separately, and our 4-level outcome variable (reference = "no symptoms of anxiety or depression"). Prior to running the adjusted models, we drew directed acyclic graphs and consulted previous literature to decide on a minimum set of a priori confounders to include in the models. Education and employee type served as proxies for socioeconomic status. Adjusted models controlled for age, sex, race/ethnicity, education, COVID-19 infection history, employee type, and presence of a preexisting psychiatric or psychological condition. The model measuring the association between clarity of workplace COVID-19 safety protocols and mental health symptoms was additionally adjusted for safety climate/culture. In addition to model diagnostics, we used the Hosmer-Lemeshow goodness-of-fit test with an alpha level of 0.05 to evaluate model specification and fit. (Fagerland and Hosmer, 2012) Data were analyzed using Stata version 16 and figures were made using RStudio version 4.1.2.

6. Results

Descriptive statistics of the analytic sample (N = 1,165) can be found in Table 1. The sample was predominantly male (73.5 %), non-Hispanic White (75.3 %), between the ages of 35 and 54 (mean: 47.8 years, range: 19–75 years), and hourly wage workers (83.6 %). Hourly respondents self-identified as production (79.4 %), skilled trades (18.9 %), or temporary (1.8 %) employees. 28.4 % of respondents reporting having had a COVID-19 infection since the start of the pandemic.

Table 1
Descriptive statistics of the analytic sample. N = 1,165.

		Total (N = 1,165)
		n (%)
Sex at birth		
	Male	856 (73.5)
	Female	309 (26.5)
Age		
	18 to 34	168 (14.4)
	35 to 54	660 (56.7)
	55 and over	337 (28.9)
Race-Ethnicity[1]		
	Non-Hispanic White	877 (75.3)
	Non-Hispanic Black	145 (12.4)
	Another race/ethnicity	143 (12.3)
Education		
	High school or less	263 (22.6)
	Some college or technical school	598 (51.3)
	College Degree	304 (26.1)
Employee Type[2]		
	Salaried	191 (16.4)
	Hourly	974 (83.6)
Past or current COVID-19 infection		
	No COVID-19	834 (71.6)
	Lab-confirmed or probable COVID-19	331 (28.4)
Preexisting psychological or psychiatric condition		
	No	1015 (87.1)
	Yes	150 (12.9)
Financial/family stressors since the start of the pandemic		
	0 stressors	614 (52.7)
	1 or more stressors	551 (47.3)
Fear of SARS-CoV-2 Exposure		
	Less than very concerned	502 (43.1)
	Very or Extremely concerned	663 (56.9)
Positive safety climate/culture (mean (SD), range)		6.8 (3.4), 0–12
Strong clarity of workplace COVID-19 safety protocols (mean (SD), range)		5.1 (2.5), 0–8
Presence of anxiety and depressive symptoms in the last 14 days		
	No anxiety or depressive symptoms	837 (71.8)
	Anxiety symptoms only	68 (5.8)
	Depressive symptoms only	53 (4.5)
	Both anxiety and depressive symptoms	207 (17.8)

[1] "Another race/ethnicity" category included respondents that identified as Hispanic (4 %), American Indian/Alaska Native (<1%), Asian (<1%), Middle-Eastern, North African (<1%), multi-racial (3.4 %) and other (3.4 %); [2]Hourly respondents included production (79.4 %), skilled trades (18.9 %), and temporary (1.8 %) employees.

Since the start of the pandemic, 47.3 % reported experiencing at least one financial/family stressor. More than half of the respondents (56.9 %) were very or extremely concerned about SARS-CoV-2 exposure. The mean for the safety climate/culture scale was 6.8 (standard deviation (SD): 3.4, range: 0–12) and the mean for the clarity of workplace COVID-19 protocols was 5.1 (SD: 2.5, range: 0–8). The prevalence of both depressive and anxiety symptoms (17.8 %) was higher than having either anxiety or depressive symptoms alone (5.8 % and 4.5 %, respectively).

Table 2 includes bivariate associations between the predictors and mental health symptoms. Females had a higher odds of anxiety only (odds ratio (OR): 2.91, 95 % Confidence Interval (CI): 1.76–4.82) and both anxiety and depressive symptoms (OR: 2.15, 95 % CI: 1.55–2.97) in comparison to males. Respondents aged 18–34 years in comparison to 35–54 years had a higher odds of anxiety only (OR: 2.87, 95 % CI: 1.56–5.27), depressive symptoms only (OR: 3.33, 95 % CI: 1.62–6.83), and both anxiety and depressive symptoms (OR: 2.77, 95 % CI: 1.86–4.12). Hourly workers had a 3.00 (95 % CI: 1.19–7.58) and a 2.23 (95 % CI: 1.36–3.64) times higher odds for anxiety only and both anxiety and depressive symptoms, respectively, in comparison to salaried workers. Race/ethnicity or having a prior COVID-19 infection were not associated with the presence of symptoms.

The results from fully adjusted multinomial logistic regression models are summarized in Fig. 1 (see Supplemental Tables 1-4 for the full model results). Having at least one financial/family stressor since the pandemic's start was associated with a 1.93 (95 % CI: 1.13–3.27) and a 2.65 (95 % CI: 1.86–3.78) times greater odds of having symptoms of anxiety only and both anxiety and depressive symptoms, respectively, in comparison to having no stressors. Similarly, feeling very or extremely concerned about exposure to SARS-CoV-2 doubled the odds of having only anxiety symptoms (adjusted odds ratio (AOR): 2.09, 95 % CI: 1.20–3.65) and both anxiety and depressive symptoms (AOR: 2.12, 95 % CI: 1.47–3.06).

Having a positive perception of safety climate/culture was associated with lower odds of all three symptom levels. For example, for a one-unit increase in the perception of safety climate/culture, the odds of both anxiety and depressive symptoms decreased by a factor of 0.79 (95 % CI: 0.75–0.84). Having higher levels of clarity of workplace COVID-19 safety protocols was associated with lower odds of having both anxiety and depressive symptoms by a factor of 0.91 (95 %CI: 0.84–0.99).

7. Discussion

Among the 1,165 U.S. auto workers who completed the survey between May and October 2021, 17.8 % reported having frequent symptoms of both anxiety and depressive symptoms, 5.8 % reported anxiety symptoms only, and 4.5 % reported depressive symptoms only. Pandemic-related financial/family stressors and fear of SARS-CoV-2 exposure more than doubled the odds of having both anxiety and depressive symptoms in our sample. Alternatively, positive perceptions of safety climate and culture in the workplace were associated with lower odds of both depressive and anxiety symptoms. Together, these findings highlight the powerful role that workplaces can have in both worsening and attenuating the psychological impact of the COVID-19 pandemic on workers.

The prevalence of anxiety and depressive symptoms in our sample (23.6 % and 22.3 %, respectively) were two to three times higher than pre-COVID 19 estimates among the 2019 U.S. adult population (8.1 % and 6.5 % for anxiety and depression, respectively). (Terlizzi and Schiller., 2021) However, our estimates were comparable to estimates of

Table 2
Bivariate associations between all model covariates and presence of anxiety and/or depressive symptoms. N = 1,165.

		Anxiety Symptoms only, n = 71	Depressive Symptoms only, n = 54	Both Anxiety and Depressive Symptoms, n = 208
Variable		OR (95 % CI)	OR (95 % CI)	OR (95 % CI)
Sex at birth				
	Male	Ref	Ref	Ref
	Female	2.91** (1.76–4.82)	1.02 (0.52–1.98)	2.15** (1.55–2.97)
Age				
	18 to 34	2.87** (1.56–5.27)	3.33** (1.62–6.83)	2.77** (1.86–4.12)
	35 to 54	Ref	Ref	Ref
	55 and over	0.62 (0.33–1.19)	1.31 (0.69–2.50)	0.53** (0.35–0.80)
Race-Ethnicity				
	Non-Hispanic White	Ref	Ref	Ref
	Non-Hispanic Black	0.61 (0.24–1.55)	2.02 (0.99–4.10)	1.27 (0.81–1.99)
	Another race/ ethnicity	1.28 (0.63–2.59)	1.35 (0.58–3.13)	1.43 (0.91–2.22)
Education				
	High school or less	1.85 (0.89–3.84)	0.92 (0.36–2.33)	1.45 (0.92–2.28)
	Some college or technical school	1.60 (0.83–3.08)	1.79 (0.89–3.60)	1.61* (1.10–2.38)
	College Degree	Ref	Ref	Ref
Employee Type				
	Salaried	Ref	Ref	Ref
	Hourly	2.29 (0.90–5.84)	3.00* (1.19–7.58)	2.23** (1.36–3.64)
Past or current COVID-19 infection				
	No COVID-19	Ref	Ref	Ref
	Lab-confirmed or probable COVID-19	1.20 (0.71–2.04)	0.59 (0.29–1.18)	1.05 (0.75–1.47)
Preexisting psychological or psychiatric condition				
	No	Ref	Ref	Ref
	Yes	4.83** (2.61–8.93)	1.85 (0.76–4.52)	7.90** (5.31–11.74)
Financial/ family stressors since the start of the pandemic				
	0 stressors	Ref	Ref	Ref
	1 or more stressors	2.06** (1.25–3.40)	1.88* (1.07–3.29)	2.88** (2.09–3.97)
Fear of SARS-CoV-2 Exposure				
	Less than very concerned	Ref	Ref	Ref
	Very or Extremely concerned	1.75* (1.04–2.94)	1.60 (0.90–2.85)	1.95** (1.41–2.70)
Positive safety climate/ culture		0.87** (0.81–0.94)	0.85** (0.78–0.92)	0.78** (0.74–0.82)
Strong clarity of workplace COVID-19 safety protocols		0.84** (0.76–0.92)	0.92 (0.82–1.03)	0.78** (0.73–0.83)

*P-value < 0.05.
**P-value < 0.01.

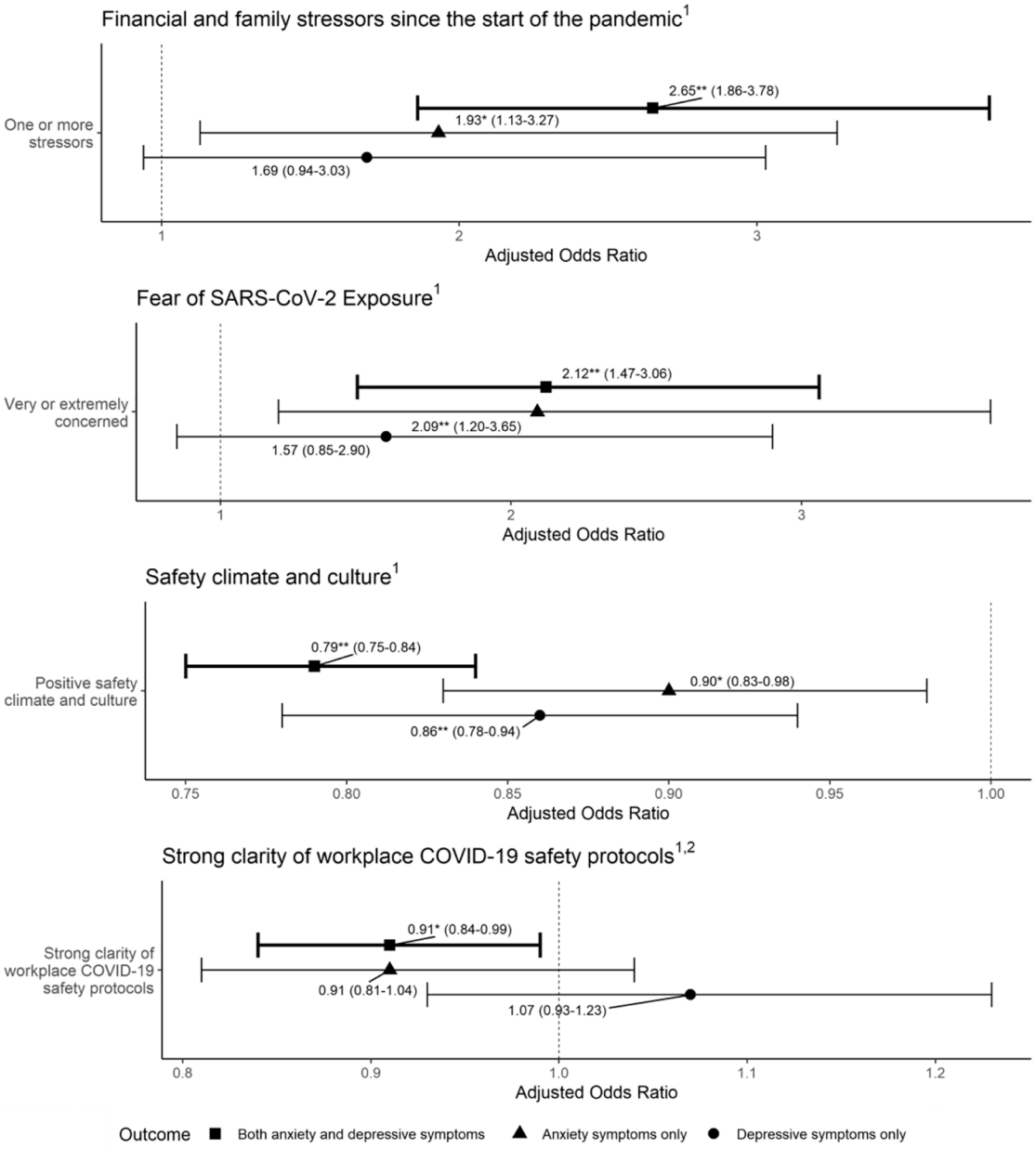
the general population surveyed during the same period as this study: between May and October 2021, an average of 26.7 % and 21.8 % of non-institutionalized U.S. adults in the U.S. Census Bureau Household Pulse Survey reported anxiety and depressive symptoms, respectively. (Household Pulse Survey, 2021) Consistent with findings from population-based studies, we observed a higher prevalence of anxiety and depressive symptoms among female and younger age respondents, in comparison to male and older respondents, respectively. (Household Pulse Survey, 2021; Kessler et al., 2005; Leibenluft, 1999) The greater share of child and eldercare responsibilities that women, in comparison to men, have absorbed throughout the pandemic may have contributed to the higher observed prevalence of poor mental health symptoms among females. (Almeida et al., 2020; Morgan et al., 2022; Wenham et al., 2020) Our finding that younger respondents (18–34 years) had the highest prevalence of anxiety and depressive symptoms followed by middle-age (35–54 years), and older (55 + years) respondents was consistent with existing findings. (Czeisler et al., 2020; O'Connor et al., 2021) Our estimates were also similar to pooled prevalence estimates of anxiety (23.2 %) and depression (22.8 %) among healthcare workers from thirteen studies conducted during the first wave of the pandemic. (Pappa et al., 2020) The higher prevalence estimates during the pandemic across worker groups and the general public need to interpreted within the greater context of increased social isolation, loss of child-care, and grief associated with lives lost due to COVID-19, contributing to a universal rise in mental health disorders in the U.S. and around the globe. (Vindegaard and Benros, 2020; U.S. Government Accountability Office, 2021).

A key finding from this study was that each of the predictors was more strongly associated with having both anxiety and depressive symptoms than with having anxiety or depressive symptoms alone (Fig. 1). Anxiety and depression, separately characterized by symptoms of hyperarousal and the inability to feel pleasure, respectively, often present as comorbid conditions. (Clark and Watson, 1991; Möller et al., 2016) Their convergence has been described as a state of "general distress" which may be common following a large scale disaster. (Clark and Watson, 1991) In our sample, anxiety and depressive symptoms were higher in hourly than salaried employees. The financial/job security afforded to salaried employees may help explain these results. During consecutive plant closures, salaried employees were able to continue working without a reduction in pay, while hourly employees were put on temporarily leave.

Financial stress is a known risk factor of anxiety, depression, suicide, and mortality in the general population, and a plausible mechanism in the pathway between unstable work during the COVID-19 pandemic and poor mental health. (Muller et al., 2020; Richardson et al., 2013; Xiong et al., 2020; Jin et al., 1995; Giorgi et al., 2020) We saw stronger associations between financial and family stressors with anxiety symptoms alone and both anxiety and depressive symptoms than with depressive symptoms. Among the 551 respondents reporting at least one financial/ family stressor since the start of the pandemic, 63.7 % were unable to pay important bills. Uncertainty about the future may have exacerbated levels of anxiety related to financial insecurity.

Fear of SARS-CoV-2 exposure and exposing family members were prevalent (56.9 %) in our sample, consistent with research among healthcare, restaurant, and hotel workers during the pandemic. (Muller et al., 2020; Lippert et al., 2021; Rosemberg et al., 2021) Levels of fear during the study period may have been lower than during previous months when the COVID-19 vaccine was not yet available. In a review of the survey's open-ended comment section, frustration over improper mask wearing, poor ventilation, a lack of sanitation, and the inability to socially distance in their jobs were commonly cited concerns. These sentiments shed light on working conditions that may have contributed to levels of fear and anxiety among the respondents.

A positive safety climate was associated with lower odds of reporting both anxiety and depressive symptoms. As evidenced by the strength of the association between a positive safety climate and depressive



*P-value < 0.05
**P-value < 0.01
[1]Model adjusted for sex, age, race/ethnicity, education, employee type, past or current COVID-19 infection and preexisting psychological or psychiatric condition; [2]Model additionally adjusted for safety climate/culture.

Fig. 1. Summary of main findings from fully adjusted multinomial logistic regression with no anxiety or depressive symptoms as the reference group. N = 1,165 *P-value < 0.05 **P-value < 0.01 [1]Model adjusted for sex, age, race/ethnicity, education, employee type, past or current COVID-19 infection and preexisting psychological or psychiatric condition; [2]Model additionally adjusted for safety climate/culture.

symptoms, safety climate may contribute more to mitigating depressive symptoms than anxiety in the workplace. This finding supports existing evidence that positive safety climates benefit worker well-being. (Giorgi et al., 2020; Hofmann et al., 2017; Johnson, 2007) Safety climate, as defined by Zohar (Zohar, 1980), involves "shared employee perceptions about the relative importance of safe conduct in their occupational behavior." (Zohar, 1980) Employees must mutually agree that the company prioritizes their safety over productivity. (Hofmann et al., 2017) Similarly, safety culture thrives on the development of shared beliefs and attitudes within the community. (Guldenmund, 2000) By design, COVID-19 protocols may have reduced morale by limiting social interactions and the use of common areas (e.g., break rooms and plant gyms).

In comparison to safety climate, we observed a weaker association between clarity of workplace COVID-19 protocols and lower odds of both anxiety and depressive symptoms. Our findings support existing evidence that organizational factors, such as clear procedures for managing infection risk, can moderate workplace stress. (Giorgi et al., 2020) In additional analyses, we found that 33.5 % of respondents indicated that the instructions were "not at all clear" regarding what to do when a coworker tests positive. Being unaware when a coworker tested positive may increase levels of SARS-CoV-2 exposure fear and diminish efforts to

track COVID-19 infections in the workplace. Modifications to existing protocols also need careful consideration; as evident in open-ended comments, respondents were frustrated by the removal and then renewal of the mandatory masking requirements.

The study population was a convenience sample and may not be representative of the socio-demographic makeup of the company's hourly and salaried employees, which may lead to an over- or under-estimate of effect sizes. We were unable to calculate a survey response rate; intermittent plant shutdowns, reduced crew sizes, and remote work options among salaried employees made it difficult for the company to estimate the total number of employees required to work in person for at least 30 days during the pandemic. The results may not be generalizable to employees without union representation, with different levels of SARS-CoV-2 exposure risk, or in occupations without pandemic-related employment disruptions. To preserve statistical power, respondents with preexisting psychological/psychiatric conditions were not excluded from the analysis. By including them, we may have over-estimated the prevalence of current anxiety or depressive symptoms related to the pandemic. In a sensitivity analysis, we excluded respondents with preexisting mental health conditions and found no differences in our main results with one exception: the association between safety climate and anxiety symptoms lost statistical significance, but the coefficient remained the same. Although salaried respondents differed from hourly respondents across the outcome, predictors, and socio-demographic characteristics, our sample size did not afford us the power to examine whether employee type modified the associations between any of the main predictors and mental health symptoms. We found, however, that excluding salaried respondents from the analyses did not change our main results. Lastly, safety climate and culture are multidimensional constructs that could not be fully represented by the four indicator items selected for this study.

Our results have implications for addressing the mental health needs of all in-person workers, regardless of essential worker status, during the COVID-19 pandemic. Building on evidence from the COVID-19 pandemic and previous disasters, there is a compelling argument to improve peer and organizational support programs to help moderate the psychological impact of the pandemic on workers' mental health. (Koh and Goh, 2020; Lulli et al., 2021) Peer-to-peer communication, safety protocols, adequate PPE, messaging designed to reduce stigma, and paid sick and family leave can build resilience among workers by helping them feel connected, competent, safe, and valued in their jobs. (Eisenberg-Guyot et al., 2021; Giorgi et al., 2020; Lulli et al., 2021; Hossain et al., 2020) Mental health resources and screenings should prioritize workers more susceptible to mental health disorders, including workers with a history of substance abuse, preexisting physical, psychological, or psychiatric health conditions, and without health benefits or social support. (Druss, 2020; Ornell et al., 2020; Rosen and Harnett, 2021).

8. Conclusions

There is an urgent need to monitor the psychological impact of the COVID-19 pandemic among *all* in-person workers with thoughtful consideration for the unique ways in which worker experiences have diverged across industries and occupations. Auto workers, like other types of in-person workers, are putting themselves at risk by physically reporting to work, not feeling safe in the workplace, and struggling to manage financial pressures related to temporary layoffs and household challenges. Encouragingly, improved work conditions, specifically those related to perceptions and attitudes surrounding safety and safety communication, can mitigate the psychological impact of the pandemic among employees. National and employer-driven decisions on managing COVID-19 in the workplace should consider not only the physical toll of infections and exposure risk, but also the related and equally disruptive growth of mental health disorders among workers in a range of industries.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pmedr.2022.102001.

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