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Association between burnout and adherence with mask usage and additional COVID-19 prevention behaviours: findings from a large-scale, demographically representative survey of US adults

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ABSTRACT

Objectives Studies have found associations between occupational burnout symptoms and reduced engagement with healthy behaviours. We sought to characterise demographic, employment and sleep characteristics associated with occupational burnout symptoms, and to evaluate their relationships with adherence to COVID-19 prevention behaviours (mask usage, hand hygiene, avoiding gatherings, physical distancing, obtaining COVID-19 tests if potentially infected).

Methods During December 2020, surveys were administered cross-sectionally to 5208 US adults (response rate=65.8%). Quota sampling and survey weighting were employed to improve sample representativeness of sex, age and race and ethnicity. Among 3026 employed respondents, logistic regression models examined associations between burnout symptoms and demographic, employment and sleep characteristics. Similar models were conducted to estimate associations between burnout and non-adherence with COVID-19 prevention behaviours.

Results Women, younger adults, unpaid caregivers, those working more on-site versus remotely and those with insufficient or impaired sleep had higher odds of occupational burnout symptoms. Burnout symptoms were associated with less frequent mask usage (adjusted odds ratio (aOR)=1.7, 95% CI 1.3–2.1), hand hygiene (aOR=2.1, 95% CI 1.7–2.7), physical distancing (aOR=1.3, 95% CI 1.1–1.6), avoiding gatherings (aOR=1.4, 95% CI 1.1–1.7) and obtaining COVID-19 tests (aOR=1.4, 95% CI 1.1–1.8).

Conclusions Disparities in occupational burnout symptoms exist by gender, age, caregiving, employment and sleep health. Employees experiencing occupational burnout symptoms might exhibit reduced adherence with COVID-19 prevention behaviours. Employers can support employee health by addressing the psychological syndrome of occupational burnout.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The recruitment of more than 5000 respondents and application of both demographic quota sampling and postsample survey weighting of responses supported the assemblance of a large-scale, demographically representative sample from which a subset of employed adults was selected to form the analytical sample.
⇒ The inclusion of an expansive set of demographic, sleep and COVID-19-related variables enabled comprehensive characterisation of the survey sample.
⇒ The cross-sectional study design limits the ability to infer causality.
⇒ Self-report data may be subject to recall, response and social desirability biases.

INTRODUCTION

Occupational burnout, a psychological syndrome resulting from chronic work-related stress,[1 2] is experienced across occupations.[3] Initially described by Greene in his 1961 novel *A Burnt-Out Case*[4] and later operationalised by Maslach,[5–7] burnout is framed as a psychological syndrome characterised by emotional exhaustion, depersonalisation and a reduced sense of professional efficacy. Together, these dimensions of burnout, which are a product of the work activity rather than individual characteristics, cause maladaptive cognitive, emotional and attitudinal states, which are compounded by projection of negative behaviours exhibited towards work and peers.[5] Empirical data indicate that exhaustion and depersonalisation represent core dimensions of occupational burnout, while perceived lack of professional fulfilment or efficacy precedes or follows burnout.[8]

Burnout is increasingly recognised as an occupational hazard, with workplace factors (eg, workload, job autonomy, perceived support from leadership) exhibiting robust associations with burnout symptoms, and psychosocial factors related to well-being (eg, mental health, sleep, social support) exhibiting bidirectional relationships with burnout.[9] Employees experiencing burnout symptoms face elevated risk of adverse consequences, including for physical health (eg, cardiovascular, metabolic and respiratory conditions) and psychological health (eg, depression, anxiety, insomnia), as well as impaired workplace performance (eg, absenteeism, presenteeism, job dissatisfaction, occupational injuries) and reduced practice of healthy behaviours (eg, a predilection for unhealthy substance use, dietary indiscretion, physical inactivity, reduced handwashing).[10]

With the COVID-19 pandemic came profound changes to workplace factors for many employers and employees. Indeed, many employed US adults experienced work-related changes in 2020 in response to the pandemic. Approximately one-third transitioned from in-person to remote work,[11] and many experienced lay-offs or furloughs. To provide essential services or manage staff reductions, others took on extended-duration shifts and long work-weeks, potentially contributing to sleep deficiency and circadian disruption, which are factors associated with burnout.[12 13] Specifically, insufficient sleep has been hypothesised as a mechanism contributing to burnout through impaired recovery, chronic depletion of energy stores and hyperactivity-related dysregulation of the hypothalamic-pituitary-adrenal axis, resulting in a chronically increased allostatic load and ultimately burnout.[14 15] Insufficient sleep is common, as one-third of US adults report insufficient sleep[16] and many live with undiagnosed and untreated or undertreated sleep disorders.[17] Some of these worksite and employment changes could alleviate burnout (eg, reduced commute time, affording increased opportunity for sleep), while others may exacerbate burnout (eg, reduced work-and-home separation).

Occupational burnout can negatively influence individual workers and the people with whom they interact.[5] For example, if an individual is affected by burnout, evidence suggests they are less likely to seek medical care for health concerns.[18 19] Prepandemic studies have also found negative associations of burnout with hand hygiene among nurses,[20] and with adherence with personal protective equipment utilisation and work-safety practices among firefighters.[21] Findings linking lower adherence with safety measures and burnout are particularly relevant during infectious disease outbreaks such as the COVID-19 pandemic, when reduction of community transmission of SARS-CoV-2 depends on engagement with healthy behaviours. The extent to which occupational burnout is associated with reduced engagement with behaviours recommended to protect against COVID-19, however, is not known.

A growing body of evidence reports sleep and occupational factors associated with burnout among healthcare professionals during the COVID-19 pandemic;[22–25] however, comparatively little research has focused on burnout across occupational sectors. Furthermore, studies conducted during the COVID-19 pandemic have found unpaid caregivers for children and adults, young adults, women and essential workers have disproportionately experienced adverse mental health symptoms,[26–30] but our understanding of how these and other demographic factors relate to burnout during the pandemic is limited.

To address the research needs of (1) investigating the impact of occupational burnout on health behaviours in response to the COVID-19 pandemic and (2) identifying key factors associated with burnout to inform tailored workplace strategies, we examined burnout symptoms, associated sleep, demographic and occupational factors and adherence with COVID-19 health behaviours in a demographically representative sample of employed US adults.

METHODS

Study sample

To assess occupational burnout symptoms in December 2020, internet-based surveys were administered by Qualtrics to US adults aged ≥18 years as part of The COVID-19 Outbreak Public Evaluation (COPE) Initiative. The COPE Initiative (https://www.thecopeinitiative.org/) is designed to assess public attitudes, behaviours and beliefs related to the COVID-19 pandemic and to evaluate mental and behavioural health during the pandemic. The COPE Initiative surveys included in this analysis were administered by Qualtrics. Quota sampling and survey weighting were employed to improve sample representativeness of the US population by sex, age and combined race and ethnicity. Surveys were administered cross-sectionally to eliminate potential for survivorship bias,[31] a source of selection bias in which survey respondents who consistently participate in longitudinal studies have better baseline mental health and mental health trajectories compared with those who attrite.

A minimum age of 18 years and residence within the USA were required for eligibility to complete a survey in December 2020. All surveys underwent data quality screening procedures including algorithmic and keystroke analysis for attention patterns, click-through behaviour, duplicate responses, machine responses and inattentiveness. Country-specific geolocation verification via IP address mapping was used to ensure respondents were from the USA. Respondents who failed an attention or speed check, along with any responses identified by the data-scrubbing algorithms, were excluded from analysis.

Measures

Burnout was assessed using the single-item Mini-Z, a non-proprietary measure of the emotional exhaustion dimension of burnout across occupations.[32] Higher Mini-Z scores from 1 through 5 reflect progressively

more severe burnout symptoms. Respondents who score ≥3 out of 5 generally screen positive for burnout symptoms. The Mini-Z has been validated using the emotional exhaustion subscale of the widely administered proprietary Maslach Burnout Inventory. The validation study included 5404 participants associated with the Veterans Health Administration, including primary care providers, registered nurses, clinical associates and administrative clerks. Using the emotional exhaustion subscale of the Maslach Burnout Inventory as a comparator, the Mini-Z had a 0.79 correlation, 83.2% sensitivity, 87.4% specificity and 0.93 area under the receiver operating characteristic curve.[32] Importantly, results were similar when stratified by respondent occupation, which suggests some level of generalisability of the measure across occupations.

Demographic variables included gender, age, combined race and ethnicity, disability status as assessed as a positive response to item 7.22 or 7.23 of the 2015 Behavioral Risk Factor Surveillance System Questionnaire, education attainment, US Census region and self-reported urbanicity. Employment-related characteristics included employment status, paid work hours per week, percentage of work hours completed remotely (ie, not in-person) and job sector. Unpaid caregiver status was assessed, both for adults aged ≥18 years and for children or adolescents aged <18 years. Sleep characteristics included self-reported sleep duration, insomnia symptoms assessed using the clinically validated 2-item Sleep Condition Indicator[33] and history of diagnosed sleep or circadian disorders and whether or not respondents were receiving treatment or taking medication for these conditions.

Frequency of adhering with COVID-19 protective behaviours was assessed using a 5-item Likert scale with Never, Rarely, Sometimes, Often and Always as response options. The question 'In the last week, how frequently did you…' was asked with the following behaviours: avoid gatherings for ≥10 persons; avoid going to places where you could not stay 6 feet away from people outside your household unit; wear a mask or cloth face covering when in public; wash your hands with soap and water after touching high-touch surfaces in public (eg, shopping carts, gas pumps, automated teller machines); and use hand sanitiser after touching high-touch surfaces in public. Hand hygiene was considered as frequency of either washing hands or using hand sanitiser, with the higher frequency designated. Mask usage and hand hygiene were only assessed among respondents who indicated they had been in public in the prior week. Multivariable models were constructed with Rarely and Never collapsed into a single response option given the similar public health implications for both scenarios.

Likelihood of obtaining a COVID-19 test if potentially infected with SARS-CoV-2 was assessed using a 3-item Likert scale with Not at all likely, Somewhat likely and Very likely as response options. Respondents could also select 'Don't know/Not sure' or 'I do this anyway'. The question 'If you thought you might have COVID-19, how likely would you be to do the following?' was asked with the following specified as getting tested for COVID-19. Multivariable models included all employed respondents who did not select 'Don't know/Not sure' or 'I do this anyway'.

Statistical analysis

Survey weighting (iterative proportional fitting, trimmed with 1/3≤weight≤3) was employed to improve sample representativeness of the US adult population by sex, age and combined race and ethnicity using 2010 US Census estimates. Sex and gender were assessed separately. Sex was used to weight based on population estimates. Gender was used as a demographic variable in the analysis.

To evaluate potential associations with demographic, employment and sleep characteristics and occupational burnout, weighted ordinal logistic regressions were used to estimate adjusted odds ratios (aORs) for Mini-Z burnout scores. All adjusted models for potential associations between demographic, employment and sleep-related characteristics and burnout symptoms included gender, age, combined race and ethnicity, disability status, education attainment, US Census region, rural/urban residence, unpaid caregiver status, paid weekly work hours and remote work percentage. Separate models were used to evaluate potential associations with other employment-related variables and sleep-related variables.

To evaluate potential associations with COVID-19 health behaviours, weighted ordinal logistic regressions with occupational burnout as explanatory variables were used to estimate aORs for lower frequency of mask wearing, hand hygiene, avoiding gatherings of ≥10 persons and physical distancing from others, and for lower likelihood of obtaining a COVID-19 test if the respondent believed they might have an active SARS-CoV-2 infection. All adjusted models for potential associations between burnout symptoms and non-adherence with COVID-19 health behaviours included these previously listed variables, plus job sector.

Statistical significance was assessed as $p<0.05$. Rounded, weighted values are reported. Analyses were conducted in R V.4.0.2 with the R survey package using V.3.29 and Python V.3.7.8. All participants provided informed electronic consent prior to enrolment in the survey.

Patient and public involvement

None.

RESULTS

During 6–27 December 2020, there were 5208 of 7909 (65.8%) eligible invited adults who completed surveys. Complete survey data for analysed variables were obtained from 5185 (99.6%) respondents, 3026 (58.4%) of whom were employed. Of these 3026 employed respondents, 1235 (40.8%) identified as women and 1835 (60.6%) as non-Hispanic white (table 1). Overall, 762 of the 3026 (25.2%) employed respondents scored ≥3 out of 5 on

Table 1 Employed US adult respondent characteristics and prevalence of burnout symptoms, 6–27 December 2020

	Respondents	Positive screen for burnout symptoms
	n (%)	n (%)
Total	3026 (100)	762 (25.2)
Single-item Mini-Z burnout response		
No symptoms	1304 (43.1)	0 (0)
Occasional stress, no burnout symptoms	960 (31.7)	0 (0)
Definite burnout, physical and emotional exhaustion	480 (15.9)	480 (100)
Burnout symptoms will not go away	124 (4.1)	124 (100)
Complete burnout—may need to make changes or seek help	158 (5.2)	158 (100)
Demographic characteristics		
Gender		
Male	1759 (58.2)	375 (21.3)
Female	1235 (40.8)	382 (30.9)
Transgender	28 (0.9)	4 (14.2)
None of these	3 (0.1)	1 (45.3)
Age group (years)		b
18–24	417 (13.8)	157 (37.6)
25–34	530 (17.5)	173 (32.7)
35–44	896 (29.6)	220 (24.5)
45–54	551 (18.2)	132 (24.0)
55–64	472 (15.6)	70 (14.9)
≥65	160 (5.3)	9 (5.7)
Race and ethnicity		
White, non-Hispanic	1835 (60.6)	411 (22.4)
Black, non-Hispanic	311 (10.3)	86 (27.7)
Asian, non-Hispanic	178 (5.9)	37 (21.1)
Other race(s), non-Hispanic	98 (3.3)	27 (27.9)
Hispanic or Latino	604 (20.0)	200 (33.1)
Disability status		
Yes	669 (22.1)	204 (30.4)
No	2331 (77.0)	549 (23.5)
Prefer not to say	26 (0.9)	10 (36.9)
Education attainment		
High school diploma or less	444 (14.7)	150 (33.8)
College or some college	1626 (53.7)	419 (25.8)
After bachelor's degree	956 (31.6)	193 (20.2)
US Census region		
Northeast	704 (23.3)	163 (23.2)
Midwest	544 (18.0)	171 (31.4)
South	1181 (39.0)	309 (26.2)
West	596 (19.7)	119 (19.9)
Urban-rural residence		
Urban	2715 (89.7)	654 (24.1)
Rural	311 (10.3)	108 (34.7)
Employment and unpaid caregiving characteristics		
Per cent of paid work completed remotely		
0–10	945 (31.2)	221 (23.4)
11–49	910 (30.1)	278 (30.6)
50–89	491 (16.2)	141 (28.6)
90–100	680 (22.5)	122 (17.9)
Paid work hours in previous week		
≤40	1939 (64.1)	426 (21.9)
41–60	705 (23.3)	199 (28.2)
>60	382 (12.6)	137 (35.9)
Types of shifts		
Day shifts only	2280 (75.4)	510 (22.3)
Evening shifts only	251 (8.3)	107 (42.9)
Night shifts only	102 (3.4)	32 (31.5)
Multiple types of shifts	393 (13.0)	113 (28.7)
Occupational sector		
Construction	227 (7.5)	62 (27.2)
Educational services	245 (8.1)	69 (28.0)
Federal government	47 (1.5)	13 (27.3)
Financial activities	240 (7.9)	61 (25.3)
Healthcare and social assistance	374 (12.3)	106 (28.3)
Information	358 (11.8)	67 (18.8)
Leisure and hospitality	123 (4.1)	40 (32.5)
Manufacturing	248 (8.2)	50 (20.2)
Mining	9 (0.3)	5 (58.7)
Retail trade	211 (7.0)	58 (27.5)
State and local government	124 (4.1)	35 (28.2)
Transportation and warehouses	109 (3.6)	27 (24.9)
Utilities	44 (1.5)	9 (19.8)
Wholesale trade	66 (2.2)	7 (11.2)
Other services	601 (19.9)	153 (25.5)
Unpaid caregiver status		
No	1425 (47.1)	271 (19.0)
Caregiver for adults only	346 (11.4)	94 (27.2)
Caregiver for children only	264 (8.7)	98 (37.1)
Caregiver for children and adults	991 (32.8)	299 (30.1)

the single-item Mini-Z in December 2020, qualifying as positive screens for occupational burnout symptoms. The prevalence of positive burnout symptom screens was common across occupational sectors (11.2%–58.7%) (table 1).

Demographic characteristics associated with greater odds of more severe occupational burnout included younger compared with older age (eg, aged 18–24 vs ≥65 years, burnout symptom prevalence=37.6%, 5.7%, respectively; aOR=3.3, 95% CI 2.1–5.3), women compared with men (30.9%, 21.3%; aOR=1.6, 95% CI 1.4–1.9) and Hispanic or Latino adults compared with non-Hispanic white adults (33.1%, 22.4%; aOR=1.7, 95% CI 1.3–2.3) (tables 1 and 2). Employment characteristics associated with increased odds of more severe occupational burnout included evening or night shifts compared with day shifts

Table 2 Demographic and employment factors associated with burnout symptoms among US adults, 6–27 December 2020

	Weighted ordered unadjusted ORs		Weighted ordered adjusted ORs	
	OR (95% CI)	P value	aOR (95% CI)	P value
Demographic characteristics				
Gender (reference: Male)				
Female	**1.63 (1.37, 1.94)**	**<0.0001**	**1.61 (1.35, 1.91)**	**<0.0001**
Age group, years (reference: ≥65)				
18–24	**4.28 (2.76, 6.62)**	**<0.0001**	**3.33 (2.09, 5.29)**	**<0.0001**
25–34	**3.00 (2.14, 4.22)**	**<0.0001**	**2.25 (1.52, 3.32)**	**<0.0001**
35–44	**1.97 (1.43, 2.71)**	**<0.0001**	**1.71 (1.19, 2.45)**	**0.0034**
45–54	**2.42 (1.68, 3.47)**	**<0.0001**	**2.13 (1.45, 3.13)**	**0.0001**
55–64	**1.64 (1.15, 2.33)**	**0.0064**	**1.52 (1.04, 2.23)**	**0.030**
Race and ethnicity (reference: White, non-Hispanic)				
Black, non-Hispanic	**1.33 (1.02, 1.72)**	**0.035**	1.16 (0.89, 1.52)	0.27
Asian, non-Hispanic	1.23 (0.97, 1.55)	0.091	**1.47 (1.12, 1.91)**	**0.0048**
Other race(s), non-Hispanic	1.39 (0.90, 2.13)	0.13	1.33 (0.95, 2.10)	0.21
Hispanic or Latino	**1.70 (1.28, 2.26)**	**0.0003**	**1.69 (1.26, 2.27)**	**0.0005**
Education attainment (reference: After bachelor's degree)				
High school diploma or less	**1.80 (1.32, 2.44)**	**0.0002**	1.30 (0.94, 1.79)	0.11
College or some college	**1.44 (1.19, 1.73)**	**0.0001**	**1.23 (1.01, 1.51)**	**0.044**
Employment and unpaid caregiving characteristics				
Per cent of paid work completed remotely (reference: 90%–100%)				
0%–10%	**1.39 (1.11, 1.74)**	**0.0044**	**1.28 (1.00, 1.65)**	**0.054**
11%–49%	**1.55 (1.21, 1.99)**	**0.0005**	**1.36 (1.05, 1.76)**	**0.018**
50%–89%	**1.38 (1.02, 1.86)**	**0.038**	1.18 (0.87, 1.62)	0.29
Types of shifts (reference: Day shift only)				
Evening shift only	**2.05 (1.38, 3.04)**	**0.0003**	**1.64 (1.12, 2.41)**	**0.011**
Night shift only	**1.64 (1.14, 2.36)**	**0.0072**	**1.50 (1.05, 2.13)**	**0.024**
Multiple types of shifts	1.26 (0.98, 1.62)	0.068	1.10 (0.85, 1.43)	0.47
Unpaid caregiver status (reference: No)				
Caregiver for adults only	**1.45 (1.11, 1.88)**	**0.0056**	1.26 (0.95, 1.66)	0.11
Caregiver for children only	**2.07 (1.54, 2.80)**	**<0.0001**	**1.87 (1.39, 2.51)**	**<0.0001**
Caregiver for children and adults	**1.30 (1.05, 1.61)**	**0.014**	1.30 (0.98, 1.73)	0.068

Boldface indicates statistical significance (p<0.05).
aOR, adjusted OR.

(eg, evening vs day shift, 42.9%, 22.3%; aOR=1.6, 95% CI 1.1–2.4) and lesser remote work (eg, 11%–49% vs 90%–100%, 30.6%, 17.9%; aOR=1.4, 95% CI 1.1–1.8). Unpaid caregivers for children also had greater odds of burnout than non-caregivers (37.1%, 19.0%; aOR=1.9, 95% CI 1.4–2.5).

Regarding sleep, 1762 (58.2%) respondents reported sufficient sleep duration (>7 hours/day), while 701 (23.2%) reported an average of 6–7 hours and 562 (18.6%) reported sleeping <6 hours (table 3). Overall, 555 (18.3%) respondents screened positive for recent insomnia symptoms, while 625 (20.6%) reported an insomnia diagnosis (318 (10.1%) with treatment). Current diagnoses of sleep apnoea and shift work disorder were reported by 687 (22.7%) and 544 (18.0%) respondents, respectively.

Sleep characteristics associated with increased odds of more severe occupational burnout included insufficient sleep duration and impaired sleep, as increased odds were found for those with daily sleep duration <7 hours compared with >7 hours (eg, <6 hours, 36.5%, 22.0%; aOR=1.9, 95% CI 1.5–2.4) and for those who screened positive for insomnia symptoms (38.5%, 22.2%, aOR=1.8, 95% CI 1.4–2.3) (tables 3 and 4). Additionally, odds of more severe burnout symptoms were higher among individuals who had diagnosed sleep or circadian disorders (insomnia, obstructive sleep apnoea, shift work disorder)

Table 3 Employed US adult respondent sleep characteristics and prevalence of burnout symptoms, 6–27 December 2020

	Respondents	Positive screen for burnout symptoms
	n (%)	n (%)
Total	3026 (100)	762 (25.2)
Sleep characteristics		
Sleep duration (hours)		
>7	1762 (58.2)	388 (22.0)
6–7	701 (23.2)	169 (24.1)
<6	562 (18.6)	205 (36.5)
Insomnia symptoms		
No	2471 (81.7)	548 (22.2)
Yes	555 (18.3)	214 (38.5)
History with diagnosed insomnia		
Never	2065 (68.2)	434 (21.0)
Yes, in the past, but not now	336 (11.1)	141 (41.9)
Yes, untreated	318 (10.5)	113 (35.7)
Yes, treated	307 (10.1)	74 (24.0)
History with diagnosed obstructive sleep apnoea		
Never	2120 (70.1)	464 (21.9)
Yes, in the past, but not now	218 (7.2)	88 (40.4)
Yes, untreated	421 (13.9)	138 (32.9)
Yes, treated	266 (8.8)	71 (26.7)
History with diagnosed shift work disorder		
Never	2297 (75.9)	508 (22.1)
Yes, in the past, but not now	184 (6.1)	70 (38.0)
Yes, untreated	317 (10.5)	122 (38.4)
Yes, treated	227 (7.5)	62 (27.2)

Table 4 Sleep characteristics associated with burnout symptoms among US adults, 6–27 December 2020

	Weighted ordered unadjusted ORs		Weighted ordered adjusted ORs	
	OR (95% CI)	P value	aOR (95% CI)	P value
Sleep duration, hours (reference: >7)				
6–7	**1.33 (1.09, 1.63)**	**<0.0001**	**1.45 (1.18, 1.79)**	**0.0005**
<6	**1.94 (1.53, 2.46)**	**0.0058**	**1.91 (1.51, 2.40)**	**<0.0001**
Insomnia symptoms (reference: No)				
Yes	**1.82 (1.43, 2.32)**	**<0.0001**	**1.75 (1.36, 2.25)**	**<0.0001**
History of diagnosed insomnia (reference: Never)				
Yes, in the past, but not now	**2.17 (1.57, 2.98)**	**<0.0001**	**1.99 (1.44, 2.77)**	**<0.0001**
Yes, untreated	**2.02 (1.51, 2.69)**	**<0.0001**	**2.05 (1.49, 2.83)**	**<0.0001**
Yes, treated	0.83 (0.58, 1.19)	0.31	0.90 (0.62, 1.30)	0.56
History of diagnosed obstructive sleep apnoea (reference: Never)				
Yes, in the past, but not now	**1.69 (1.14, 2.51)**	**0.0094**	**1.68 (1.11, 2.55)**	**0.015**
Yes, untreated	**1.57 (1.22, 2.02)**	**0.0005**	**1.56 (1.16, 2.10)**	**0.0035**
Yes, treated	1.09 (0.75, 1.58)	0.65	1.20 (0.83, 1.74)	0.34
History of diagnosed shift work disorder (reference: Never)				
Yes, in the past, but not now	**1.61 (1.12, 2.32)**	**0.01**	**1.50 (1.01, 2.23)**	**0.043**
Yes, untreated	**1.79 (1.31, 2.45)**	**0.0003**	**1.81 (1.24, 2.62)**	**0.0019**
Yes, treated	0.99 (0.66, 1.48)	0.95	0.98 (0.65, 1.47)	0.91

Boldface indicates statistical significance (p<0.05).
aOR, adjusted OR.

who were not receiving treatment or taking mediation compared with individuals who were not diagnosed with these disorders, but not among those with these diagnosed sleep or circadian disorders who were receiving treatment or taking medication (tables 3 and 4).

Employed US adults who were experiencing burnout symptoms had greater odds of less frequently adhering with COVID-19 health behaviours (table 5). Adjusting for demographic and employment characteristics, those who were experiencing burnout symptoms had greater odds of having less frequently worn a mask when in public (aOR=1.7, 95% CI 1.3–2.1), practised hand hygiene (aOR=2.1, 95% CI 1.7–2.7), avoided gatherings of ≥10 persons (aOR=1.4, 95% CI 1.1–1.7) or maintained a 6-foot physical distance from others (aOR=1.3, 95% CI 1.1–1.6); all p<0.05. Individuals with burnout symptoms also had higher odds of being less likely to obtain a COVID-19 test if they thought they may be infected with SARS-CoV-2 (aOR=1.4, 95% CI 1.1–1.8, p=0.0096).

DISCUSSION

More than one-quarter of 3026 employed US adult respondents were experiencing occupational burnout symptoms in December 2020. Occupational burnout was associated with less frequent practice of COVID-19 prevention behaviours, including mask usage. Women, younger adults, unpaid caregivers, Hispanic or Latino adults and those working more on-site versus remotely more commonly experienced burnout symptoms than employed adults in comparator demographic groups. Working night and evening shifts, short sleep duration and insomnia symptoms were also associated with burnout symptoms. Finally, individuals with untreated sleep or circadian disorders, but not those with such disorders receiving treatment, had greater odds of burnout symptoms than those without these disorders.

Burnout symptoms were associated with reduced engagement in personal COVID-19 protective behaviours, as employees experiencing occupational burnout symptoms had greater odds of less frequent practice of behaviours to protect against COVID-19, including mask usage, practice of hand hygiene, avoidance of in-person gatherings and maintenance of physical distance. Reduced engagement in COVID-19 protective behaviours, which persisted after adjusting for demographic and employment characteristics, provides further evidence of adverse consequences of the occupational hazard of burnout.

To our knowledge, this study is the first to identify the negative association between burnout symptoms and COVID-19-recommended health behaviours in a general occupational sample, revealing associations that align with

Table 5 Associations of burnout symptoms and non-adherence with COVID-19 prevention behaviours among employed US adult respondents, 6–27 December 2020

	Less frequently having:								Less likely to have:	
	Worn a mask in public		Practised hand hygiene		Avoided gatherings of ≥10 persons		Maintained physical distance		Obtained a COVID-19 test if potentially infected	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Unadjusted										
Burnout symptoms	**2.05 (1.64, 2.58)**	**<0.0001**	**2.2 (1.77, 2.74)**	**<0.0001**	**1.72 (1.40, 2.12)**	**<0.0001**	**1.51 (1.24, 1.83)**	**<0.0001**	**1.7 (1.32, 2.20)**	**<0.0001**
Adjusted										
Burnout symptoms	**1.67 (1.33, 2.09)**	**<0.0001**	**2.14 (1.71, 2.67)**	**<0.0001**	**1.41 (1.14, 1.73)**	**0.0014**	**1.29 (1.05, 1.58)**	**0.014**	**1.41 (1.09, 1.83)**	**0.0096**

Boldface indicates statistical significance (p<0.05).

prepandemic burnout and safety practice research.[20 21] Critically, our findings extend occupation-specific and hand hygiene-specific findings during the COVID-19 pandemic, including associations between burnout symptoms and (1) reduced hand hygiene among healthcare workers in China,[34] (2) reduced personal protective equipment adherence and hand hygiene among healthcare workers in Malaysia[35] and (3) reduced handwashing behaviours among restaurant kitchen chefs in China.[36] Interestingly, a moderation analysis conducted on frontline healthcare professionals in Pakistan found that high levels of handwashing buffered the negative influence of burnout on mental health,[37] identifying another relation that merits attention.

Our findings also add to prepandemic literature describing reduced healthcare-seeking behaviours commonly reported among individuals with burnout.[18 19] Notably, we found that if affected by burnout, employees were less likely to obtain a COVID-19 test if potentially infected. Amidst a broader observation of deferred or neglected medical care during the pandemic,[38 39] whether burnout has also influenced other healthcare-seeking behaviour at this time is unknown. Community-supported and employer-supported programmes targeted towards reducing occupational burnout may improve adherence with COVID-19 health behaviours among employees, which could benefit both employees and those with whom they interact. Moreover, clinicians and providers should recognise the reduced healthcare seeking associated with burnout symptoms and could consider proactive screening in populations that disproportionately experience burnout.

Occupational burnout symptoms were disproportionately experienced by specific populations, including women, younger adults and unpaid caregivers, which is consistent with prepandemic data[1] and evidence from Germany during the COVID-19 pandemic.[40] Importantly, Meyer *et al* found that employed women with job autonomy and partner support had better psychological health during the pandemic, highlighting value in protective factors. Our findings of burnout among young persons and unpaid caregivers closely align with broader mental health research that has revealed that these populations have disproportionately experienced adverse mental health symptoms, including depression and anxiety symptoms.[26–30] Occupational burnout symptoms may be another area of concern for these populations. There is debate regarding the extent to which burnout symptoms may overlap with depression and anxiety symptoms,[5] yet recent findings show these conditions to be distinct,[41] and, to our knowledge, there is no evidence of this overlap using the Mini-Z burnout measure administered in the current study.

Further research is needed to understand and alleviate contributors to burnout within disproportionately affected populations in the workforce (eg, women, caregivers, young adults). Intervention efforts could focus on restructuring social and economic systems to reduce gender and racial pay gaps,[42 43] which create inequitable opportunities for these populations to have living wages. Concurrent efforts could focus on developing support systems for additional factors that might more broadly contribute to occupational burnout, including essential work in low-wage jobs and economic insecurities for younger persons, increased need for daytime childcare for those in virtual-learning environments and disruptions to the provision of care for adults. For employers, considerations could include improving access to and accessibility of employment-based mental health services and providing mindfulness-based programmes or seeking to improve recognition among employees given promising findings of reduced burnout associated with these measures.[44 45]

More broadly, as outlined in the 2022 US Surgeon General's Advisory on Health Worker Burnout,[46] addressing occupational burnout will require recognition that burnout is a distinct workplace phenomenon demanding system-oriented, organisational-level solutions beyond individual-level support. Compared with day shift workers, employees working evening and night shifts had higher odds of burnout symptoms. These results are consistent with prepandemic data,[12] and with recent research conducted during COVID-19 in frontline healthcare workers.[47] Shift work is increasingly common across occupations, including those outside of healthcare and other frontline professions.[48] Therefore, by including

employees from a range of job sectors, our findings highlight the association between burnout symptoms and night or evening shift work among the general working population during the pandemic. Of further relevance to the general working population is the potential impact of working remotely on burnout symptoms, given over one-third of employed adults transitioned to remote work during the pandemic.[11] Working remotely only a small amount of time with most of their work completed on-site, less extensive remote work has been shown to result in lower job satisfaction and higher work–family conflict,[49] which are factors shown to increase the risk of burnout.[50] Considering 30% of our sample reported combined on-site and remote work arrangements, our findings may have implications for enhanced monitoring of burnout symptoms in these sectors of the workforce.

Beyond demographic and employment characteristics, employed adults with sleep deficiency or insomnia symptoms had higher odds of more severe burnout symptoms. The relationship between sleep deficiency and burnout symptoms is consistent with findings from a study of a US adult general population sample with objective wearable devices to measure sleep-wake data, in which persistently short sleep duration and sleep duration shortened during the pandemic were each associated with burnout, anxiety, and depression symptoms.[51] Additionally, untreated or potentially undiagnosed sleep or circadian disorders (ie, insomnia, obstructive sleep apnoea, shift work disorder) were associated with more severe burnout symptoms but treated diagnosed sleep and circadian disorders were not. Prepandemic research has reported similar relationships between untreated and undiagnosed sleep disorders and burnout symptoms in healthcare workers,[52] which, together with our findings, highlight the potential protective role that treatment of sleep and circadian disorders may have in reducing burnout symptoms. With sleep deficiency and undiagnosed and untreated sleep disorders common among US adults,[16] these findings suggest that employers may address burnout by sponsoring sleep disorder and sleep enhancement or fatigue reduction workplace health promotion programmes, which were offered by less than 10% of US worksites in 2017.[53] Clinicians and healthcare systems could also contribute to diagnosing and treating sleep disorders to mitigate burnout symptoms among broader health improvements. Improving sleep health may also reduce the economic impact of sleep deficiency, which was estimated to cost US businesses US$411 billion annually.[54]

Strengths of this study include assessment of burnout in a demographically representative sample of more than 3000 employed US adults spanning across occupations, use of a validated instrument to assess burnout symptoms and application of measures to reduce non-response bias during (demographic quota sampling) and after (survey weighting) data collection. Moreover, demographic, employment and sleep characteristics were comprehensively characterised and adjusted for in multivariable analyses, and multiple COVID-19 prevention behaviours were assessed and included in this analysis. Finally, a cross-sectional study design was used to eliminate potential for survivorship bias to influence relationships.[31]

Limitations of this study include the use of self-report data, which are subject to recall, response and social desirability biases, especially for COVID-19 health behaviours. Additionally, the single-item Mini-Z is validated to assess the emotional exhaustion dimension of occupational burnout; future studies could focus on the depersonalisation and reduced personal accomplishment dimensions. Moreover, the Mini-Z was validated in a sample of clinical and administrative primary care staff. Encouragingly, agreement and discrimination statistics from the validation study support the generalisability of the Mini-Z across occupations included in the validation study, though additional studies could characterise the psychometric properties of the Mini-Z across more diverse occupations. Moreover, cross-sectional findings do not demonstrate causality. While a comprehensive set of variables was included in multivariable analyses, confounding factors might partially account for relationships reported in this analysis. Finally, although quota sampling methods and survey weighting were employed to improve representativeness, this internet-based sample may not be fully representative of the 2020 employed adult US population.

CONCLUSION

In this demographically diverse sample of 3026 employed US adults, occupational burnout symptoms were more common among respondents who were of younger age or female gender, those with lesser remote work or with unpaid caregiver roles and those with insufficient or impaired sleep. In turn, occupational burnout symptoms were associated with non-adherence with key COVID-19 prevention behaviours, including hand hygiene, mask usage, physical distancing, avoiding gatherings and obtaining COVID-19 tests if potentially infected. Future studies should explore the extent to which employers can support the health of their employees by implementing strategies to address occupational burnout, such as promotion of work–life balance and sponsorship of sleep enhancement programmes and other wellness promotion programmes. Addressing occupational burnout and providing resources to reduce burnout among employees could reduce non-adherence with COVID-19 prevention behaviours.

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